Upper Wakulla River and Wakulla Spring Basin Management Action Plan

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

with participation from the
Wakulla Stakeholders

June 2018

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Acknowledgments

The Florida Department of Environmental Protection adopted the *Upper Wakulla River and Wakulla Spring 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. Upper Wakulla River and Wakulla Spring stakeholders

Type of Entity	Name
Responsible Stakeholders	Agricultural Producers Leon County Wakulla County City of Tallahassee Florida Department of Transportation District 3 Gadsden County Jefferson County City of Gretna City of Midway City of Quincy Town of Havana Federal Correctional Institution, Tallahassee Florida Agricultural and Mechanical University Florida State University Tallahassee Community College Talquin Electric Cooperative
Responsible Agencies	Florida Department of Agriculture and Consumer Services Florida Department of Environmental Protection, including Wakulla Spring State Park Florida Department of Health Leon County Health Department Northwest Florida Water Management District Wakulla County Health Department
OSTDS Advisory Committee	City of Tallahassee Community Leader Florida Department of Health Leon County Florida Department of Health Wakulla County Florida Onsite Wastewater Association Friends of Wakulla Springs Home Builder Industry Leon County Talquin Electric Cooperative Wakulla County Wakulla Springs Alliance

Type of Entity	Name
Other Interested Stakeholders	1000 Friends of Florida Citizens Florida Department of Economic Opportunity Friends of Wakulla Spring Wakulla Spring Alliance

See **Appendix A** for links to important sources referenced in this document. For additional information on total maximum daily loads and nutrient management strategies for the Upper Wakulla River and Wakulla Spring, 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
cfs	Cubic Feet Per Second
CMAQ	Community Multiscale Air Quality
CRF	Controlled-Release Fertilizer
DEP	Florida Department of Environmental Protection
DMR	Discharge Monthly Report
DO	Dissolved Oxygen
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
FLUCCS	Florida Land Use Cover and Forms Classification System
FOWA	Florida Onsite Wastewater Association
F.S.	Florida Statutes
FSAID	Florida Statewide Agricultural Irrigation Demand
FY	Fiscal Year
FYN	Florida Yards and Neighborhoods
GIS	Geographic Information System
gpd	Gallons Per Day
HA	Habitat Assessment
IA	Implementation Assurance
ILG	Irrigation Lands Geodatabase
IV	Implementation Verification
in/yr	Inch Per Year
lb	Pound
lb-N/yr	Pounds of Nitrogen Per Year
lb-N/yr/ac	Pounds of Nitrogen Per Year Per Acre
LID	Low-Impact Development
LVS	Linear Vegetation Survey
LW	Livestock Waste
MFL	Minimum Flow and Level
mgd	Million Gallons Per Day
mg/L	Milligrams Per Liter

N	Nitrogen
N/A	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
NPDES	National Pollutant Discharge and Elimination System
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
OFW	Outstanding Florida Water
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
RD	Rural Development
RIB	Rapid Infiltration Basin
RPS	Rapid Periphyton Survey
SBIO	DEP Statewide Biological Database
SCI	Stream Condition Index
SOP	Standard Operating Procedure
STF	Sports Turfgrass Fertilizer
STORET	Florida Storage and Retrieval System
SWFWMD	Southwest Florida Water Management District
SWIM	Surface Water Improvement and Management
TDEP	Total Atmospheric Deposition Model
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
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
WWTP	Wastewater Treatment Plant
yr	Year

Executive Summary

Upper Wakulla River and Wakulla Spring 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. Wakulla Spring is an impaired first magnitude OFS.

The Upper Wakulla River and Wakulla Spring are located in in the Big Bend area of Florida in Gadsden, Jefferson, Leon, and Wakulla Counties. The Upper Wakulla River and Wakulla Spring Basin Management Action Plan (BMAP) focuses on the portion of the springshed located in Florida, referred to as the BMAP area (**Figure ES-1**). The BMAP area is approximately 848,445 acres, or 1,325 square miles. Wakulla Spring is the main source of water to Wakulla River, which flows southward and joins the St. Marks River before discharging into Apalachee Bay. The BMAP area extent of Upper Wakulla River ends at the Highway 98 Bridge. Major centers of population in the basin include the cities of Tallahassee, Woodville, and Crawfordville.

Upper Wakulla River and Wakulla Spring Priority Focus Areas (PFAs)

There are two PFAs (see **Appendix C**) in the Upper Wakulla River and Wakulla Spring Basin that are subareas within the BMAP boundary. These PFAs represent the areas in the basin where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and Wakulla Spring.

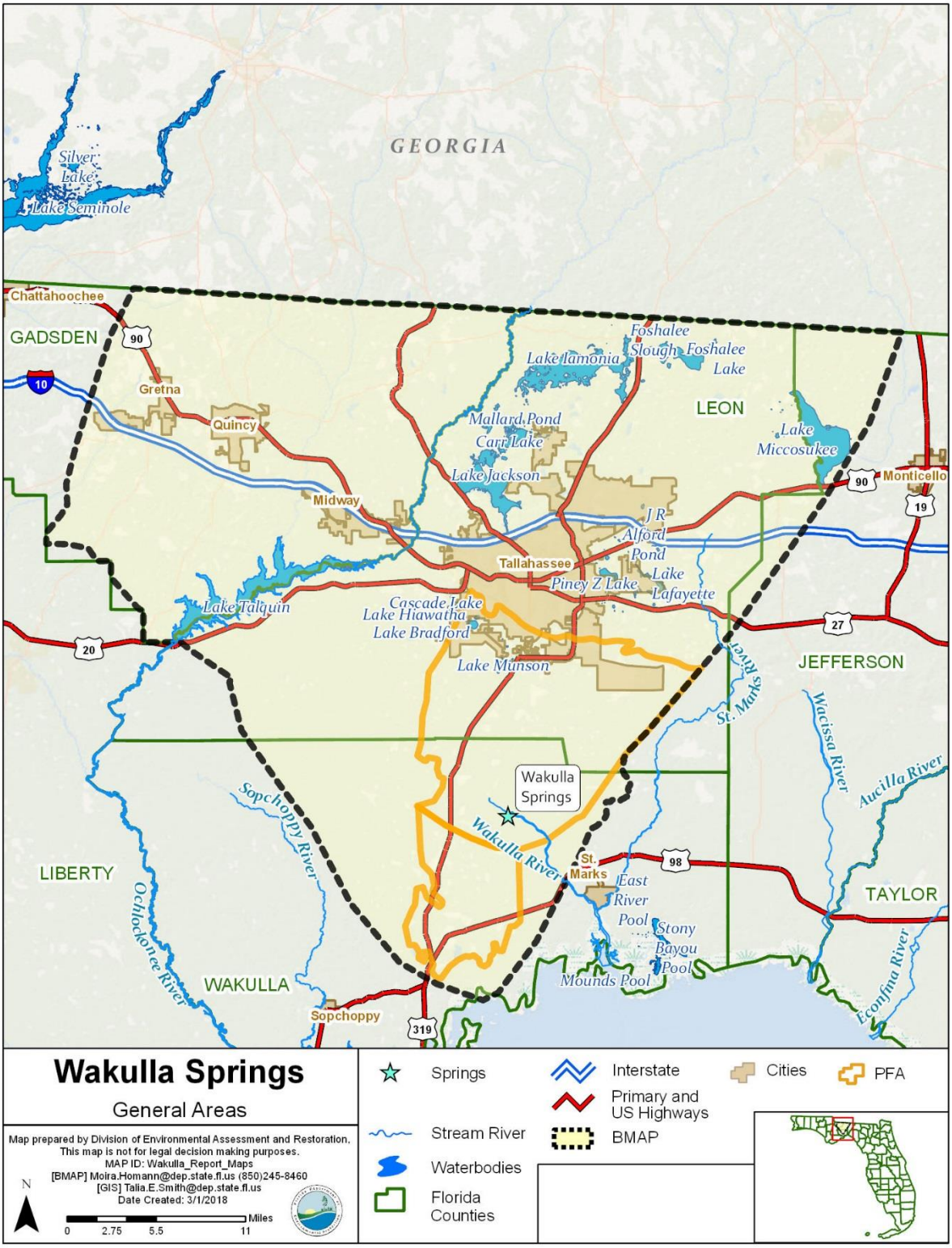

Figure ES-1. Upper Wakulla River and Wakulla Spring BMAP and PFA boundaries

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

Wakulla Spring is the main source of water to the Wakulla River, which was identified as impaired because of a biological imbalance caused by excessive concentrations of nitrate in the water. In 2012, a total maximum daily load (TMDL) for nitrate was developed as a water quality restoration target for the Upper Wakulla River. The TMDL established a monthly average nitrate target of 0.35 milligrams per liter (mg/L).

Onsite sewage treatment and disposal systems (OSTDS or septic systems; the terms are used interchangeably throughout this document) represent 34 % of the estimated nitrogen loading to groundwater, atmospheric deposition 27 %, and farm fertilizer (FF) 21 % of the total loading to groundwater based on the DEP analysis conducted using the Nitrogen Source Inventory Loading Tool (NSILT).

The total load reduction required to meet the TMDL at the spring vent is 139,564 pounds of nitrogen per year (lb-N/yr). To measure progress towards achieving the necessary load reduction, DEP is establishing the following milestones:

- Initial reduction of 41,869 lb-N/yr (30 %) within 5 years.
- An additional 69,782 lb-N/yr (50 %) within 10 years.
- The remaining 27,913 lb-N/yr (20 %) within 15 years.
- For a total of 139,564 lb-N/yr within 20 years.

The policies and submitted projects included within this BMAP are estimated to achieve a reduction of 134,107 to 234,567 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. 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. This may include expanding the area to which the OSTDS remediation policies apply; any such change, however, would be incorporated into an updated BMAP through a formal adoption process.

For the list of projects to improve water quality, see **Appendix B**. Included are owner-implemented best management practices (BMPs) for FF, livestock waste (LW), sports turfgrass (STF); wastewater treatment facility (WWTF) upgrades; projects to reduce urban turfgrass fertilizer (UTF) application; and OSTDS 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 and to restore the Upper Wakulla River and Wakulla Spring to a sustainable biological community that is resilient to the impacts of existing and continuing human use and development on the land from which Wakulla Spring draws its waters. 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. Local governments and utilities are expected to develop master wastewater treatment feasibility analyses within 5 years to identify specific areas to be sewered or to have enhanced nitrogen reducing OSTDS within 20 years of BMAP adoption. The OSTDS remediation plan is incorporated as **Appendix D**.

- **Existing OSTDS** – Upon completion of the master wastewater treatment feasibility analyses, FDOH rulemaking, and funding program for homeowners included in the OSTDS remediation plan, but no later than five years after BMAP adoption, modification or repair permits issued by FDOH for all OSTDS within the PFAs on all lots will require enhanced treatment of nitrogen, unless sewer connections will be available based on a BMAP-listed project. All OSTDS subject to the policy must include enhanced treatment of nitrogen no later than 20 years after BMAP adoption.

- **WWTFs** − The effluent standards listed in **Table ES-1** will apply to all new and existing WWTFs in PFA1 and PFA2.

Table ES-1. WWTF effluent standards

gpd = Gallons per day

95 % of the Permitted Capacity (gpd)	Nitrogen Concentration Limits for Rapid Infiltration Basins (RIBs) and Absorption Fields (mg/L)	Nitrogen Concentration Limits for All Other Land Disposal Methods (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.

- **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 implementation of additional agricultural projects or 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.

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. Wakulla Spring is an impaired first magnitude OFS. Development of the basin management action plan (BMAP) to meet the new requirements of the Florida Springs and Aquifer Protection Act for the Upper Wakulla River and Wakulla Spring Basin was initiated in 2017.

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. Wakulla River and the Wakulla Spring 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 springs and rivers and can produce human health problems, foul beaches, inhibit navigation, and reduce the aesthetic value of resources.

DEP adopted a nutrient TMDL for the Upper Wakulla River in 2012 (**Table 1**)**.** The TMDL established a target of a monthly average of 0.35 milligrams per liter (mg/L) of nitrate to be protective of the aquatic flora and fauna. The period of record for water quality data evaluated for the TMDL was January 1, 2000 through June 30, 2007.

Table 1. Restoration target for the Upper Wakulla River

Waterbody	Waterbody Identification (WBID)	Parameter	TMDL (mg/L)
Upper Wakulla River	1006	Nitrate, monthly average	0.35

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 Outstanding Florida Springs.

1.4 BMAP Area

The BMAP area (**Figure 1**) comprises 848,445 acres located in the Big Bend area of Florida in Gadsden, Jefferson, Leon, and Wakulla Counties. The BMAP area contains one OFS and one other spring.

This area includes the surface water basin as well as the groundwater contributing areas for the spring (or springshed). The springshed for the OFS was reviewed by Northwest Florida Water Management District (NWFWMD) 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 Areas (PFAs)

In compliance with the Florida Springs and Aquifer Protection Act, this BMAP delineates two PFAs, which are defined as the areas 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 PFAs provide a guide for focusing restoration strategies where science suggests these efforts will most benefit the springs. The documents that describe the delineation process for each PFA are on the DEP website. The link to the PFA documentation 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 PFAs (see **Appendix C**).

Following BMAP adoption, DEP will ensure that the Geographic Information System (GIS) files associated with the PFA boundaries are available to the public on the DEP Map Direct webpage.

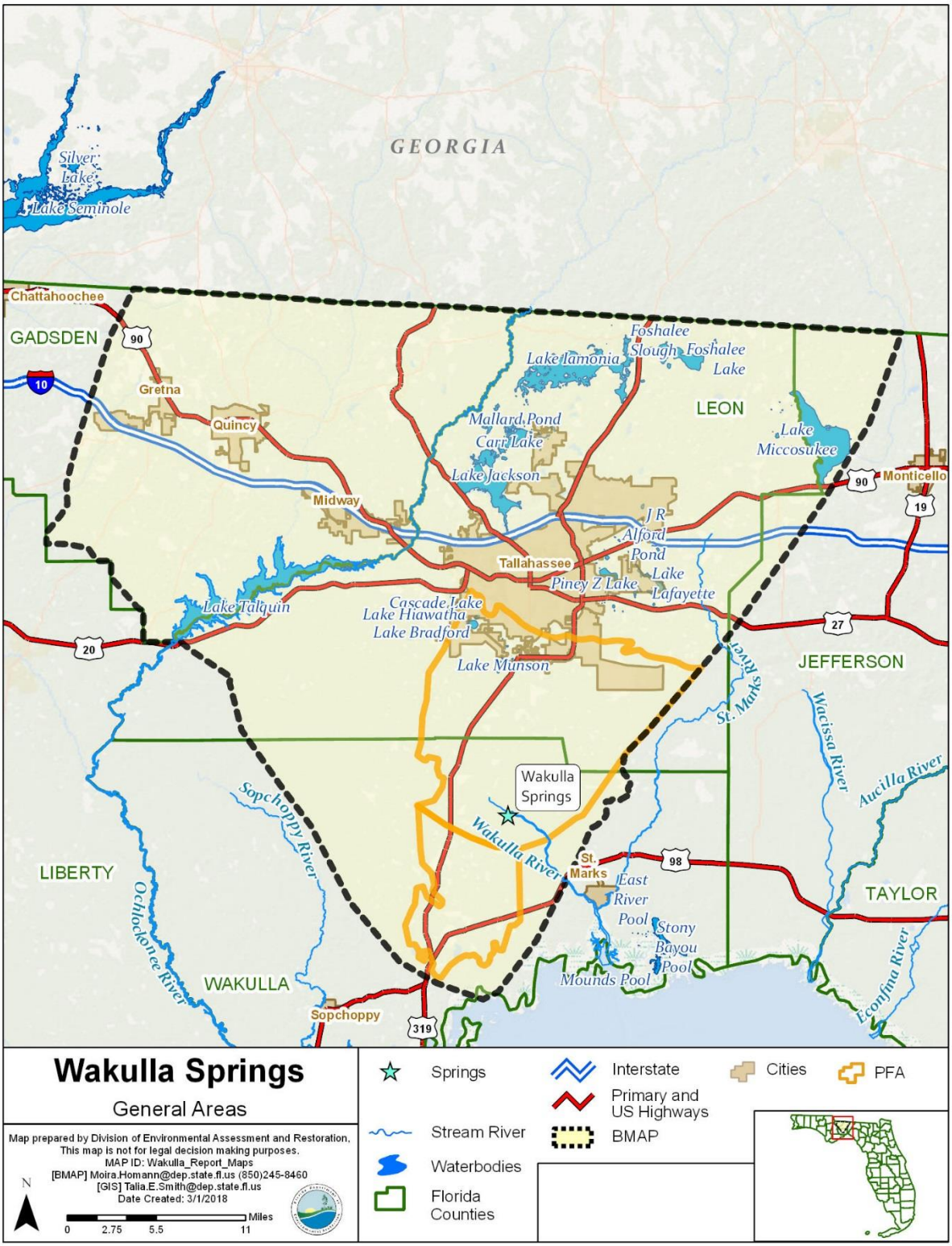

Figure 1. Upper Wakulla River and Wakulla Spring BMAP area and PFA boundaries

1.5.2 Additional Requirements

In accordance with Section 373.811, F.S., the following activities are prohibited in the PFAs:

- New domestic wastewater disposal facilities, including rapid infiltration basins (RIBs), with permitted capacities of 100,000 gallons per day (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 throughout 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 PFAs, the aquifer contributing to the spring 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 PFAs, 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 Florida Department of Agriculture and Consumer Services (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 Wakulla Spring, 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 TMDL. 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 Upper Wakulla River and Wakulla Spring BMAP, DEP held a series of 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 of the 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 17, 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 Upper Wakulla River and Wakulla Spring, described below.

2.1.1 Nutrients in the Springs and Spring Systems

DEP developed Nitrogen Source Inventory Loading Tool (NSILT) to provide information on the major sources of nitrogen in the groundwater contributing area and spring 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:

- Confined (0 to 2 inches per year [in/yr]).
- Semi-confined (3 to 8 in/yr).
- Unconfined (9 to 20 in/yr).

In the NSILT, 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 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.

Phosphorus is naturally abundant in the geologic material underlying much of Florida and is often present in high concentrations in surface water and groundwater. Monitoring and evaluation of phosphorus and influences on the springs continues as the nitrate TMDLs are implemented.

2.1.2 Estimated Nitrogen Loads

Table 3 lists the estimated nitrogen loads to groundwater by source. 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 BMAP area

Nitrogen Source	Total Nitrogen Load to Groundwater in Pounds of Nitrogen Per Year (lb-N/yr)	% Contribution
OSTDS	272,313	34
UTF	77,282	10
Atmospheric Deposition	212,134	27
FF	161,985	21
Sports Turfgrass Fertilizer (STF)	15,398	2
LW	23,840	3
Wastewater Treatment Facility (WWTF)	26,697	3
Total	**795,386**	**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 pounds of nitrogen per year (lb-N/yr) was used to calculate the loading from OSTDS. The average household contribution was estimated based on 2010 U.S. Census Bureau data on the average number of people per household by county.

- **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 be re-evaluated periodically.

- **OSTDS Inventory and Loading Calculations** – The total number of OSTDS in the basin is estimated based on local information and Florida Department of Health (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.

- **PFAs** – The PFAs provide 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. Projects completed in the springshed after January 1, 2013, 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 TMDL 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 TMDL 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. Where feasible, 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. Septic systems represent 34 % of the nitrogen sources, FF 21 %, and UTF 10 %. Stormwater loading to groundwater is incorporated into the various source categories.

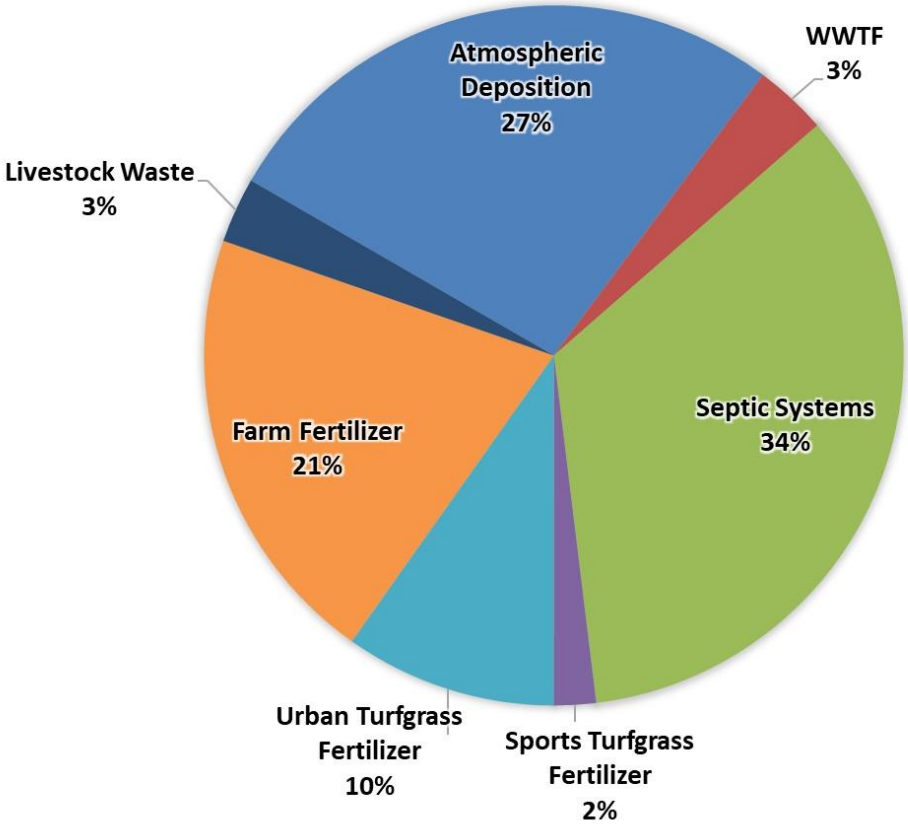

Figure 2. Loading to groundwater by source in the Upper Wakulla River and Wakulla Spring BMAP area

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 vent compared with the TMDL loading based on a target nitrate concentration of 0.35 mg/L. The difference between the spring vent loading and the TMDL loading estimate is the required reduction to meet the TMDL. 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 TMDL

Description	Nitrogen Loads (lb-N/yr)	Notes Regarding Data Used
Total Load at Spring Vent	701,411	Upper 95 % confidence interval - nitrate data and flow data from years 2014 to 2017 (814 cubic feet per second [cfs])
TMDL Load	561,847	TMDL target is 0.35 mg/L using the same flow data from years 2014 to 2017
Required Reduction	**139,564**	

Significant progress towards reducing nitrate loading at the spring vent has occurred since the TMDL was adopted in 2012. For example, the City of Tallahassee's AWT upgrade and other associated management practices achieved an approximate 80 % reduction in the nitrogen load to the land surface. These efforts are apparent in the decreasing nitrate trend at Wakulla Spring and are reflected in the decision to choose the 2014 to 2017 timeframe to determine current load conditions at the spring vent.

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. This may include expanding the area to which the OSTDS remediation policies apply; any such change, however, would be incorporated into an updated BMAP through a formal adoption process.

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 %)
41,869	69,782	27,913	**139,564**

2.2 Prioritization of Management Strategies

The management strategies listed in **Appendix B** and **Appendix D** 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 139,564 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 134,107 and 234,567 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 Upper Wakulla River and Wakulla Spring Basin.

Table 6. Summary of potential credits for the Upper Wakulla River and Wakulla Spring BMAP to meet the TMDL

Note: No reductions are estimated for atmospheric deposition sources.

Nitrogen Source	Credits to Load to Groundwater (lb-N/yr)	Description
OSTDS	77,277 – 112,943	Credits are based on lots of all sizes inside the PFAs being remediated by either enhancing onsite system or connecting to sewer. An estimated 7,787 lb-N/yr have been provided as OSTDS remediation projects which may be on these lots or in the larger BMAP area. Any projects outside the PFAs would add additional reductions to the estimates listed.
UTF	7,883	DEP approved credits (6 %) for public education activities as well as credits identified for stakeholder stormwater projects.
STF	1,449	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.
FF	24,298	15 % BMP credit on FF load to groundwater, assuming 100 % owner-implemented and verified BMPs on all fertilized lands
LW	2,384	10 % BMP credit on load to groundwater, assuming 100 % owner-implemented and verified BMPs at all livestock facilities.
WWTF	4,618	Achieved by BMAP WWTF policy for PFA1 and PFA2 and projects in metrics workbooks.

Nitrogen Source	Credits to Load to Groundwater (lb-N/yr)	Description
Total Credits from BMAP Policies and Submitted Projects	**117,908 – 153,574**	
Advanced Agricultural Practices and Procedures	16,199 – 80,933	Includes 10 % to 50 % reduction from 100 % of fertilized acres with a change in practice.
Total Credits	**134,107 – 234,567**	**Load reduction to meet the TMDL at the spring vent is 139,564 lb-N/yr.**

2.4 OSTDS Management Strategies

Overall, there are currently nearly 12,000 OSTDS in the PFAs, based on FDOH estimates. This BMAP lists nine specific projects (**Appendix B**) that reduce nitrogen loading from existing OSTDS on variably sized parcels by a total of 7,787 lb-N/yr. **Figure 3** shows the locations of all OSTDS in the BMAP area.

In addition to the nine listed projects, 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 Upper Wakulla River and Wakulla Spring BMAP area, OSTDS contribute more than 20 % of nonpoint source nitrogen pollution to the OFS. Per the Wakulla Spring NSILT, septic systems contribute 34 % pollutant loading in the springshed areas and 46 % of the nitrogen loading in the PFAs. Cumulatively, nitrogen loading from OSTDS within this springshed result in the significant degradation of groundwater that impacts the Upper Wakulla River and Wakulla Spring BMAP area. Therefore, the comprehensive remediation of OSTDS, consistent with the requirements of this BMAP, is necessary to prevent associated groundwater and surface water contamination so that the TMDL can ultimately be achieved and so that increases in nitrogen loads from future growth are limited. The OSTDS remediation plan is incorporated as **Appendix D**.

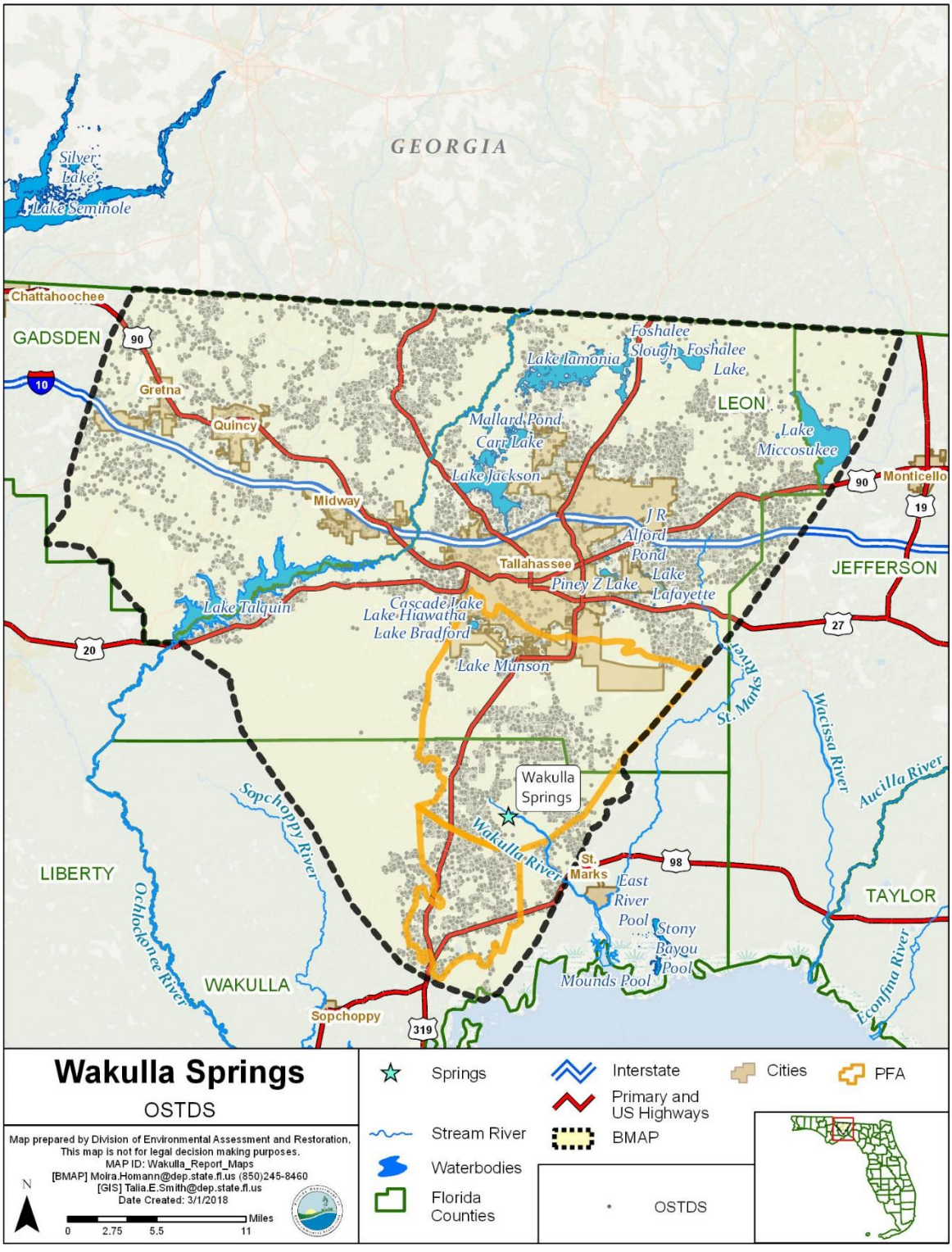

Figure 3. OSTDS locations in the Upper Wakulla River and Wakulla Spring BMAP area and PFAs

In addition to the actions outlined in the OSTDS remediation plan (incorporated into this BMAP as **Appendix D)**, remedial efforts on existing conventional OSTDS could achieve nitrogen reductions. **Table 7** summarizes the nitrogen inputs, attenuation and recharge factors, and loads to groundwater for a conventional OSTDS. The conventional OSTDS nitrogen input is based on a per capita contribution of 9.012 lb-N/yr. This value is multiplied by the estimated number of people using the system (i.e., 2.46 persons per household in counties within the BMAP). Percent reductions for enhanced or replaced systems are applied to the conventional OSTDS nitrogen groundwater loads to evaluate possible improvements to groundwater. Enhanced OSTDS can achieve an estimated 65 % improvement in the load to groundwater compared to a conventional system. OSTDS replaced by sewer reduce the conventional nitrogen inputs by an estimated 95 %, assuming a sewer connection to a WWTF meeting AWT levels.

The results show an estimated nitrogen reduction (i.e., credit) of 6.5 in unconfined areas, 2.9 in semi-confined areas, and 0.7 in confined areas for each enhanced OSTDS and an estimated nitrogen reduction of 9.5 in unconfined areas, 4.2 in semi-confined areas, and 1.1 in confined areas for each replaced OSTDS. Estimated costs for retrofitting (onsite treatment improvements) or removing (sewering) OSTDS range from $10,000 to $20,000 per system, which would be anticipated to be offset somewhat by cost-share from state funds. These costs can be refined as projects are completed and detailed cost data are available.

Table 7. Estimated individual OSTDS improvements to groundwater

Recharge Category	Conventional OSTDS Load To Groundwater (lb-N/yr/OSTDS)	Credit Per System (lb-N/yr/OSTDS) Enhanced OSTDS	Credit Per System (lb-N/yr/OSTDS) Replaced OSTDS
Nitrogen Input	22		
Attenuation (0.5)	11.1		
Confined (0.1)	1.1	0.7	1.1
Semi-Confined (0.4)	4.4	2.9	4.2
Unconfined (0.9)	10.0	6.5	9.5

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 and public education activities in place at the time of BMAP adoption, the associated credits for UTF reductions to groundwater are 3,111 lb-N/yr (see **Table 8**). 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 in place (see **Table 9**), with the estimated reduction to groundwater of 3,246 lb-N/yr.

Table 8. Current project credits to reduce UTF loading to groundwater

Project Category	Project Credits (lb-N/yr) Based on Management Actions Listed in Appendix B
Fertilizer Ordinances and Public Education Activities	3,111
Stormwater Improvements	3,246
Total Project Credits	**6,357**

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 (see **Table 9**).

If all the local governments implement the full suite of public education measures, a 4,637 lb-N/yr reduction can be achieved. Currently, these credits total 3,111 lb-N/yr. Thus, an additional 1,526 lb-N/yr reduction could be achieved through public education and source control efforts.

Table 9. 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	0.5	386
Pet Waste Ordinance	0.5	386
Landscape Ordinance	0.5	386
Irrigation Ordinance	0.5	386
FYN Program	3.0	2,318
Public Education Program	1.0	773
Total Possible Credits	**6.00**	**4,637**

Appendix E contains technical support information that further explains the concepts presented in this section, including nitrogen loading by source category, reduction obligations, and management strategies.

2.6 STF Management Strategies

Sports turfgrass areas fall into two main categories that are evaluated separately: golf courses and sporting facilities (such as baseball, football, soccer, and other fields). There are 12 golf courses covering 4,043 acres in the Upper Wakulla River and Wakulla Spring BMAP area. The majority of the golf course acreage is located in semi-confined areas (2,851 acres) or unconfined areas (997 acres). The majority of the sporting facility acreage is located in semi-confined areas (186 acres) or unconfined areas (108 acres).

2.6.1 Prioritized Management Strategies and Milestones

DEP will work with sports field managers and golf course superintendents to ensure relevant BMP implementation and to estimate the 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 sports turf. The estimated credit for better management of non-golf sports turfgrass is 6 % of the starting load to groundwater. Based on these approaches, the initial reduction from STF sources is 1,449 lb-N/yr, as listed in **Table 10**.

Table 10. 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	1,313
Sports Fields BMPs	6	136
Total Possible Credits		**1,449**

2.7 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 62,696 acres of land in the springshed area are considered agricultural, of which 4,998 acres are livestock lands, 31,119 acres are identified as crop fertilizer lands, and 26,579 acres are identified as both fertilizer croplands and livestock lands.

2.7.1 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 161,985 lb-N/year, or 21 % of the total nitrogen load to groundwater in the BMAP area. FF includes commercial inorganic fertilizer applied to row crops, field crops, pasture, and hay fields.

2.7.2 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 23,840 lb-N/year, or 3 % of the total nitrogen load to groundwater in the BMAP area.

2.7.3 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 or NWFWMD 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 priority focus areas 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 to 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, Notices of Intent (NOIs) covered 39,153 acres in the Upper Wakulla River and Wakulla Spring BMAP area (39,153 of 62,696 agricultural acres). 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 24,298 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 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 all livestock operations, owner-implemented BMPs are expected to achieve a reduction of 2,384 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 26,682 lb-N/yr.

2.7.4 Additional Agricultural Reduction Options

Further reductions may be achieved through implementing additional agricultural projects or practices, including land acquisition and conservation easements. NWFWMD is 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, changing land use to fallow or native landscape, or changing 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 11 identifies possible projects and practices with the estimated acreages. FDACS used FSAID IV to identify crop types and acreages where projects and practices could potentially be implemented.

Table 11. Estimated acreages for additional agricultural projects or practices

Action	Acreage
Precision Irrigation	192
Soil Moisture Probes	480
Precision Fertilization	292
Controlled Release Fertilizer	192
Cover Crops	3,290

The projects and practices listed in **Table 11** are a component of the reductions to groundwater that could be achieved through changes in practices (**Table 12**).For example, a 75 % reduction of fertilizer loss to groundwater on 25 % of the fertilized lands would result in an estimated reduction of 30,372 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 12. Potential for additional load reductions to groundwater

% of Fertilized Acres with a Change in Practice	Amount of Fertilized Acres with a Change in Practice	100 % Reduction in Load to Ground-water (lb-N/yr reduced)	75 % Reduction in Load to Ground-water (lb-N/yr reduced)	50 % Reduction in Load to Ground-water (lb-N/yr reduced)	25 % Reduction in Load to Ground-water (lb-N/yr reduced)	10 % Reduction in Load to Ground-water (lb-N/yr reduced)
100	57,698	161,985	121,489	80,993	40,496	16,199
75	43,274	121,489	91,117	60,744	30,372	12,149
50	28,849	80,993	60,744	40,496	20,248	8,099
25	14,425	40,496	30,372	20,248	10,124	4,050
10	5,770	16,199	12,149	8,099	4,050	1,620

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 funding is made available. The acreages provided by FDACS are preliminary estimates of the maximum acreages and 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.

2.8 WWTF Management Strategies

In the Upper Wakulla River and Wakulla Spring BMAP area, treated effluent containing nitrogen is discharged to sprayfields, RIBs, and absorption fields, and is reused for irrigation water. The nitrogen load from WWTFs is 26,697 lb-N/year. The discharge location (such as proximity to the spring, highly permeable soils, etc.) and level of wastewater treatment are important factors to consider when calculating 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 Upper Wakulla River and Wakulla Spring BMAP area, including 8 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 Upper Wakulla River and Wakulla Spring BMAP area with discharges greater than 0.1 million gallons per day (mgd) and discharges less than 0.1 mgd.

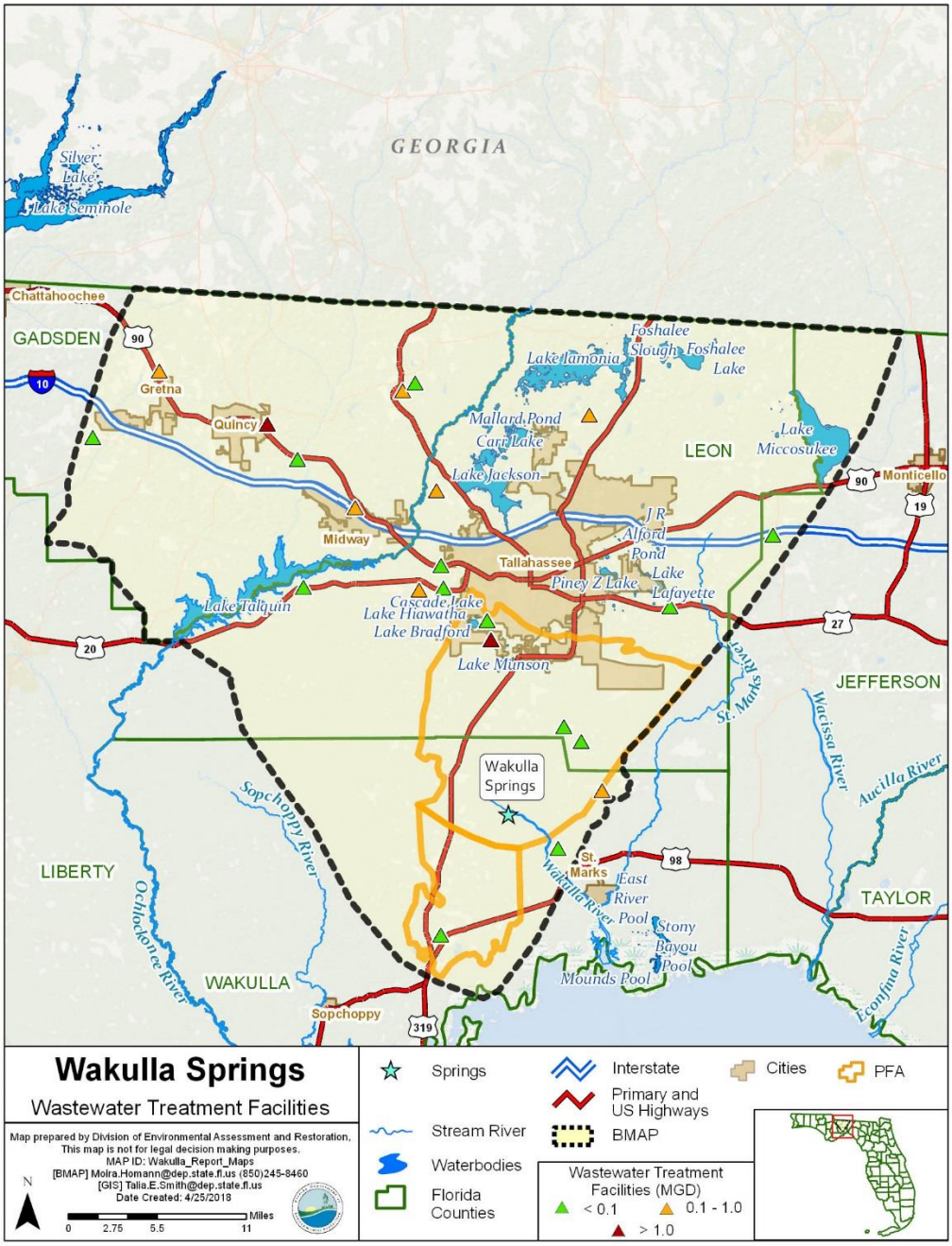

Figure 4. Locations of domestic WWTFs in the Upper Wakulla River and Wakulla Spring BMAP area

2.8.2 Wastewater Management Standards and Reuse Management

The Florida Springs and Aquifer Protection Act prohibits new domestic wastewater disposal facilities in the PFA, 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 issued to a facility that discharges within PFA1 and PFA2, 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 TMDL. 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 0.35 mg/L at the spring vent. 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 13** 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 issuance or renewal or no later than five years after BMAP adoption, whichever is sooner.

Table 13. Wastewater effluent standards for PFA1 and PFA2

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 (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 PFA1 or PFA2 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 reductions to be achieved through the implementation of these revised wastewater standards are 2,125 lb-N/yr. **Appendix B** contains detailed information on projects that have been completed, are underway, or are planned to reduce nitrogen loading from WWTFs.

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 2.7**), 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 Upper Wakulla River and Wakulla Spring BMAP. **Table 14** identifies known land conservation purchases made since January 1, 2000 in the BMAP area.

Table 14. Stakeholder conservation land purchases in the BMAP area

Lead Entity	Name of Conservation Purchase	Description	Cost	Acreage Acquired	Year Acquired
Florida Dept. of Environmental Protection, Division of State Lands	Bailey's Mill Conservation Easement	Bailey's Mill Conservation Easement is a privately owned easement managed by the FDEP located south of Lake Miccosukee and adjacent to the Letchworth Mounds Conservation Easement.	$1,982,531	436	2009
City of Tallahassee	Barnette W. Allen Nature Preserve	Barnette W. Allen Nature Preserve is a city park located in central Tallahassee southeast of Leon High School.	$1,050,000	9	2004
Northwest Florida Water Management District	Billingsley Conservation Easement	The Billingsley Conservation Easement is a privately owned easement managed by the NWFWMD located northeast of Tallahassee and east of the Miccosukee Canopy Road Greenway.	$880,000	195	2009
Northwest Florida Water Management District	Blueprint 2000 Conservation Easement	The Blueprint 2000 Conservation Easement is a privately owned easement managed by the NWFWMD located northwest of Lake Lafayette adjacent to the CSX Railroad.	Mitigation	133	2010
Northwest Florida Water Management District	Carlton Farms Conservation Easement	Carlton Farms Conservation Easement is a privately owned easement managed by the NWFWMD located adjacent to the Leon Sink Geological Area.	$101,535	62	2001
Northwest Florida Water Management District	Carpenter and Westmark Conservation Easement	Carpenter and Westmark Easement is a privately owned easement managed by the NWFWMD located adjacent to Spring Creek in the St. Marks Basin.	$315,000	354	2001
Northwest Florida Water Management District	Carroll Conservation Easement	Carroll Conservation Easement is a privately owned easement managed by the NWFWMD located adjacent to the Carpenter and Westmark Conservation Easement in the Spring Creek/St. Marks Basin.	$271,571	362	2002

Lead Entity	Name of Conservation Purchase	Description	Cost	Acreage Acquired	Year Acquired
Northwest Florida Water Management District	Coastal Forest Resources Conservation Easement	Conservation easement on west bank of the Ochlockonee River.	Mitigation	151	2009
City of Tallahassee	Dr. Charles Billings Greenway	The Billings Greenway property sits in a heavily developed southwest area of Tallahassee.	$153,800	25	2008
Leon County	Fred George Greenway	The Fred George Greenway is located adjacent to Capital Circle Northwest in Tallahassee. The Greenway is intended to preserve and protect large flood prone areas in this part of the County that contain significant wildlife and vegetation habitat and which drain into sinkholes and other surface water features that contribute to the local Floridan aquifer.	$2,163,000	158	1998/2009
Leon County	J. R. Alford Greenway	This property is a vista of rolling hills that includes natural habitats such as herbaceous marsh and hardwood/pine forests in addition to pastureland. Alford Arm is adjacent to the Lake Lafayette ecosystem.	$1,777,746	877	2001
Florida Fish and Wildlife Conservation Commission	L. Kirk Edwards Wildlife and Environmental Area	The L. Kirk Edwards Wildlife and Environmental Area is part of the Lake Lafayette ecosystem. Wood stork and great egret rookeries occur on the property. FWC owns the land west of Chaires Cross Road, and the Wood Sink tract east of the road is titled to the State of Florida.	$4,999,500	1,782	2007
Florida Dept. of Environmental Protection, Div. of Recreation and Parks	Lake Jackson Mounds Archaeological State Park	The park site, just north of Tallahassee around Lake Jackson, is part of the Southeastern Ceremonial Complex and encompasses four earthen temple mounds.	$165,000	200	2015
Florida Dept. of Environmental Protection, Div. of State Lands	Letchworth-Love Mounds State Park and Conservation Easement	The Letchworth Mounds Conservation Easement is a privately owned easement located adjacent to the Letchworth-Love Mounds Archaeological State Park south of Lake Miccosukee in Leon and Jefferson counties.	$4,727,630	1,270	2005
Florida Dept. of Environmental Protection, Div. of State Lands	Millstone Plantation Conservation Easement	The Millstone Plantation Conservation Easement is a privately owned easement with no public access located south of Lake McBride just north of Tallahassee.	$901,740	93	2004
Northwest Florida Water Management District	Pace Conservation Easement	Pace Conservation Easement is a privately owned easement managed by the NWFWMD located just northeast of Tallahassee.	$235,725	121	2004

Lead Entity	Name of Conservation Purchase	Description	Cost	Acreage Acquired	Year Acquired
Tall Timbers Research, Inc.	Shade Farm Conservation Easement	Tall Timbers Land Conservancy uses working forest easements to protect and steward working lands while enhancing wildlife habitat for diverse species.	Donation	620	2011
Leon County	St. Marks Headwaters	The St. Marks Headwaters consists of wetlands and wet flatwoods across much of the site, as well as some restoration areas with old field and agricultural activity.	$3,310,000	754	1999 - 2002
Tall Timbers Research, Inc.	Sunny Hill Plantation Conservation Easement	Tall Timbers Land Conservancy uses working forest easements to protect and steward working lands while enhancing wildlife habitat for diverse species.	Donation	7,650	2000
Florida Dept. of Environmental Protection, Division of Recreation and Parks	Tallahassee-St. Marks Historic Railroad State Trail	The Tallahassee-St. Marks Historic Railroad State Trail runs 20.5 miles from Florida's capital city to the coastal community of St. Marks. Officially part of Florida's Greenways and Trails System, this state trail has also been designated as a National Recreation Trail.	Donation	151	2008
City of Quincy	Tanyard Creek Preservation Park	Located in Quincy.	$494,607	121	2006
Northwest Florida Water Management District	Thompson/ Gray Conservation Easement	Conservation easement along the Ochlockonee River.	Mitigation	312	2001
City of Tallahassee	Timberlane Ravine	Passive park with hiking and biking trails on the northern side of Tallahassee.	$300,000	72	2001
Florida Dept. of Environmental Protection, Division of Recreation and Parks	Upper St. Marks River Corridor and St. Marks River Preserve State Park	The St. Marks River Preserve State Park is located along the St. Marks River south of Lower Lake Lafayette, east of Tallahassee. The park protects the headwaters, sloughs and pools which converge with the Wakulla River and flow to the Gulf of Mexico.	$10,800,872	2,590	2006
Florida Dept. of Agriculture and Consumer Services, Florida Forest Service	Wakulla State Forest	Wakulla State Forest consist of cutover sandhills with remnant longleaf-wiregrass vegetation, and mixed hardwood-pine forest. The forest contains a portion of the spring-fed McBride Slough. The former "Woodville State Forest" tract in Leon County is primarily planted slash pine and sand pine in what was formerly longleaf pine-wiregrass sandhills. There are a few areas of natural longleaf, a dome swamp, and small pond.	$7,735,000	4,897	1946/1999/ 2013

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 TMDL.

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 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 Upper Wakulla River and Wakulla Spring.

- Focus BMP efforts by using water quality results combined with appropriate project information, and land use data 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.

- 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 (**Tables 15** and **16**, respectively). The core indicators are directly related to the parameters causing impairment in the river or associated springs. Spring monitoring stations, ambient groundwater monitoring stations and certain surface water monitoring stations are core (required) stations. Supplemental indicators are monitored primarily to support the interpretation of core water quality parameters. Certain surface water monitoring stations, biological monitoring stations, and flow monitoring stations are supplemental stations. 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 numeric nutrient criteria (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 15. Core water quality indicators

Core Parameters
Ammonia as Nitrogen
Total Kjeldahl Nitrogen
Nitrate/Nitrite as Nitrogen

Table 16. Supplemental water quality indicators and field parameters

Note: * Denotes only applicable to river sites
(F) Denotes field parameters

Supplemental Parameters
Chlorophyll-*a**
Total Organic Carbon
Total Phosphorus
Chloride
Sulfate
Fluoride
Calcium
Magnesium
Sodium
Potassium
Alkalinity
Hardness
Turbidity (lab)
Specific Conductance (lab)
Color (true)
Total Suspended Solids
Total Dissolved Solids
Specific Conductance (F)
Dissolved Oxygen (DO) (F)
pH (F)
Temperature (F)
Sample Depth (F)
Secchi Depth (F)

Initially, data from the ongoing sampling effort being conducted by DEP and the 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 Upper Wakulla River and Wakulla Spring Basin.

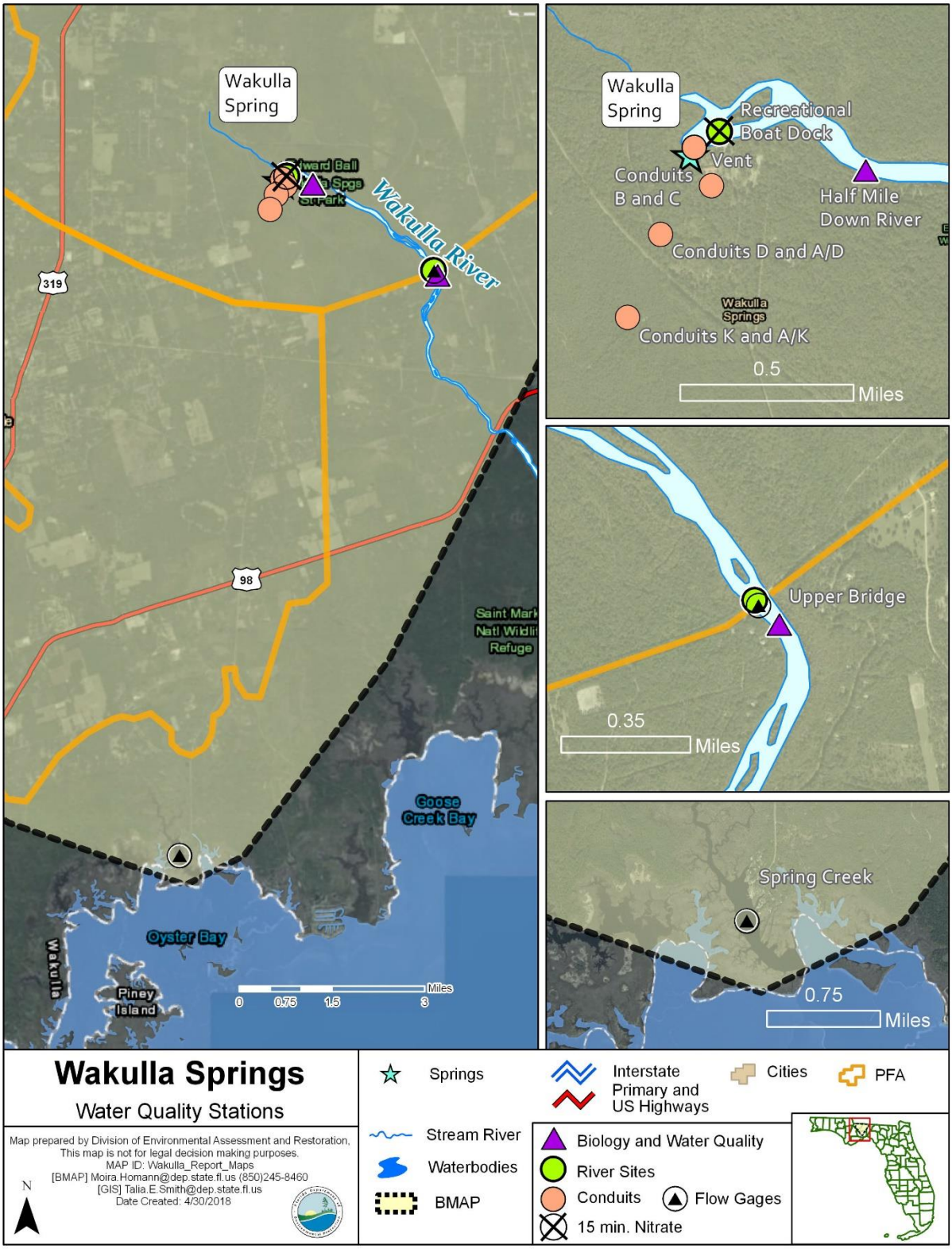

Figure 5. Groundwater and surface water stations sampled in Upper Wakulla River and Wakulla Spring BMAP

Table 17 lists the water quality stations in the BMAP monitoring network sampled by the department. The water quality monitoring will be conducted in accordance with the frequencies below.

In addition, flow stations (also listed in **Table 17**) will help determine loads to the river. These flow stations are maintained by the U.S. Geological Survey (USGS). The Spring Creek flow station is included in the BMAP monitoring plan because it will be helpful in understanding the movement of water in the aquifer. This gage will allow Spring Creek Springs flow volumes and periods of reverse flows at Spring Creek to be correlated with flows and water chemistry at the Wakulla Springs vent. This could help stakeholders determine where to carry out management strategies in the future.

Table 17. Surface water and flow monitoring stations

Sampling Entity	Station Id	Station Name	Station Type	Frequency	Site Established
NWFWMD	S587	Spring Vent	Discharge	Continuous	05/1997
DEP	S266	Upper Bridge	Water quality river	Monthly	08/2009
DEP	S556	Recreation Area Boat Dock	Water quality river	Monthly	10/2013
USGS	S556	Recreation Area Boat Dock	Temperature, conductance	Continuous	03/1999
DEP	9695	Spring Vent	Water quality vent	Quarterly	09/2001
DEP	20383	B-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	20385	C-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	20387	D-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	20388	AD-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	20340	K-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	20381	AK-Tunnel	Water quality conduit	Quarterly	04/2004
DEP	S556	Recreation Area Boat Dock	Nitrate meter	Continuous	12/2013
USGS	02327022	Wakulla River near Crawfordville, FL	Flow	Continuous	10/2004
USGS	02327031	Spring Creek Gage	Flow	Continuous	10/2013

3.3.3 Biological Monitoring

Biological resource responses represent improvements in the overall ecological health of the Upper Wakulla River and Wakulla Spring Basin (see **Table 18**).

Table 18. 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. **Table 19** summarizes the biological monitoring, and **Figure 5** shows the locations for this sampling.

Table 19. Biological monitoring stations

Sampling Entity	Type of Monitoring	Station ID	Location	Frequency	Start Date
DEP	RPS	S266	200 meters Downstream of Upper Bridge	Quarterly	01/2014
DEP	LVS	S266	200 meters Downstream of Upper Bridge	Quarterly	01/2014
DEP	SCI	S266	200 meters Downstream of Upper Bridge	Quarterly	01/2014
DEP	HA	S266	200 meters Downstream of Upper Bridge	Quarterly	01/2014
DEP	RPS	S98	Half Mile Downstream of Spring Vent @ Boat Maintenance Tram	Quarterly	01/2014
DEP	LVS	S98	Half Mile Downstream of Spring Vent @ Boat Maintenance Tram	Quarterly	01/2014
DEP	SCI	S98	Half Mile Downstream of Spring Vent @ Boat Maintenance Tram	Quarterly	01/2014
DEP	HA	S98	Half Mile Downstream of Spring Vent @ Boat Maintenance Tram	Quarterly	01/2014

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 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 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.

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 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: https://floridadep.gov/dear/quality-assurance/content/dep-sops
- 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/
- NWFWMD 2017 St. Marks River and Apalachee Bay Surface Water Improvement and Management (SWIM) Plan: https://www.nwfwater.com/Water-Resources/Surface-Water-Improvement-and-Management/St.-Marks-River
- NWFWMD Consolidated Annual Report: https://www.nwfwater.com/Data-Publications/Reports-Plans/Consolidated-Annual-Reports
- NWFWMD Springs: https://www.nwfwater.com/Water-Resources/Springs
- 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 2038, projects completed since January 1, 2013, 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	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
City of Gretna	**CG-001**	No Fertilizer Use	Fertilizer is not applied on any city-owned property.	Fertilizer Cessation	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A
City of Quincy	**CQ-001**	City of Quincy WWTF	AWT at the WWTF.	WWTF Nutrient Reduction	Completed	Not Provided	2015	WWTF	0	Not Provided	Not Provided	Not Provided
City of Quincy	**CQ-002**	Land Development Code - Watershed Conservation Measures	Ordinance that requires minimum stormwater treatment levels and use of BMPs including slow release fertilizers.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	0	N/A	N/A	N/A
City of Quincy	**CQ-003**	Street Sweeping	Sweeping the streets in the south side of the city one week and the north side the next week.	Street Sweeping	Completed	Not Provided	N/A	UTF	TBD	Not Provided	Not Provided	Not Provided
City of Tallahassee	**COT-001**	Wastewater Treatment Facility Upgrade to AWT	Upgrade to AWT to reduce the nitrogen concentration by 75 % at the spray field near Tram Road and improve the quality of reuse.	WWTF Nutrient Reduction	Completed	2008	2012	WWTF	170,232	$227,000,000	Not Provided	Not Provided
City of Tallahassee	**COT-002**	Biosolids Application Elimination	Eliminated biosolids disposal in the springshed.	WWTF Management	Completed	2001	2006	WWTF	372,563	N/A	N/A	N/A
City of Tallahassee	**COT-003**	Assessment and Rehabilitation of the Sewer Collection System	Project consisting of an assessment and rehabilitation of the sewer collection system.	Sanitary Sewer and WWTF Maintenance	Completed	2011	2011	WWTF	N/A	$10,000,000	Not Provided	Not Provided
City of Tallahassee	**COT-004**	Fertilizer Use Ordinance (08-072AA)	Standard credit for fertilizer ordinance.	Regulations, Ordinances, and Guidelines	Completed	2009	N/A	UTF	108	N/A	N/A	N/A
City of Tallahassee	**COT-004a**	Fertilizer Use Ordinance (08-072AA	Credit above and beyond standard credit for ordinances based on survey. Households that applied fertilizer (2007 vs. 2012) decreased 49 %, level of nitrogen applied per household decreased 27 %.	Regulations, Ordinances, and Guidelines	Underway	2009	N/A	UTF	177	N/A	N/A	N/A

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
City of Tallahassee	**COT-005**	Public Education for Stormwater, Fertilizer, and Pet Waste	Public education using various media resources to promote behavioral changes for individuals and businesses to conserve water and reduce or eliminate pollution impacts to surface water and ground water.	Public Education Efforts	Completed	2006	N/A	UTF	216	$1,700,000	N/A	N/A
City of Tallahassee	**COT-006**	Spray Field Fertilizer Application	Eliminated fertilizer application on the spray field (in the springshed).	Fertilizer Cessation	Completed	2007	2007	UTF	48,708	N/A	N/A	N/A
City of Tallahassee	**COT-007**	Pet Waste Ordinance (Number 10-0-15AA)	34 % of dog owners began picking up after their pets.	Regulations, Ordinances, and Guidelines	Completed	2008	N/A	UTF	108	N/A	N/A	N/A
City of Tallahassee	**COT-008**	Stormwater Improvement Projects	Conveyance improvements.	Regional Stormwater Treatment	Completed	2004	2012	UTF	8	$990,000	N/A	N/A
City of Tallahassee	**COT-009**	PSPZ Ordinance (Number 08-0-68AA)	Identifies the Primary Springs Protection Zone (PSPZ) where development has to meet more stringent requirements.	Regulations, Ordinances, and Guidelines	Completed	2009	N/A	UTF	0	N/A	N/A	N/A
City of Tallahassee	**COT-010**	Comprehensive Plan Provisions (Conservation Element Policy 4.2.5)	Reduced allowed development in the urban fringe inside the PSPZ.	Regulations, Ordinances, and Guidelines	Completed	2009	N/A	UTF	0	N/A	N/A	N/A

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
City of Tallahassee	**COT-011/LC-029**	Alternatives to Sewer Solutions Study	Study and develop preferred options for management alternatives to traditional OSTDS in unincorporated areas of Leon County, including PSPZ; identify preferred options for responsible management entities, including recommendations for financing and management structure for identified preferred options; identify other issues related to sewage treatment and disposal system financing.	Study	Planned	2018	2019	OSTDS	N/A	Not Provided	Not Provided	Not Provided
City of Tallahassee	**COT-012**	Stormwater Treatment Projects	79 stormwater projects city-wide (outside of PFA1) completed since 2004, examples include Lower CDD, Frenchtown Pond, and Emory Court, Weems Pond projects.	Regional Stormwater Treatment	Completed	2004	2015	UTF	Not Provided	$82,303,740	Not Provided	Not Provided
City of Tallahassee	**COT-013**	Street Sweeping	City-wide street sweeping annually collects and estimated 2000 tons of material and 2000 pounds (942 kg) of total nitrogen removed.	Street Sweeping	Completed	Not Provided	2015	UTF	283	$1,500,000	Not Provided	Not Provided
City of Tallahassee	**COT-014**	Public Education-Wakulla Springs Nitrate Video	5 min video educates homeowners on the local groundwater system & explains the need to address septic systems to restore Wakulla Springs. Shared via social media and WCOT TV.	Enhanced Public Education	Completed	2014	N/A	UTF	0	$27,000	COT Water Resources Engineering	Not Provided
City of Tallahassee	**COT-015**	Septic Connection to Existing Sewer in the Wakulla BMAP Area	Facilitating the connection of approximately 130 properties currently on OSTDS to existing central sewer in the Wakulla BMAP PFA1.	OSTDS Phase Out	Underway	2017	2019	OSTDS	1,177	$2,587,000	DEP-Legislative Projects Grant/ City of Tallahassee	637,000

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
City of Tallahassee	**COT-016**	OSTDS Reduction Outreach Initiative - Outreach for the City of Tallahassee's Connect Septic to Sewer Project	2017 – 2019 the City of Tallahassee will produce and distribute educational public service announcements, billboards, and other media, to encourage the City residents who are on septic systems within the Priority Focus Area 1 (PFA1), to connect to existing central sewer.	Enhanced Public Education	Underway	2017	N/A	UTF	TBD	$170,000	DEP-Fiscal year (FY)2015-319/City of Tallahassee	100,000
City of Tallahassee	**COT-017**	2017-2020 Dev. & Imp Edu Plan	Development & implementation of plan to educate residents about springshed and impact on Wakulla Springs - including Public Service Announcements (PSAs).	Enhanced Public Education	Planned	2018	N/A	UTF	TBD	$50,000	DEP-FY2017-319/City of Tallahassee Submitted to EPA	25,000
City of Tallahassee	**COT-018**	Interlocal Agreement for the Provision of Sewer Service to Woodside Heights Subdivision	Interlocal agreement for the provision of sewer service to Woodside Heights subdivision.	Regulations, Ordinances, and Guidelines	Planned	Not Provided	N/A	OSTDS	TBD	N/A	N/A	N/A
FAMU	**FAMU-001**	National Pollutant Discharge and Elimination System (NPDES) MS4 Permit	NPDES MS4 Permit.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
FDOT District 3	**FDOT-001**	Fertilizer Cessation	Eliminated fertilizer use for ongoing turf maintenance within the entire basin, including areas outside the PFAs.	Fertilizer Cessation	Completed	Not Provided	2015	UTF	2,756	Not Provided	Florida Legislature	N/A
FDOT District 3	**FDOT-002**	Street Sweeping	Contract for street sweeping of FDOT curb and gutter roads within the urbanized areas of Leon County and City of Tallahassee.	Street Sweeping	Completed	Not Provided	2015	UTF	169	Not Provided	Florida Legislature	N/A

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
FDOT District 3	**FDOT-003**	Innovative Nitrogen Removal Technologies	Investigating the use of innovative nitrogen removal technologies as part of the present work program within the PFAs.	Study	Canceled	Not Provided	N/A	UTF	N/A	Not Provided	Florida Legislature	N/A
FDOT District 3	**FDOT-004**	Avoidance of Mapped Karst Caves	Avoid constructing ponds directly over mapped karst caves by providing a 300 foot buffer.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
Federal Correctional Institute	**FCI-001**	NPDES MS4 Permit	Stormwater system inspection and maintenance.	Stormwater System Rehabilitation	Completed	Not Provided	2015	UTF	N/A	N/A	N/A	N/A
Federal Correctional Institute	**FCI-002**	No Fertilizer Use	Fertilizer is not applied on facility grounds.	Fertilizer Cessation	Completed	Not Provided	2015	UTF	TBD	N/A	N/A	N/A
Florida State University	**FSU-001**	Fertilizer Rule in University Master Plan	Fertilizer rule in the University Master Plan.	Regulations, Ordinances, and Guidelines	Completed	2008	N/A	UTF	TBD	N/A	N/A	N/A
Florida State University	**FSU-002**	NPDES MS4 Permit	NPDES MS4 Permit.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
Gadsden County	**GC-001**	Comprehensive Plan Policy 4.5.1 and 5.2.11 in Infrastructure and Conservation Element	Comprehensive Plan Policy 4.5.1 and 5.2.11 in the Infrastructure and Conservation Element.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
Gadsden County	**GC-002**	Comprehensive Plan Policy 5.2.4 and 5.2.11 in Conservation Element	Comprehensive Plan Policy 5.2.4 and 5.2.11in the Conservation Element.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
Gadsden County	**GC-003**	Comprehensive Plan Infrastructure Element	Comprehensive Plan Infrastructure Element.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A
Gadsden County	**GC-004**	Section 3.4 Special Drainage Basins - Water Quality (Pollution Abatement) in Stormwater Policies and Procedures Manual	Section 3.4 Special Drainage Basins - Water Quality (Pollution Abatement) in the Stormwater Policies and Procedures Manual.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	N/A	N/A	N/A	N/A

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Gadsden County	**GC-005**	Fertilizer Ordinance	Adoption of fertilizer ordinance.	Regulations, Ordinances, and Guidelines	Completed	2017	N/A	UTF	14	N/A	N/A	N/A
Leon County	**LC-001**	Sewering in PSPZ	The County had identified this project both in its adopted sewer master plan and the water and sewer interlocal agreement with the city as a targeted area for sewer. Funds for the project are available through the county's share of the Blueprint Water Quality Funding supported by the local infrastructure sales tax, subject to annual budget and appropriation.	OSTDS Phase Out	Planned	2020	Not Provided	OSTDS	TBD	$24,500,000	Not Provided	Not Provided
Leon County	**LC-001a**	Woodside Heights Septic to Sewer Project	Wastewater system expansion to provide service connections eliminating over 150 OSTDS.	OSTDS Phase Out	Underway	Jul-15	2019	OSTDS	1,358	$4,900,000	NWFWMD, Blueprint	$2,450,000
Leon County	**LC-001b**	Woodville Septic to Sewer Project Design	Wastewater system expansion design to provide service connections eliminating approximately 1,500 OSTDS.	OSTDS Phase Out	Underway	Jul-17	2019	OSTDS	TBD	$3,000,000	NWFWMD, Blueprint	$1,500,000
Leon County	**LC-002**	Septic Tank Inventory	Preparation of a GIS inventory of all the septic systems in Leon County.	Study	Completed	2013	2013	OSTDS	N/A	$50,000	Not Provided	Not Provided
Leon County	**LC-003**	Septic Tank Repairs	Proposed revision to the septic tank ordinance to require repairs to have a minimum of 24-inch separation between drain field and seasonal high water table.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	OSTDS	N/A	N/A	N/A	N/A

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Leon County	**LC-004**	Septic Tank Nitrogen Removal Requirements	Pending the results of FDOH evaluation of passive systems as referenced in Section 381.0065(4)(x), F.S, the county shall: (1) review the results of this Florida study of nitrogen reducing, performance-based OSTDS, including passive systems; (2) identify passive systems regulated under Section 381.0065, F.S., that are approved by the State of Florida for permitting and appropriate for use within Leon County; (3) evaluate factors such as cost and operational feasibility of such passive systems; and (4) develop a proposed amendment to the code of laws requiring the use of appropriate systems for new construction within the PSPZ.	Study	Underway	2015	Not Provided	OSTDS	N/A	Not Provided	Not Provided	Not Provided
Leon County	**LC-004a**	Passive Onsite Sewage Nitrogen Reduction Pilot Project	Upgrade of 37 OSTDS to AWT systems with follow-up monitoring to determine effectiveness.	OSTDS Enhancement	Underway	Nov-17	2019	OSTDS	335	$750,000	NWFWMD	$750,000
Leon County	**LC-005**	Septic Tank Education	Add educational kiosks at the Woodville Community Center to explain how septic systems work.	Public Education Efforts	Underway	2015	N/A	OSTDS	N/A	$2,500	N/A	N/A
Leon County	**LC-006**	Enacted Comprehensive Fertilizer Ordinance (Number 09-34)	Requires commercial applicators to follow a set of BMPs for the application of fertilizers.	Regulations, Ordinances, and Guidelines	Completed	2009	N/A	UTF	188	N/A	N/A	N/A

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Leon County	**LC-007**	Fertilizer Ordinance Modification	Consider modification to the fertilizer ordinance to reduce nitrogen application rates below the Cody Scarp, if allowable by Florida law.	Regulations, Ordinances, and Guidelines	Completed	2014	N/A	UTF	N/A	N/A	N/A	N/A
Leon County	**LC-008**	Education and Outreach	Outreach through FYN, illicit discharge program, pamphlets, presentations, workshops, and special events.	Public Education Efforts	Completed	2015	N/A	UTF	377	N/A	N/A	N/A
Leon County	**LC-009**	Enacted Pet Waste Ordinance (Number 11-21)	Education program to promote cleanup of pet waste as a contributor to surface water pollution.	Public Education Efforts	Completed	2011	N/A	UTF	188	N/A	N/A	N/A
Leon County	**LC-010**	Land Development Regulations	Adopted new minimum countywide environmental regulations that exceed state stormwater standards.	Regulations, Ordinances, and Guidelines	Completed	2012	N/A	UTF	TBD	N/A	N/A	N/A
Leon County	**LC-011**	Comprehensive Plan Provisions (Conservation Element Policy 4.2.5)	Reduced allowable development in the urban fringe from up to 1 unit per acre to 1 unit per 3 acres. Transfer of density with no net increase in dwelling units as allowed on the future land use map permitted.	Regulations, Ordinances, and Guidelines	Completed	2009	N/A	UTF	1	N/A	N/A	N/A
Leon County	**LC-012**	Lake Munson Erosion and Flood Protection Upgrades	Removed 15-acre nutrient sediment dam in 2002, stabilized Munson Slough to reduce erosion, and repaired the dam for stabilization of lake hydroperiod.	Hydrologic Restoration	Completed	2002	2002	UTF	93,299	$7,200,000	Not Provided	Not Provided
Leon County	**LC-013**	Low-Impact Development	Develop low impact development incentives to reduce nitrogen loading to surface waters and ground water.	Regulations, Ordinances, and Guidelines	Completed	2014	N/A	UTF	N/A	N/A	N/A	N/A
Leon County	**LC-014**	Street Sweeping	Contract for 821 miles of street sweeping annually; collects 124.75 tons/yr.	Street Sweeping	Completed	Prior to 2015	2015	UTF	38	N/A	N/A	N/A

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Leon County	**LC-015**	FYN Program	Participation in the FYN Program through the Cooperative Extension Service.	Public Education Efforts	Completed	2015	N/A	UTF	1,131	N/A	N/A	N/A
Leon County	**LC-016**	Irrigation Ordinance	Irrigation ordinance.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	188	N/A	N/A	N/A
Leon County	**LC-017**	Landscaping Ordinance	Landscaping ordinance.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	188	N/A	N/A	N/A
Leon County	**LC-018**	Aquifer Vulnerability Assessment	Study to determine the areas with the most direct connections to Wakulla Springs.	Study	Completed	2006	2007	UTF	0	$73,000	N/A	N/A
Leon County	**LC-019**	Lombardo Report	In conjunction with City of Tallahassee and Wakulla County, compiled previous studies identifying nitrogen loading to Wakulla Springs, and identified treatment and management options, where central sewer is not available, for the purpose of reducing nitrate loading to Wakulla Springs from septic systems located within the geographic area of Leon and Wakulla counties.	Study	Completed	2010	2013	OSTDS	N/A	$60,000	N/A	N/A
Leon County	**LC-020**	Water Quality Sampling	Sampled 73 sites in 13 lakes, 27 streams, and two rivers.	Monitoring/Data Collection	Completed	Not Provided	2015	UTF	N/A	$250,000	N/A	N/A
Leon County	**LC-021**	Preparation of Annual Water Quality Report	Preparation and publishing an annual water quality report to document the health of our natural systems and utilize for prioritization of water quality project needs.	Study	Completed	Not Provided	2015	UTF	N/A	N/A	N/A	N/A

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Leon County	**LC-022**	Woodville Recharge Aquifer Protection Study	EPA grant to study the 60 square mile Woodville Recharge Basin for flooding, water quality, and aquifer protection.	Study	Completed	2005	2007	UTF	N/A	$300,000	U.S. EPA	Not Provided
Leon County	**LC-023**	Annual Wakulla Springs Status Report	Commitment to develop an annual status report on Wakulla Springs for the Board of County Commissioners.	Study	Completed	2014	2014	UTF	N/A	N/A	N/A	N/A
Leon County	**LC-024**	Established Primary Springs Protection Zone (Number 09-12)	Enacted to establish a defined area for enforcement for additional water quality protections within this zone.	Regulations, Ordinances, and Guidelines	Completed	2006	N/A	UTF	N/A	N/A	N/A	N/A
Leon County	**LC-025**	Eight Mile Pond	Acquisition of 132 acres immediately upstream of Ames Sink to preserve/protect the sink.	Land Acquisition	Completed	2009	2010	UTF	TBD	N/A	N/A	N/A
Leon County	**LC-026**	Aquifer Wellhead Protection Ordinance (Number 07-20)	Includes Aquifer Protection Program.	Regulations, Ordinances, and Guidelines	Completed	2007	N/A	UTF	TBD	N/A	N/A	N/A
Leon County	**LC-027**	Litter Control Program	Maintain 2,316 miles of right-of-way, collecting 78.4 tons of waste.	Public Education Efforts	Completed	2015	N/A	UTF	TBD	N/A	N/A	N/A
Leon County	**LC-028**	Adopt-A-Road Program	Maintain 112 miles of right-of-way, collecting 2.11 tons of trash.	Public Education Efforts	Completed	2015	N/A	UTF	TBD	N/A	N/A	N/A

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Leon County	**LC-029/COT-011**	Alternatives to Sewer Solutions Study	Study and develop preferred options for management alternatives to traditional OSTDS in unincorporated areas of Leon County, including PSPZ; identify preferred options for responsible management entities, including recommendations for financing and management structure for identified preferred options; identify other issues related to sewage treatment and disposal system financing.	Study	Underway	2018	Not Provided	OSTDS	N/A	N/A	N/A	N/A
Leon County	**LC-029**	Harbinwood Estates Ponds	Constructed two stormwater retrofit ponds and planted/stabilized 1,200 linear feet of channel.	Wet Detention Pond and Shoreline Stabilization	Completed	Prior to 2015	2008	UTF	30	$2,980,000	N/A	N/A
Leon County	**LC-030**	Fuller Road Regional Facility	Constructed 10-acre stormwater retrofit facility at I-10 and US 27.	Stormwater Treatment Areas (STAs)	Completed	Prior to 2015	2010	UTF	58	$800,000	N/A	N/A
Leon County	**LC-031**	Fred George Basin Acquisition	Acquisition of 166 acres which includes Fred George Sink for preservation/protection of the sink.	Land Acquisition	Completed	2009	2012	UTF	TBD	$2,600,000	N/A	N/A
Leon County	**LC-032**	Fred George Basin Wetland Rehydration	Wetland rehydration through grade restoration and construction of trash racks at the inflow points are planned to improve water quality prior to runoff entering the Fred George Sink.	Wetland Restoration	Underway	2016	2019	UTF	N/A	$1,000,000	N/A	N/A
Tallahassee Community College	**TCC-001**	Fertilizer Cessation	Fertilizer cessation.	Fertilizer Cessation	Completed	2012	2012	UTF	1	N/A	N/A	N/A
Talquin Electric	**TEC-001**	Oyster Bay Wastewater Treatment Plant (WWTP) Abandonment	Oyster Bay WWTP abandonment.	WWTF Abandonment	Completed	Not Provided	2016	WWTF	610	$750,000	N/A	N/A

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Talquin Electric	**TEC-002**	Gadsden East WWTP	Gadsden East WWTP (Construct a treatment wetland by retrofitting three existing rapid infiltration basins and building additional treatment cells).	WWTF Disposal Site	Completed	Not Provided	2016	WWTF	1,882	$200,000	N/A	N/A
Talquin Electric	**TEC-003**	Highway 267 Sewer	Highway 267 sewer.	Sanitary Sewer and WWTF Maintenance	Completed	Not Provided	2008	OSTDS	2	$400,000	N/A	N/A
Talquin Electric	**TEC-004**	Beech Ridge Trail Sewer	Beech Ridge Trail sewer.	Sanitary Sewer and WWTF Maintenance	Completed	Not Provided	2004	OSTDS	2	$40,000	N/A	N/A
Town of Havana	**TH-001**	Street Sweeping	Street sweeping.	Street Sweeping	Completed	Not Provided	2015	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-001**	Comprehensive Plan Infrastructure Policy 1.3.6	Requires AWT for any WWTF or spray field located in the Wakulla Springs Special Planning Area.	Regulations, Ordinances, and Guidelines	Completed	2006	N/A	WWTF	N/A	N/A	N/A	N/A
Wakulla County	**WC-002**	Otter Creek WWTP Upgrade and Capacity Expansion	Proposed upgrades and expansion to include contributing systems within PFA2 to the WWTF for improved treatment.	WWTF Nutrient Reduction	Underway	9/19/2016	5/12/2018	WWTF	TBD	$7,644,346	U.S. Department of Agriculture (USDA) Rural Development (RD) Loan/Grant	N/A
Wakulla County	**WC-003**	Public Education on OSTDS	Provide citizens and officials with the best available information for decision making regarding the use of OSTDS and decentralized wastewater systems to reduce nutrients in ground water to the springs.	Public Education Efforts	Completed	2007	N/A	OSTDS	N/A	N/A	N/A	N/A

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Wakulla County	**WC-004**	Comprehensive Plan Infrastructure Policy 1.3.7	Requires nitrogen reducing septic systems on parcels smaller than five acres in the Wakulla Springs Special Planning Area; within 150 feet of surface water, swallet, or other karst feature, or within 300 feet of a 1st or 2nd magnitude spring; and on all parcels less than 0.229 acres in size.	Regulations, Ordinances, and Guidelines	Completed	2012	N/A	OSTDS	TBD	N/A	N/A	N/A
Wakulla County	**WC-005**	Magnolia Gardens Sewer - Phase I	Installation of central sewer and proper abandonment of +/-159 septic systems.	OSTDS Phase Out	Underway	2016	2018	OSTDS	1,599	$2,300,000	Legislative Springs Protection Funds	$2,300,000
Wakulla County	**WC-006**	Wakulla Gardens Sewer - Phase I	Installation of central sewer and proper abandonment of +/- 51 septic systems.	OSTDS Phase Out	Underway	2016	2018	OSTDS	513	$2,300,000	Legislative Springs Protection Funds	$2,300,000
Wakulla County	**WC-007**	Greiner's Addition Central Sewer Installation	Planned central sewer installation for the Greiner's Addition neighborhood.	OSTDS Phase Out	Planned	Not Provided	TBD	OSTDS	TBD	N/A	N/A	N/A
Wakulla County	**WC-008**	Wakulla County WWTF - Plantation River Estates	Wakulla County will assume ownership and management of the River Plantation Estates WWTP sewer system and wastewater treatment facility. Project includes removal and replacement of existing facility.	WWTF Upgrade	Completed	Not Provided	2015	WWTF	0	$4,900,000	N/A	N/A
Wakulla County	**WC-009**	Wakulla Springs Watershed	Inspection and repair of old, damaged, and failing systems in the Wakulla Springs watershed area.	OSTDS Enhancement	Planned	2012	TBD	OSTDS	TBD	$1,380,300	N/A	N/A
Wakulla County	**WC-010**	Crawfordville TIF District	TIF District for Crawfordville area to fund improvements including basic infrastructure.	OSTDS Phase Out	Completed	2012	2015	OSTDS	0	N/A	N/A	N/A
Wakulla County	**WC-011**	Fertilizer Use Ordinance 2010-1	Adopts model ordinance on Florida-friendly fertilizer use on urban landscapes.	Regulations, Ordinances, and Guidelines	Completed	2010	N/A	UTF	71	N/A	N/A	N/A

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Wakulla County	**WC-012**	Fertilizer Management Education	Education and outreach to the public about fertilizer management.	Regulations, Ordinances, and Guidelines	Completed	2014	N/A	UTF	143	N/A	N/A	N/A
Wakulla County	**WC-013**	Comprehensive Plan Future Land Use Policies 1.2.10, 1.2.10.3, Special Area Plans	Establishes special area plans for the Bloxham Special Area Plan, Special Area Plan #2, and Spring Creek Highway Special Area Plan within the Wakulla Springs Basin. Requires nitrate loading analyses for development. Establish standards for stormwater, karst feature protections, landscaping, and open space.	Regulations, Ordinances, and Guidelines	Completed	2004	N/A	UTF	13	N/A	N/A	N/A
Wakulla County	**WC-014**	Wakulla County Aquifer Vulnerability Assessment	Modeling effort to identify the most vulnerable areas in the county.	Study	Completed	2007	2009	UTF	Part of WC-10	N/A	N/A	N/A
Wakulla County	**WC-015**	Comprehensive Plan Future Land Use Polity 1.2.9.1 - Northeast Wakulla Sustainable Community	Establishes standards for 606 acres within the Wakulla Springs Basin. Requires no net increase in nutrients or phosphorus loading to ground water. Sustainable community standards established for stormwater, ground water, open space, and BMPs. Requires AWT standards for sanitary sewer service to the site.	Regulations, Ordinances, and Guidelines	Completed	2003	N/A	UTF	0	N/A	N/A	N/A

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Wakulla County	**WC-016**	Ordinance 2006-58 (Multiple Objectives and Policies in Comprehensive Plan Conservation and Future Land Use Elements)	Add karst buffers; require a nitrate loading study for proposed development greater than one acre; incorporate FYN practices and landscaping standards that promote native vegetation for new subdivisions; reduce nitrates from public facilities; and address stormwater, water conservation, wastewater facilities, treated wastewater reuse, and natural water flows.	Regulations, Ordinances, and Guidelines	Completed	2006	N/A	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-017**	Comprehensive Plan Conservation Objective 12.0	Develop solutions to restore the health of Wakulla Springs by reducing pollutants in the ground water, and implementing policies for the Wakulla Springs Special Planning Area.	Regulations, Ordinances, and Guidelines	Completed	2010	N/A	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-018**	Comprehensive Plan Conservation Objective 12.1	Establishes a transfer of development rights policy to encourage development in Crawfordville with connection to sewer service, "no net increase in dwelling units above 2 units per acre" allowed by the future land use map in the Wakulla Springs Special Planning Area, fertilizer restrictions based on FYN Program.	Regulations, Ordinances, and Guidelines	Completed	2010	N/A	OSTDS	0	N/A	N/A	N/A
Wakulla County	**WC-019**	Comprehensive Plan Conservation Objective 12.2	County shall consider expanding the Wakulla Springs Special Planning Area based on geologic vulnerability.	Regulations, Ordinances, and Guidelines	Completed	2010	N/A	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-020**	Comprehensive Plan Infrastructure Objective 2.5	To protect the functions of ground water recharge areas, springs, and springsheds.	Regulations, Ordinances, and Guidelines	Completed	1995	N/A	UTF	0	N/A	N/A	N/A

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Wakulla County	**WC-021**	Ground Water Extraction Ordinance	Requests NWFWMD establish minimum flows and levels for Wakulla Springs and requests NWFWMD deny permits to transport water from the Wakulla Springs springshed and the Ochlocknee and St. Marks Rivers.	Regulations, Ordinances, and Guidelines	Completed	2012	N/A	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-022**	Litter Regulations. Code of Ordinances Section 27.049	Prohibits litter and dumping along roadways and waterways, and establishes penalties.	Regulations, Ordinances, and Guidelines	Completed	1992	N/A	UTF	0	N/A	N/A	N/A
Wakulla County	**WC-023**	Wakulla Gardens Sewer - Phase II	Installation of central sewer and proper abandonment of +/- 181 septic systems.	OSTDS Phase Out	Underway	2016	2018	OSTDS	1,820	$4,240,000	Legislative Springs Protection Funds	$4,240,000
Wakulla County	**WC-024**	Magnolia Gardens Sewer - Phase II	Installation of central sewer and proper abandonment of +/- 98 septic systems.	OSTDS Phase Out	Underway	2016	2018	OSTDS	985	$1,560,000	Legislative Springs Protection Funds	$1,560,000
Wakulla County	**WC-025**	Wakulla Gardens Sewer - Phase III	Upgrades and rerouting of the 319 liftstation.	OSTDS Phase Out	Underway	2017	2018	OSTDS	TBD	$1,066,280	Legislative Springs Protection Funds	$1,066,280
Wakulla County	**WC-026**	WINCO WWTP Purchase	Nitrogen reduction – Northeast Wakulla County.	Wastewater Management	Planned	Not Provided	TBD	WWTF	TBD	Not Provided	TBD	N/A
Wakulla Springs State Park	**WP-001**	Learning in Florida's Environment	Annual environmental education program.	Public Education Efforts	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A
Wakulla Springs State Park	**WP-002**	Project Learning Tree	Annual environmental education program.	Public Education Efforts	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A
Wakulla Springs State Park	**WP-003**	Green Guide Class	Annual environmental education program.	Public Education Efforts	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A
Wakulla Springs State Park	**WP-004**	Wakulla Wildlife Festival	Annual environmental education program.	Public Education Efforts	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A
Wakulla Springs State Park	**WP-005**	Park Ranger Programs	Annual environmental education program.	Public Education Efforts	Completed	Not Provided	N/A	UTF	0	N/A	N/A	N/A

Lead Entity	Project Number	Project Name	Project Description	Project Type	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**	Agricultural Farm Fertilizer BMP Implementation	Enrollment and verification of BMPs by agricultural producers.	Agricultural BMPs	Underway	Not Provided	2023	FF	24,298	TBD	TBD	TBD
FDACS	**FDACS-02**	Agricultural Livestock Waste BMP Implementation	Enrollment and verification of BMPs by agricultural producers.	Agricultural BMPs	Underway	Not Provided	2023	LW	2,384	TBD	TBD	TBD
Golf Courses	**GC-01**	Golf Course Reduction Credits	10 % BMP credit on golf course load to groundwater, assuming 100 % BMP implementation by golf course owners.	Golf Course BMPs	Planned	Not Provided	Not Provided	STF	1,313	TBD	TBD	TBD
Sports Fields	**SF- 01**	Sports Field Reduction Credits	6 % BMP credit on sports field load to groundwater, assuming 100 % BMP implementation by sports field owners.	Sport Field BMPs	Planned	Not Provided	Not Provided	STF	136	TBD	TBD	TBD
Wastewater Utilities	**WU-01**	WWTF Policy Reductions	Achieved by WWTF policy in PFA1 and PFA2, achieving 3 or 6 mg/L.	Wastewater Management	Planned	Not Provided	Not Provided	WWTF	2,125	TBD	TBD	TBD
Various	**OSTDS-01**	Enhancement of Existing OSTDS - Voluntary	Repair, upgrade, replacement, drainfield modification, addition of effective nitrogen reducing features, initial connection to central sewerage system, or other action to reduce nutrient loading, voluntarily taken by owner of OSTDS within BMAP area.	OSTDS Enhancement	Underway	2018	N/A	OSTDS	TBD	TBD	DEP	TBD

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
Various	**OSTDS-02**	Enhancement of Existing OSTDS - Required	Repair, upgrade, replacement, drainfield modification, addition of effective nitrogen reducing features, initial connection to a central sewerage system, or other action taken to comply with the OSTDS Remediation Plan for the group of systems identified for remediation (see **Appendix D**).	OSTDS Enhancement	Planned	TBD	TBD	OSTDS	TBD	TBD	DEP	TBD

Appendix C. PFAs

C.1 Description

In the Upper Wakulla River and Wakulla Spring Basin, two PFAs were identified to focus management strategies for the first BMAP iteration (see **Figure 1**). These PFAs represent the areas in the basin where the aquifer is most vulnerable to pollutant inputs, where groundwater travels the fastest, and where there is a known connectivity between groundwater pathways and Wakulla Spring. Pollutant loads contributed in the PFAs are considered to result in the largest magnitude and most immediate impacts to the Upper Wakulla River. Development of the PFA boundaries did not take surface features or land use activities into account. The PFAs provide a guide for focusing strategies where science suggests these efforts will best benefit the spring.

To delineate these PFAs, the department reviewed the spatial location of actual and potential pollutant contributing areas with emphasis on the following considerations: where surface pollutant inputs have greatest potential to increase nitrate in groundwater based on the aquifer vulnerability assessments (AVAs); areas characterized with the fastest groundwater travel times to Wakulla Spring; and known connectivity to the springs or direct groundwater pathways.

The PFAs were identified using information on the areas classified as “most” and “more” vulnerable from two individual AVAs:

- Wakulla County Aquifer Vulnerability Assessment - WCAVA, Version 1.4, September 2009. Within the springshed, areas with more and most vulnerable designations were generally included in the PFAs.
- Leon County Aquifer Vulnerability Assessment - LAVA, July 2007. Within the springshed, areas with most vulnerable designations were generally included in the PFAs.

Different vulnerability scales were used between these two AVAs; more information about the vulnerability scales used are described in each report, respectively.

The department also looked at the areas with the fastest groundwater travel times to Wakulla Spring and areas with known connectivity to the springs. Based on hydrogeological studies (Davis 1996; Davis and Katz 2007) conducted in the region, the area south of the Cody Scarp has the highest recharge rate and, therefore, the most impact to the groundwater. The Cody Scarp was therefore used to establish the northern boundary of the PFAs.

Groundwater tracer tests (Kincaid and Werner, 2008) have been conducted in the basin to identify connectivity of surface areas via ground water to the springs. The department defined the PFA boundaries so as to cover the land areas south of the Cody Scarp above both the mapped conduits and the areas of most direct connection based on the dye traces. Based on the review of the contributing area and the three special considerations, two PFAs were designated for the Wakulla Spring.

PFA1 is the primary area of concern for sources contributing to the nitrate impairment. Based on the groundwater tracer studies (Kincaid and Werner, 2008), this area has either documented evidence or the highest probability of regularly contributing loading to the groundwater flows to Wakulla Spring. PFA1 has the highest probability for surficial infiltration and contribution to groundwater based on information in the AVA reports. This area also has the most direct and fastest groundwater travel times to Wakulla Spring, based on dye trace studies conducted in the basin.

PFA2 is the secondary area of concern for sources contributing to the nitrate impairment. This area also has a high probability for surficial infiltration to groundwater and contribution to Wakulla Spring, based on the AVA reports. However, this area has a more intermittent contribution to groundwater flows to the springs, based on dye trace studies in the basin (Kincaid and Werner, 2008).

C.2 PFA References

Davis, J.H., 1996, *Hydraulic investigation and simulation of ground-water flow in the Upper Floridan aquifer of northcentral Florida and southwestern Georgia and delineation of contributing areas for selected City of Tallahassee, Florida, water-supply wells*: U.S. Geological Survey Water-Resources Investigations Report 95-4296, 55 p.

Davis, J.H., and Katz, B.G., 2007, *Hydrogeologic investigation, water chemistry analysis, and model delineation of contributing areas for City of Tallahassee public-supply wells, Tallahassee, Florida*: U.S. Geological Survey Scientific Investigations Report 2007-5070, 67 p.

Kincaid, T. R., and C. L. Werner (2008), Conduit flow paths and conduit/matrix interactions defined by quantitative groundwater tracing in the Floridian Aquifer, *in Sinkholes and the Engineering and Environmental Impacts of Karst*: Proceedings of the Eleventh Multidisciplinary Conference, Am. Soc. of Civ. Eng. Geotech. Spec. Publ., no. 183, edited by L. B. Yuhr, E. C. Alexander Jr., and B. F. Beck, pp. 288–302, Am. Soc. Civ. Eng. Geotech., Reston, Va.

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 Upper Wakulla River and Wakulla Spring Basin NSILT estimates and GIS coverages, OSTDS contribute approximately 34 % loading to groundwater in the BMAP area and 46 % of the pollutant loading in the PFAs. 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. Local governments and utilities are expected to develop master wastewater treatment feasibility analyses to identify specific areas to be sewered within 20 years of BMAP adoption. 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 or Repair of Existing OSTDS

Per statute, the OSTDS remediation plan must provide loading reductions consistent with achieving the TMDL within 20 years of plan adoption (see Section 373.807(1)(b)8., F.S.). This plan therefore establishes the following remediation policy for existing systems, based on (a) the potential for reducing nitrogen loads by converting existing OSTDS to enhanced nitrogen removing systems or by connecting homes to central sewer, (b) the total amount of nitrogen load that must be reduced to achieve the TMDL, and (c) the relative contribution of nitrogen load from existing OSTDS.

- Where does the remediation policy for existing systems apply? It applies to all existing OSTDS within the PFAs on all lots.

- When is the remediation policy for existing systems effective? The remediation policy for existing systems does not go into effect upon BMAP adoption. The requirements begin following completion of the master wastewater treatment feasibility analyses, FDOH rulemaking, and funding program to help offset the costs to homeowners, but no later than five years after BMAP adoption.

- What will be required by the remediation policy for existing systems when it becomes effective? Upon the need for repair or replacement, an existing OSTDS must include at least one of the following nitrogen reducing enhancements, unless the OSTDS permit applicant demonstrates that sewer connections will be available within 5 years.

    - Enhanced treatment of nitrogen means inclusion of features allowed pursuant to FDOH rules, 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; or other FDOH-approved treatment systems capable of meeting or exceeding the NSF Standard 245 nitrogen removal rate before disposing the wastewater in the drain field, such as ATUs and PBTSs. 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.

    - FDOH permitting requirements with respect to defining "modification," "repair," and lot size (i.e., acreage) will be followed for this remediation plan.

- In addition, a utility is required to provide written notice to OSTDS owners of the availability of sewer lines for connection, no later than 1 year prior to the date the utility's sewerage system will become available, which triggers an obligation for OSTDS owners to comply with the requirements of Section 381.00655, F.S.

D.1.3 Achieving Necessary Load Reductions

All conventional OSTDS in areas subject to the remediation policy for existing systems are required to adopt enhanced treatment of nitrogen or connect to sewer no later than 20 years after BMAP adoption.

D.1.4 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 Wakulla Spring 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 results were reviewed by NWFWMD, FDOH, and FDACS. Additional technical support information concerning the NSILT can be found in **Appendix E**.

Monitoring and research:

- Maintain and expand water quality monitoring programs (NWFWMD/DEP).
- Research and develop advanced septic systems (FDOH/DEP/UF–IFAS).

Completed project:

- Florida Onsite Sewage Nitrogen Reduction Strategies Study (FDOH).

Ongoing projects:

- Quarterly springs water quality monitoring (NWFWMD).
- USGS Surface Water Data Collection (USGS/NWFWMD).

Proposed projects:

- Nutrient hot-spot loading identification (DEP).
- Groundwater quality monitoring for BMAP assessment (DEP/).

DEP developed calculation methods to estimate nitrogen reductions associated with septic system enhancement and replacement projects, WWTF projects, golf course BMPs, other sports turfgrass BMPs, and urban turfgrass BMPs.

D.3 Remediation Options

The NSILT estimates that OSTDS contribute approximately 46 % 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. **Figure D-1** shows the areas where OSTDS are located.

Table D-1. Estimated reduction credits for 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 Size 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)	Total OSTDS in PFAs	Total Credits for Sewering	Total Credits for Enhancement
High	5,982	56,694	38,791	5,935	56,249	38,486	11,917	112,943	77,277
Total	**5,982**	**56,694**	**38,791**	**5,935**	**56,249**	**38,486**	**11,917**	**112,943**	**77,277**

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 lot sizes, 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. 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.

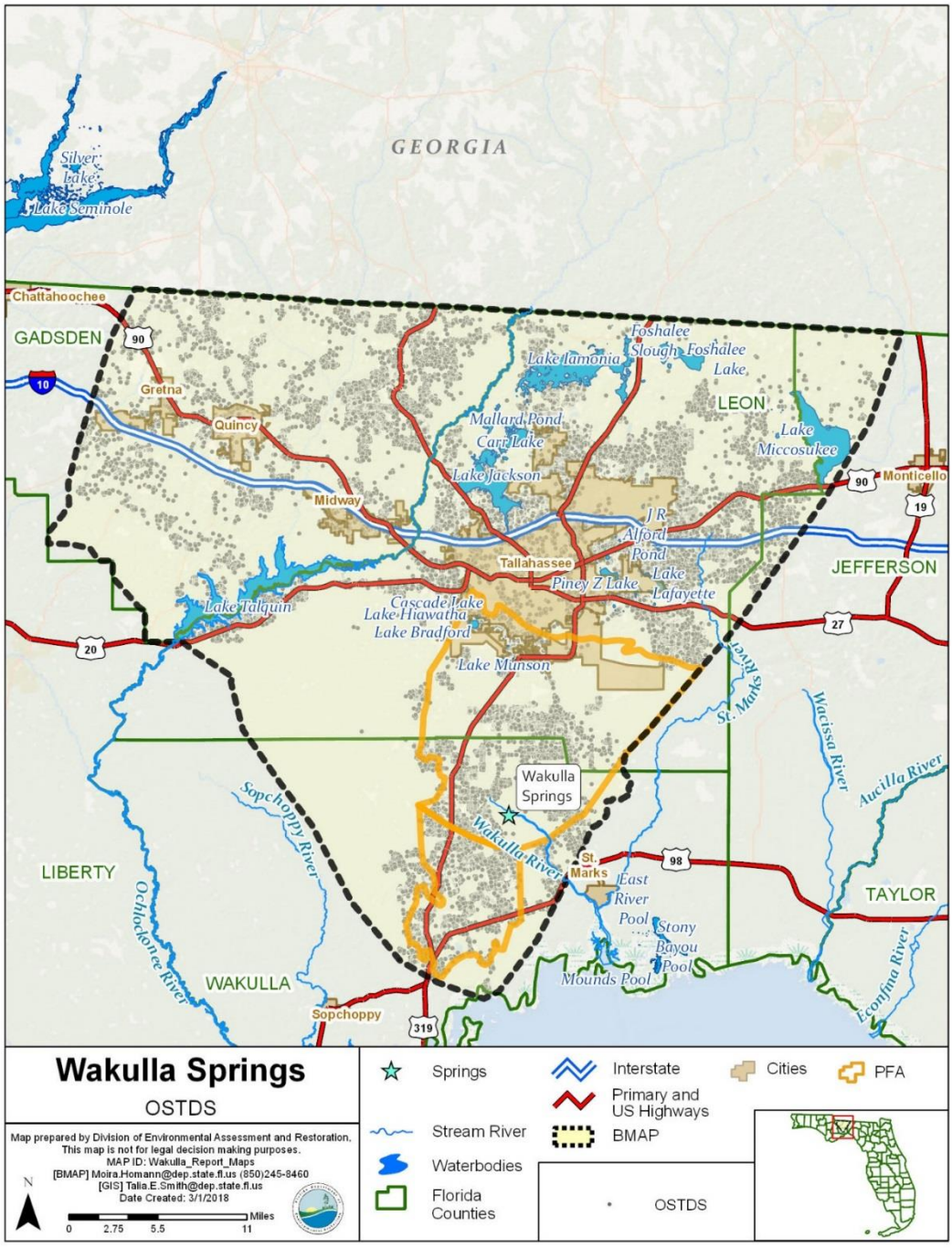

Figure D-1. OSTDS locations in the Upper Wakulla River and Wakulla Spring BMAP area and PFAs

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 Florida Onsite Wastewater Association (FOWA).

DEP hosted a brainstorming session on December 6, 2016, to gather local input on the primary facets of a public education plan, including key audiences, the identification of major themes for communication/education, and the identification of misconceptions about septic systems.

During the development of this BMAP, the following list of steps, target audiences, consideration of appropriate messaging, and preparation of materials/resources were identified.

- **Step 1** – Understand the data and issues associated with OSTDS.
- **Step 2** – Identify existing and short-term activities to address the issues.
- **Step 3** – Undertake a pilot project outreach and social marketing campaign.
- **Step 4** – Identify future actions for basin wide implementation.

Target Audiences

- Board of County Commissioners.
- Homeowners and Renters.
- Citizens/Voters.
- OSTDS Industry.
- Builders.
- School Children.
- Environmental Groups.
- Real Estate Agents.

Messaging

- Financing Options.
- Market/Affordability.
- Nature of the Challenge.
- Nitrogen Source from OSTDS.
- Achievements to Date (e.g., City of Tallahassee).

- "Connect to Protect" or other simple message.
- Show Wakulla Springs from the Past.
- Options Available. More than One Technical and Financial Solution.
- Be Part of the Solution.
- Why Change is Needed.
- Shifted Baseline.
- Clean Water (Although it is Important to Make Clear that Drinking Water is Not Unsafe).
- Septic Tank Owners are Not Bad.
- Connection to Aquifer.
- Dark Water does not Equal Nitrogen Problem.
- Not a Health Issue, but an Ecological Issue.
- Life Cycle Costs.
- All Nitrogen Sources are Part of the Problem.

Materials/Resources

- K-12 Education Program.
- Cross-Section Model.
- Florida Onsite Wastewater Association (FOWA) Visual Aids.
- Festivals (Wildlife, Monarch, Magnetic Laboratory, Art Festivals).
- Tallahassee Museum.
- Lincoln High School Stormwater Pond.
- Wastewater Treatment Plant Tours.
- Displays at Malls, Movie Theaters, Airports.
- Annual Home Show, Parade of Homes.
- County First Time Homeowners Program.
- City's Think About Personal Pollution (TAPP) Program.
- Wakulla Environmental Institute.
- State Agency Staff Education.
- U.S. Environmental Protection Agency's (EPA's) Septic Smart Week in September.
- Earth Day at the Capital in April.
- Florida State University Football Games.

- State History Museum.

The management strategies listed in **Table D-2** 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.

Table D-2. Stakeholder education activities to implement the OSTDS remediation plan

Lead Entity	Project Number	Project Name	Project Description	Project Type	Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lb-N/yr)	Cost Estimate	Funding Source	Funding Amount
City of Tallahassee	**COT-014**	Public Education-Wakulla Springs Nitrate Video	5 min video educates homeowners on the local groundwater system & explains the need to address septic systems to restore Wakulla Springs. Shared via social media and WCOT TV.	Enhanced Public Education	Completed	2014	N/A	UTF	0	$27,000	COT Water Resources Engineering	Not Provided
City of Tallahassee	**COT-016**	OSTDS Reduction Outreach Initiative - Outreach for the City of Tallahassee's Connect Septic to Sewer Project	2017 – 2019 the City of Tallahassee will produce and distribute educational public service announcements, billboards, and other media, to encourage City residents who are on septic systems within Priority Focus Area 1 (PFA1), to connect to existing central sewer.	Enhanced Public Education	Underway	2017	N/A	UTF	TBD	$170,000	DEP-FY2015-319/City of Tallahassee	100,000
City of Tallahassee	**COT-017**	2017-2020 Dev. & Imp Edu Plan	Development & implementation of plan to educate residents about springshed and impact on Wakulla Springs - including PSAs.	Enhanced Public Education	Planned	2018	N/A	UTF	TBD	$50,000	DEP-FY2017-319/City of Tallahassee Submitted to EPA	25,000
Leon County	**LC-005**	Septic Tank Education	Add educational kiosks at the Woodville Community Center to explain how septic systems work.	Public Education Efforts	Underway	2015	N/A	OSTDS	TBD	$2,500	N/A	N/A
Wakulla County	**WC-003**	Public Education on OSTDS	Provide citizens and officials with the best available information for decision making regarding the use of OSTDS and decentralized wastewater systems to reduce nutrients in groundwater to the springs.	Public Education Efforts	Completed	2007	N/A	OSTDS	TBD	N/A	N/A	N/A

Appendix E. Technical Support Information

E.1 NSILT Data

An NSILT was completed on Wakulla Spring for the Wakulla Spring BMAP. This technical support information identifies the data sources relied upon during NSILT development and documents all the major assumptions used by DEP when applying the NSILT approach to the Wakulla Spring 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 an aquifer vulnerability assessment conducted by Advanced Geospatial Inc. for Leon and Wakulla Counties in 2007. The assessment was based on regional geologic and physiographic contexts affecting groundwater hydrology. Additionally, the presence of groundwater conduits was also considered.

Land Use
Land use information is from NWFWMD based on the 2012 to 2013 Florida Land Use Cover and Forms Classification System (FLUCCS) and local county property appraiser offices within the BMAP boundary.

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 Wakulla Spring dataset 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. Smaller WWTFs are not always required to monitor and report TN effluent concentrations, and therefore may not have data available in the WAFR database. For these, DEP estimated TN concentrations based on nitrate-N (NO3-N) data (assuming the NO3-N concentration was 38.5 % of the TN, based on a 2009 cooperative study with the Water Reuse Foundation of 40 domestic WWTFs across the state).

The range of years for which data were available varied with the individual WWTFs; however, the majority of the data were collected between 2016 and 2017.

OSTDS

In 2014, FDOH began the Florida Water Management Inventory (FLWMI), a statewide project to develop geographic information system (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 for each county. The 2010 persons per household for Leon, Wakulla, Gadsden, and Jefferson Counties were reported as 2.35, 2.61, 2.61, and 2.38, respectively. The total population in the Wakulla BMAP area served by septic systems was calculated by multiplying the number of people per household (adjusted for occupied populations) by the number of septic systems. 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 this NSILT, urban fertilizers include fertilizer application estimates for residential purposes, business, parks, and similar properties. Golf course and sporting facility fertilizer use is estimated separately (see STF discussion below). Results from surveys and workshops pertaining to fertilizer application on turfgrass in nearby counties were used to estimate the nitrogen application rates for urban turfgrass in the Wakulla Spring BMAP area. The results provided input data on percent of the population that fertilize, the applicator, and application rates.

For residential parcels such as single- and multi-family homes, the acreage receiving fertilizer applications is calculated in the same manner as nonresidential parcels. Prior to applying the fertilizer application rates to the pervious land area, two factors are taken into account: (1) the percentage of a property that a homeowner will fertilize, and (2) the probability that a homeowner will use fertilizer.

While homeowners may apply fertilizer to all the pervious area on their property (lawns and beds), this is less likely for those with larger lot sizes. For this analysis, it was assumed that the owners of properties with greater than one acre of pervious land area would regularly apply fertilizer to no more than one acre.

Property value may also be a factor when considering the likelihood of fertilizer application. Previous socioeconomic studies have shown that property value is a reliable indicator of the probability that a homeowner will apply fertilizer to a property (Kinzig et al. 2005; Law et al.

2004; Zhou et al. 2008; Cook et al. 2012). Properties with higher assessed values tend to be fertilized more than properties with lower assessed values. To account for this, the range of property values for single-family homes was evaluated for the BMAP area and subdivided into three categories based on property value specific to the county: high, medium, and low.

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.

Fertilizer application on commercial and public green spaces was assumed to be performed by lawn service professionals or trained staff using application rates and frequencies similar to those recommended in the *Green Industries BMP Manual* (DEP 2010). For estimating the urban, non-residential fertilizer input in the Wakulla BMAP area, an average application rate of 21.78 lb-N/yr was used.

In 2016, a COT contractor conducted a telephone survey to solicit information about residential fertilizer use in Leon County (TAPP 2016). This survey provided information on urban turf fertilizer application practices in the BMAP area. Information was also obtained from a 2008 study by a Southwest Florida Water Management District (SWFWMD) contractor in the Springs Coast region (Martin 2008) and a 2009 fertilizer use survey in the Wekiva River Basin by the University of Central Florida Stormwater Management Academy (Suoto et. al 2009). Some information about fertilizer use was obtained from each survey, although none of them provided a complete picture.

Residential parcels are evaluated by estimating the survey information cited above. According to the Leon County survey, most of the surveyed residents (68 %) did not fertilize their lawns, 17 % applied fertilizer to their own lawns, and 15 % had lawn service contractors apply fertilizer (TAPP 2016). These rates, combined with the consideration of the likely area being fertilized and the likelihood of fertilizer use, were the basis of the estimates of residential fertilizer use.

STF

Sports turfgrass areas include golf courses and sporting facilities. The nitrogen input for 11 golf courses in the BMAP area are estimated using voluntary surveys completed by some of the golf course superintendents. Of those surveyed, only 3 superintendents responded with detailed information about fertilizer use. The results indicated that nitrogen fertilizer was being applied at an average rate of 71.0 pounds of nitrogen per acre per year (lb-N/ac/yr). This average accounts for higher application in some areas (greens, tees, fairways) and much lower application in others (rough). The average rate of 71.0 lb-N/ac/yr was used for the remaining golf courses in the NSILT analysis (assuming 72 % of the course area is fertilized) (DEP 2007).

Sporting facilities were assessed based on property appraiser data. The parcel types likely to contain these facilities were identified and evaluated based on aerial imagery, including schools, clubs/lodges, forest/parks/recreational, colleges, and outdoor parkland/recreational. Any sports turfgrass acreage that fell within a parcel previously identified as urban turfgrass was subtracted

from the urban turfgrass acreage to avoid double counting. In total, 320 acres (ac) of land were associated with sports facilities in the Wakulla BMAP area, with 108 ac in the unconfined region, 186 ac in the semiconfined region, and 26 ac in the confined region. It was assumed that turf areas at sports facilities are fertilized at rates applied by lawn service companies (21.78 lb-N/ac twice a year)

LW

Livestock waste practices specific to this area were identified through several steps. The nitrogen waste factor for each animal type is based on published literature values and subdivided into locations and recharge area (Goolsby et al. 1990; Chelette et al. 2002; Ruddy et al. 2006; Meyer 2012; Sprague and Gronberg 2013). Livestock populations were drawn from the 2012 Census of Agriculture (CoA) that provides the number of livestock by kind of animal per county. The number of livestock in the BMAP area are adjusted by estimating the land use percentages in the BMAP area compared to the full county land uses to get a percentage of livestock-related land uses in the NSILT area. The 2012 data were cross-referenced with the populations reported in the 2016 Annual Survey of Agriculture (published by the USDA).

FF

Agricultural fertilizer is applied at varying rates depending on crop type and farm practices. Water Management District land use information, and an agricultural land use planning tool called the FSAID geodatabase were used to determine fertilized land. Estimated application rates by crop type are based on discussions of local fertilizer practices with FDACS and UF. These crop fertilizer application rates were applied to the applicable agricultural acres based on crop type.

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. Additionally, research scientists in Florida (UF–IFAS, universities, and USDA Agricultural Research Service), and local stakeholders provided additional guidance. The BAFs in **Table E-1** 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-1**.

Table E-1. Range of environmental attenuation of nitrogen from a detailed literature review

1	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 Systems	40	50	75
Livestock Waste	80	90	95
Dairies	30	50	70
Farm Fertilizers	50	80	85
Urban Fertilizers	50	70	85

Hydrogeological Attenuation (i.e., Recharge)

The recharge rate for the area where the surface input is calculated is based on the recharge map previously described. To account for variations in recharge rates to the UFA, non-attenuated nitrogen inputs in unconfined recharge areas are multiplied by a weighting factor of 0.9, while nitrogen inputs are multiplied by a weighting factor of 0.4 for semi-confined recharge areas and 0.1 for confined recharge areas.

Estimated Nitrogen Load 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.

E.2 References

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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 or NWFWMD. Failure either to implement BMPs or conduct monitoring may result in enforcement action by DEP or NWFWMD.

Growers who implement BMPs may be eligible for cost-share funding from FDACS, NWFWMD, or others to defray partially the costs of implementation. Through 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 for enrollment in the FDACS BMP Program within the Upper Wakulla River and Wakulla Spring BMAP area using the FSAID IV geodatabase.

Table F-1 summarizes the land use data for agriculture in the Upper Wakulla River and Wakulla Spring BMAP. Based on the FSAID IV geodatabase, the total agricultural lands within the Upper Wakulla River and Wakulla Spring Basin is 62,969 acres. **Table F-2** summarizes the agricultural land by crop type that was estimated to be fertilized and the corresponding acreages. The primary agricultural fertilized land use in the Upper Wakulla River and Wakulla Spring BMAP is hay, improved pasture, and cropland/pastureland which comprises 87 % of the fertilized land use in the springshed. **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 Upper Wakulla River and Wakulla Spring BMAP.

Table F-1. Agricultural land use within the Upper Wakulla River and Wakulla Spring BMAP

Agricultural Nitrogen Loading Category	Acres
Crop Fertilizer Lands only	31,119
Livestock Lands only	4,998
Crop Fertilizer and Livestock Lands	26,579
Total	**62,696**

Table F-2. Fertilized crop lands within the Upper Wakulla River and Wakulla Spring BMAP

Crop Type	Application Rate (lbs/acre)	Acres
Container Nursery	90	1,132
Cotton	60	690
Cropland and Pastureland	60	31,639
Field Corn	210	192
Field Corn (not irrigated)	150	544
Field Crops	90	515
Field Nursery	90	152
Grains	100	56
Grass/Pasture	80	650
Hay	160	9,322
Horse Farms	100	986
Improved Pasture	60	9,601
Mushrooms	151	4
Ornamentals	90	104
Peanuts	20	290
Peppers	200	53
Pole Beans and Peppers	160	9
Small Vegetables	151	115
Sod	50	762
Tomatoes	200	294
Tomatoes and Peppers	200	93
Tomatoes and Watermelon	200	56
Vegetables	151	439
Total	-	**57,698**

Table F-3. Livestock lands within the Upper Wakulla River and Wakulla Spring BMAP

Livestock Category	Acres
Cropland and Pastureland	16,179
Herbaceous (Dry Prairie)	736
Horse Farms**	986
Improved Pasture**	9,415
Specialty Farms	73
Unimproved Pastures	634
Woodland Pastures	3,555
Total	**31,578**

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 due to 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 a 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 being conducted on the land 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.

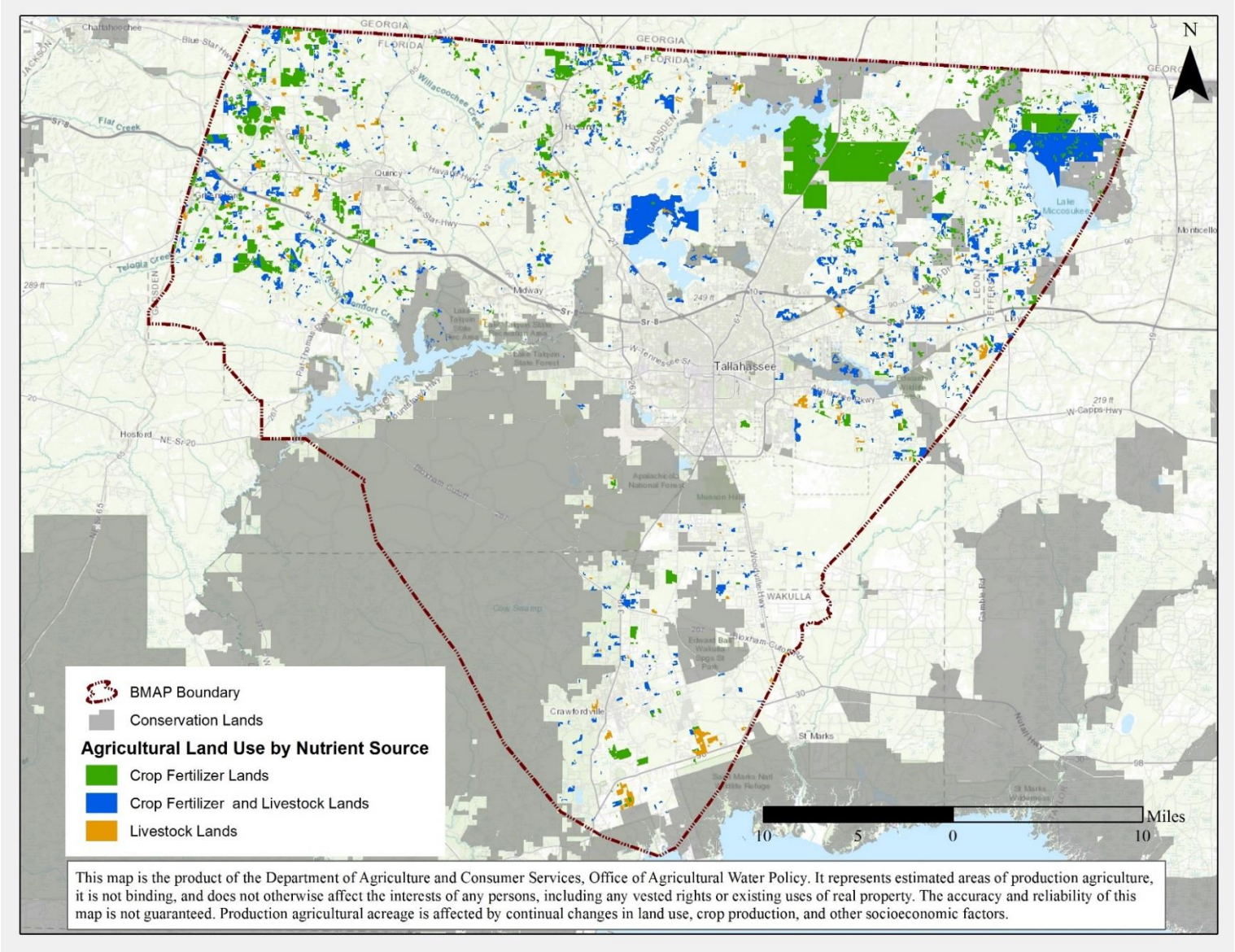

Figure F-1. Composite of agricultural lands in the Upper Wakulla River and Wakulla Spring BMAP area

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 Upper Wakulla River and Wakulla Spring Basin 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 where 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 is included in **Table F-4**.

As of December 31, 2017, NOIs cover 39,153 agricultural acres in the Upper Wakulla River and Wakulla Spring Basin. No producers are conducting water quality monitoring in lieu of implementing BMPs at this time.

Table F-4. Agricultural acreage and BMP enrollment in the Upper Wakulla River and Wakulla Spring BMAP area as of December 31, 2017

Related FDACS BMP Programs	NOI Acreage Enrolled	FSAID4 Agricultural Land Use Acres within NOIs
Citrus	448	80
Cow/Calf Operations	7,657	3,291
Multiple Commodities	297	297
Nurseries	2,809	1,295
Row/Field Crops	24,193	10,062
Specialty Fruit and Nut	3,199	84
Sod	550	235
Total	**39,153**	**15,344**

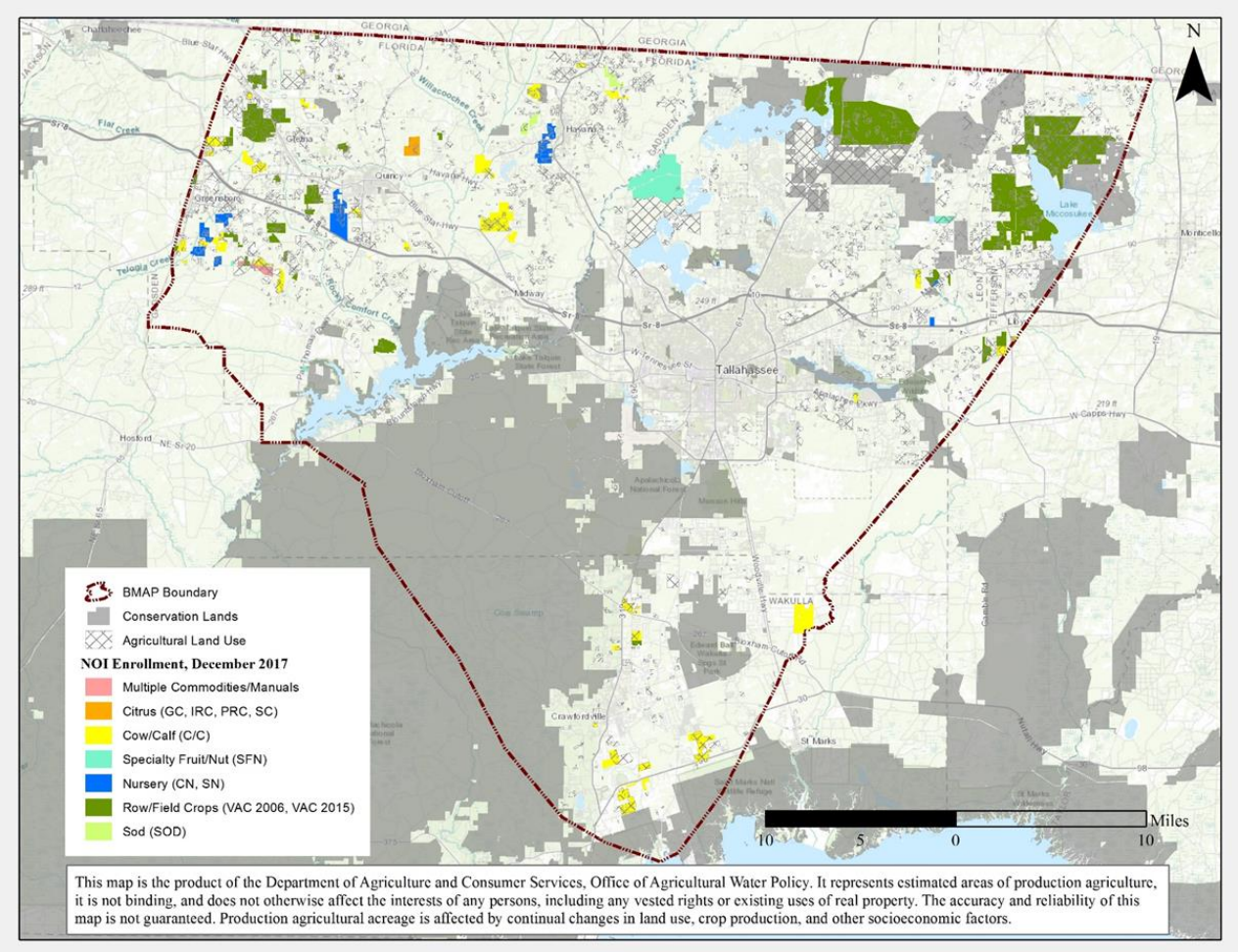

Figure F-2. BMP enrollment in the Upper Wakulla River and Wakulla Spring BMAP area as of December 2017

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

OAWP works with producers to submit Notices of Intent (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 additional projects and practices that reduce nutrients from agricultural nonpoint sources. In that case, FDACS will work with DEP and NWFWMD 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 and NWFWMD activities. If a reevaluation of the BMPs is needed, FDACS will also include NWFWMD and other partners in the process.

F.5 OAWP Implementation Verification 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 Implementation Verification rule (Chapter 5M-1, F.A.C.) became effective. The Implementation Verification (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 5-10% 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 funding is made available. Acreages provided by FDACS are preliminary estimates that are 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 design 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 Upper Wakulla River and Wakulla Springs Springshed. 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
Wakulla County	Ordinance No. 2013-08	Wakulla County Floodplain Management Ordinance	Ordinance	Completed
Wakulla County	Ordinance No. 2010-01	Fertilizer Regulations	Ordinance	Completed
Wakulla County	Ordinance No. 2009-09	Sewage Disposal	Ordinance	Completed
Wakulla County	Ordinance No. 2007-03	Landscape Regulations	Ordinance	Completed
Wakulla County	Conservation Objective 2	Protect surface water quality to ensure that water quality is not allowed to degrade below present conditions, including that of Wakulla Springs, St. Marks Springs, Spring Creek Springs, and the sections of the St. Marks, Wakulla, Sopchoppy and Ochlockonee Rivers and Apalachee Bay that have been declared by DEP as Outstanding Florida Waters.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 2.2	The County shall inspect and monitor on a regular basis at least annually all county owned wastewater treatment facilities larger than 2,000 gallons to ensure compliance with effluent standards.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 2.3	The County shall not allow any stormwater discharge to flow into a wetland, river, spring, spring run, or other body of water, or into a freshwater fishery, bay, lake or other marine habitat or sinkhole or other karst feature connected to the aquifer without sufficient prior treatment to protect the receiving waters from degradation consistent with the below applicable State water quality standards including state anti-degradation standards.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 2.3.1	The harvesting of trees shall be pursuant to "Silviculture Best Management Practices 2008," Florida Department of Agriculture and Consumer Services, Rule 5I-6, F.A.C., and shall apply to intermittent or perennial streams.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Wakulla County	Conservation Policy 2.6	The County shall require review of proposed site plans and planned unit developments and the evaluation of the effects of land development activities on the natural functions of fresh water fisheries, bays, lakes, springs, spring runs, karst features connected to the aquifer, beaches, shores and marine habitats, floodways and wetlands. Where adverse impacts are noted, uses and disturbed areas on the site shall be arranged so as to minimize impact on such areas. Site plan review shall be required for any development directly contiguous to or involving disturbance of floodways, wetlands, a freshwater or saltwater body, beach, dune, springs, spring runs or karst features connected to the aquifer.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 5.1	The County hereby adopts DEP's water quality standards and shall coordinate with DEP and NWFWMD, to monitor groundwater quality and levels.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 5.4	The County shall protect water quality through the regulation of activities known to adversely affect the quality and quantity of identified water sources such as storage and handling of hazardous and toxic materials without secondary containment, continuation of abandoned wells, and operation of unpermitted landfills. Water sources to be protected shall include existing identified cones of influence, water recharge areas and water-wells. The County will also prohibit discharges of pollutants, as defined by DEP, into sinkholes.	Comprehensive Plan	Completed
Wakulla County	Conservation Objective 6	Regulate the existing and projected allowable water quality and quantity, including natural water flows to receiving estuarine bodies, such that no net quantity increase or quality decrease will be allowed through mandated project review criteria in the land development codes.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 6.2	In reviewing proposed development involving sites larger than 10 acres, the County shall require all potential commercial and industrial water users to develop a wastewater reuse plan with assistance from NWFWMD, except when those potential users are to be connected to a central sewer system which provides for reuse.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Wakulla County	Conservation Policy 6.5	The use of landscaping BMPs as stated in the Florida Friendly BMPs for Protection of Water Resources by the Green Industries (DEP, 2015) is encouraged by non-commercial applicators of fertilizer. All commercial and institutional applicators of fertilizer shall comply with Article 2 of Chapter 13 in the Code of Ordinances and as such, abide by the practices of the aforementioned Best Management Practices manual.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 6.6	All golf course siting, design, construction, and management shall implement the prevention, management, and monitoring practices, detailed in the golf course siting, design, and management chapter of the P*rotecting Florida's Springs Manual – Land Use Planning Strategies and Best Management Practices.* These practices are derived from the Audubon International Signature program.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 7.1	The County shall develop and implement a stream and bank stabilization program to minimize erosion caused by human activity along the rivers and streams.	Comprehensive Plan	Completed
Wakulla County	Conservation Objective 12	To develop solutions to restore the health of Wakulla Springs by reducing pollutants in the groundwater.	Comprehensive Plan	Completed
Wakulla County	Conservation Policy 12.1	The County shall adopt in the Land Development Regulations a mapped Primary Spring Protection Zone (PSPZ) for Wakulla Springs based on the Florida Aquifer Vulnerability Assessment (FAVA) and in consideration of the Wakulla Aquifer Vulnerability Assessment and the Leon County Aquifer Vulnerability Assessment. Land development regulations shall be adopted to establish additional requirements and regulations within the PSPZ to minimize the adverse impacts of development on groundwater recharge quality and quantity. At a minimum, Wakulla County shall consider and address the items below: 1) preferred method of wastewater treatment…2) performance-based OSTDS…3) low impact development (LID) approach…4) transfer of development rights…5) restrict fertilizer content and application rates and incorporate the principles of the FYN Program, 6) protect environmentally sensitive areas…and 7) regulate underground storage tanks.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Wakulla County	Future Land Use (FLU) Objective 13	Protect Wakulla County's springs and water quality.	Comprehensive Plan	Completed
Wakulla County	FLU Policy 13.3	In order to minimize the contribution of nitrates to groundwater with its resultant effects on increased growth of vegetation in the springs, rivers and coastal waters, and loss of water clarity, and to foster long-term stewardship, special design and BMPs as set forth in policies 13.4 through 13.11 shall be instituted for all proposed development.	Comprehensive Plan	Completed
Wakulla County	FLU Policy 13.8	All development shall require BMPs, such as those included in the principles and practices of the FYN Program, and incorporate these practices into development orders and covenants and restrictions for subdivisions.	Comprehensive Plan	Completed
Wakulla County	FLU Policy 13.9	Landscaping standards shall encourage plant materials to be native or naturalized species in order to avoid or minimize the use of irrigation and fertilizers. Landscaping standards should also encourage retention of existing native species rather than planting new vegetation.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.1.5	Consistent with the urban growth policies of FLU Element of this Plan, centralized sanitary sewer and potable water shall be provided to the urbanizing areas shown in the support documents of this plan.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Objective 1.3	To implement mandatory requirements for inspections, operations and maintenance of on-site wastewater treatment systems.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.3.1	Use of on-site wastewater treatment systems shall be limited to the following conditions…	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.3.4	The County will coordinate with appropriate federal and state agencies and amend local ordinances to require that issuance of permits for replacement or expansion of existing on-site wastewater treatment systems is conditioned upon compliance with current regulatory requirements and water quality standards.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.3.5	The County will coordinate with Leon County and the City of Tallahassee to explore the establishment of a regional management entity for decentralized wastewater systems.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Wakulla County	Infrastructure Policy 1.3.6	All new development shall connect to central wastewater treatment facilities within one year from the date that such facilities are available or become available as provided by law. For central wastewater treatment facilities whose sprayfield(s) or other disposal system is located in the Wakulla Springs Special Planning Area, the following standards for treatment are: a. AWT levels (3mg/L for nitrogen, 5 mg/L CBOD, 1 mg/L total phosphate, 5 mg/L suspended solids, & a high level of disinfectant) for all Type I (design capacity of 500,000 gallons per day to 12.5 million gallons per day) and Type II (100,000 to 500,000 gallons per day) central wastewater treatment facilities using RIBs. b. A treatment standard above secondary treatment of 10 mg/L for nitrogen for Type III (less than 100,000 gallons per day) facilities.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.3.7	Effective October 1, 2012, the requirement for new development to install performance-based septic systems as provided in Policy 1.3.1 shall only apply to those properties outlined below. A list of approved systems, which shall include all nitrogen reducing systems engineered to achieve a 50 percent (50%) nitrogen reduction at the outfall of the tank, shall be maintained at the Wakulla County Health Department.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 1.3.8	Notwithstanding the requirements in Policy 1.3.1, effective October 1, 2012 repairs and modifications, as defined in Chapter 64E-6 F.A.C. or its successor in function, to existing residential septic systems or to non-residential septic systems having a flow rate of 500 gallons per day or less shall be allowed without requiring that system to be upgraded to a performance-based septic system, but any repair or modification of an existing septic system within the County shall require conformance with State law.	Comprehensive Plan	Completed
Wakulla County	Infrastructure Policy 2.5.1	New development will be required to maintain surface and groundwater flow rates and volumes at pre-development levels so that the natural function of groundwater recharge areas is maintained.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Wakulla County	Infrastructure Policy 2.5.3	BMPs shall be used in combination as part of a BMP treatment plan to protect water quality and minimize flooding. BMPs shall be used in the design of stormwater management facilities and systems. The following stormwater BMPs shall be instituted to reduce nitrate loading…	Comprehensive Plan	Completed
Leon County	Ordinance Nos. 07-20 and 12-07	Leon County Environmental Management Act		
Leon County	Ordinance No. 10-01	Floodplain Management Ordinance	Ordinance	Completed
Leon County	Ordinance No. 07-20	Aquifer/Wellhead Protection; Stormwater Management System	Ordinance	Completed
Leon County	Ordinance No. 09-34	Fertilizer Use	Ordinance	Completed
Leon County	Ordinance No. 93-6	Leon County Urban Services Area Water and Sewer Systems Ordinance	Ordinance	Completed
Leon County	Ordinance No. 17-11	Public Water and Sewage Disposal Systems	Ordinance	Completed
Leon County	Ordinance No. 16-01	Leon County On-Site Sewage Disposal System Ordinance	Ordinance	Completed
Leon County	Ordinance No. 13-10	Stormwater Utility	Ordinance	Completed
City of Tallahassee	Ordinance No. 08-O-72AA	Fertilizer Use	Ordinance	Completed
City of Tallahassee	Code 1957, § 28-7; Code 1984, § 11-97	Sewers and Sewage Disposal	Ordinance	Completed
City of Tallahassee	Ordinance Nos. 89-O-0058AA and 11-O-35	Stormwater Collection and Disposal	Ordinance	Completed
City of Tallahassee-Leon Co.	FLU Policy 1.1.4	Central water and sewer may be provided in areas designated as Rural Community, Woodville Rural Community, and enclaves within the Woodville Rural Community designated for Residential Preservation on the future land use map.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Tallahassee-Leon Co.	FLU Policy 1.2.4	By 2010, local government shall adopt in the Land Development Regulations a mapped PSPZ for Wakulla Springs based on the Leon County Aquifer Vulnerability Assessment. Accompanying land development regulations for the PSPZ shall be developed as indicated in Policy 4.2.5 of the Conservation Element to aid in the protection of Wakulla Springs. These efforts shall be coordinated with Wakulla County.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Aquifer Recharge Objective 1.1	Maintain regulations and programs to protect the function of natural groundwater recharge areas and natural drainage features, including areas of high aquifer vulnerability.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Wastewater Objective 1.1	Treat and dispose of all wastewater in a manner that protects natural resources and public health.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Wastewater Objective 1.2	Maintain ordinances that regulate septic tanks in a manner that protects public health and groundwater quality.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Wastewater Policy 1.2.1	The land use designations on the Future Land Use Map notwithstanding, the densities and intensities authorized by such land use designations shall not be allowed until such time as central water and sewer services are available, except as provided in Policy 1.2.3: [SS] and 1.2.4: [SS] below. The minimum lot size for a septic tank shall be one-half acre.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Wastewater Policy 1.2.5	Facilities other than traditional septic systems must be provided before development is allowed in areas where severe soil limitations exist for septic systems.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Wastewater Policy 1.2.6	Within the PSPZ, as identified in Policy 4.2.5 [C], performance based OSTDS shall be required when connection to sewer facilities designed to achieve AWT standards is not available. Performance based OSTDS must be a design that is accepted by FDOH. Local government shall establish by ordinance a nitrogen reduction treatment standard for new and replacement performance based OSTDS in the PSPZ.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Stormwater Policy 1.2.1	A stormwater management ordinance shall establish minimum aesthetic standards for stormwater facility designs and shall provide incentives to encourage designs which exceed minimum standards.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Tallahassee-Leon Co.	Stormwater Policy 1.2.2	All permitted stormwater facilities shall be inspected periodically to ensure compliance with code.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Stormwater Policy 1.5.4	Water quality impacts from stormwater runoff associated with sites that were developed prior to the adoption of current stormwater treatment regulations will be addressed through two approaches. Land development regulations require water quality retrofit of sites that undergo major redevelopment. To address water quality impacted from older developed areas not undergoing major redevelopment, local government will develop and fund a water quality enhancement program. This water quality enhancement program will be developed with due consideration of State and Federal regulatory requirements, technical feasibility and community affordability. The water quality enhancement program will be funded through revenue generated by the Stormwater Fee at the funding level approved by the City Commission.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Conservation Policy 1.2.1	Local government shall work with all applicable private, local, state and federal programs such as the Conservation and Recreation Lands program, Save Our Rivers, SWIM, Land Acquisition Trust Fund program and others in the acquisition and maintenance of unique vegetative communities, as well as protecting and enhancing surface and groundwater.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Conservation Objective 2.2	By 1992, local government shall have in place programs and procedures to improve water quality in degraded water bodies. In other natural water bodies, local government shall have in place programs and procedures to maintain water quality in order to meet local standards or state standards if no local standards are designated.	Comprehensive Plan	Completed
City of Tallahassee-Leon Co.	Conservation Objective 4.2	Protect aquifer recharge areas from contamination by restricting land uses with the potential to contaminate groundwater through site location review and strict monitoring requirements and by establishing a PSPZ for Wakulla Springs.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Tallahassee-Leon Co.	Conservation Policy 4.2.5	By 2010, local government shall adopt in the Land Development Regulations a mapped PSPZ for Wakulla Springs based on the Leon County Aquifer Vulnerability Assessment (LAVA). Land development regulations shall be adopted to establish additional requirements and regulations within the PSPZ to minimize the adverse impacts of development on groundwater recharge quality and quantity. At a minimum, local government shall address the items below…	Comprehensive Plan	Completed
Gadsden County	Ordinance No. 09-007	On-site sewage disposal systems; state law provisions adopted. The provision of F.S. § 381.00655, which mandates that every on-site sewage disposal system, except approved on-site graywater systems, shall be connected to a central sewage collection and disposal system within 365 days after such a system becomes available, is adopted in its entirety as law within the unincorporated areas of the county.	Ordinance	Completed
Gadsden County	Ordinance No. 2017-005	Fertilizer Ordinance	Ordinance	Completed
Gadsden County	Ordinance No. 95-010	Flood Damage Prevention	Ordinance	Completed
Gadsden County	FLU Policy 1.2.3	If the residential density calculation relies upon the connection to a central water or sewer system or package plant, and the central water or sewer system or package plant is not online at the time of the development order submission, a development agreement shall be required as part of the process in order to grant the density. The system must be available and online within 3 years of the completion of the development in order for the additional density to be granted.	Comprehensive Plan	Completed
Gadsden County	FLU Policy 1.2.4	If the proposed development is located within one half mile of existing potable water or sanitary sewer infrastructure, the developer shall connect to the existing service provider for potable water or sanitary sewer services.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Gadsden County	FLU Policy 1.2.5	If the proposed development is located within one half mile of existing potable water or sanitary sewer infrastructure, and current capacity does not exist to provide for the projected demands of the development, dry lines shall be installed and provided to serve the projected capacities of the development when the service provider obtains the capacity to serve the development.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.3.1	The County shall require new developments to connect to sanitary sewage systems and central water systems, if they are within ¼ mile of such public facilities, within 24 months if the provider can provide capacity.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.5.1	The County shall prohibit the installation of OSTDS in locations with unsuitable soils and within 100 feet of wetlands, creeks, streams, ponds, lakes and critical habitat areas (endangered and threatened animals and plant species). Mound systems (soil absorption systems) are prohibited in mobile home parks.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.5.5	The County shall permit OSTDS subject to minimum standards of Rule 64E-6, F.A.C., Policies 4.5.1 and 4.12.6, the Future Land Use Map, Policy 1.5.2 of the Future Land Use Element, and the following requirements: 1. A maximum of 4 units per acre with central water. Exclusive of streams, lakes, normally wet ditches, marshes or other such bodies or surface water. 2. A mound system must be used if the water table is within 24 inches of the surface.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.7.5	The County shall use such measures as BMPs to provide for the conservation, appropriate use and protection of the quality and quantity of current and projected water sources such as the Quincy Creek and Interlocken Lakes Drainage Basins, water recharge areas and potable water wells.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.7.6	The County shall permit the use of greywater systems for irrigation purposes, or other appropriate reuse applications. The county shall support the reuse of effluent from AWT facilities when appropriate.	Comprehensive Plan	Completed
Gadsden County	Infrastructure Objective 4.11	The County shall protect the functions and natural drainage features in the floodplain in accordance with the provisions of the FEMA National Flood Insurance Protection Program pursuant to 44 Code of Federal Regulations.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Gadsden County	Infrastructure Policy 4.12.1	The County shall require that all development and redevelopment meet the following standards to protect the Floridan aquifer, natural groundwater recharge areas, and natural drainage features: 1) Silviculture – "Silviculture Best Management Practices" – FDACS, 1993. 2) Agriculture – "Best Management Practices for Agrichemical Handling and Farm Equipment Maintenance" June 1998 3) Development – "Florida Development Manual: A Guide to Sound Land and Water Management" (1988)	Comprehensive Plan	Completed
Gadsden County	Infrastructure Policy 4.12.5	The County shall establish agricultural densities (1:5, 1:10, 1:20) restrict commercial/industrial activities, provide minimum setbacks and buffering of water bodies, prohibit the proliferation of deep wells and high concentrations of septic tanks in subdivisions, along with establishing streamside protection areas as conservation zones to protect the Quincy Creek Drainage Area.	Comprehensive Plan	Completed
Gadsden County	Conservation Objective 5.3	Conserve and protect the quality and quantity of local water bodies and their sources.	Comprehensive Plan	Completed
Gadsden County	Conservation Policy 5.3.3	The location of septic tanks and drain fields shall be prohibited within 100 feet of all perennial rivers, streams, creeks, lakes and wetlands.	Comprehensive Plan	Completed
Gadsden County	Conservation Policy 5.3.6	Any Outstanding Florida Water (OFW) or Class I surface water, designated by 62-302.700(9) and 62-302.400(16)(b) F.A.C., respectively, shall be afforded extra protections in the Land Development Code (Map 5.1).	Comprehensive Plan	Completed
Gadsden County	Conservation Policy 5.3.13	Promote water reuse and reclamation, where appropriate, for landscape, golf courses, and farm irrigation, and industrial use applications.	Comprehensive Plan	Completed
Gadsden County	Conservation Policy 5.3.14	Prescribe water wise "Florida Friendly Landscaping" guidelines for new non-residential development, and encourage the same for residential development.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Gadsden County	Conservation Policy 5.3.17	Procedures to remove or control intrusive submerged, emergent or floating vegetation shall be limited to that necessary to provide reasonable access, and provides the standard of aquatic weed control as defined by the appropriate agencies. Any use of chemical herbicides for such purposes shall ensure that water quality and ecological integrity are not degraded. Restoration of natural aquatic vegetation will be used in conjunction with shoreline restoration in all future conservation and outdoor recreation developments bordering the County's rivers, streams and lakes.	Comprehensive Plan	Completed
Gadsden County	Conservation Objective 5.5	Establish standards for silviculture activities.	Comprehensive Plan	Completed
Jefferson County	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

Lead Entity	Strategy Name	Description	Strategy Type	Status
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. 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.	Comprehensive Plan	Completed
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, waterbodies, 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

Lead Entity	Strategy Name	Description	Strategy Type	Status
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
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
Jeffers 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
City of Gretna	Ordinance No. 85-1	Municipal Water and Sewer System	Ordinance	Completed
City of Gretna	Ordinance No. O2002-1	Reclaimed Water System	Ordinance	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Quincy	Ordinance No. 1020, § 3	Stormwater Management	Ordinance	Completed
City of Quincy	Code 1958, § 33-13; Ord. No. 823, § 1	Sewers and Sewage Disposal	Ordinance	Completed