Gemini Springs
Basin Management Action Plan

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

with participation from the
Gemini Springs Stakeholders

June 2018

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Tallahassee, FL 32399
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Acknowledgments

The Florida Department of Environmental Protection adopted the *Gemini Springs 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. Gemini Springs stakeholders

Type of Entity	Name
Responsible Stakeholders	City of DeBary City of Lake Mary City of Sanford Seminole County Volusia County
Responsible Agencies	Florida Department of Agriculture and Consumer Services Florida Department of Environmental Protection Florida Department of Health Florida Department of Transportation St. Johns River Water Management District
Other Interested Stakeholders	Agricultural Producers Blue Springs Alliance Citizens/Homeowners East Central Florida Regional Planning Council Florida Farm Bureau Florida Onsite Wastewater Association Save the Manatee Club Septic Contractors Volusia Blue Audubon Volusia Water Alliance

See **Appendix A** for links to important sources referenced in this document. For additional information on the watershed management approach in the Gemini Springs Basin, contact:

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Table of Contents

List of Figures

List of Tables

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
FYN	Florida Yards and Neighborhoods
GIS	Geographic Information System
gpd	Gallons Per Day
IA	Implementation Assurance
IV	Implementation Verification
in/yr	Inch Per Year
lb	Pound
lb-N/yr	Pounds of Nitrogen Per Year
LID	Low Impact Development
LVS	Linear Vegetation Survey
LW	Livestock Waste
MFLs	Minimum Flows and Levels
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
OAWP	Office of Agricultural Water Policy
OFS	Outstanding Florida Spring
OSTDS	Onsite Sewage Treatment and Disposal System
PBTS	Performance-based Treatment System
PFA	Priority Focus Area
PSA	Public Service Announcement
QA/QC	Quality Assurance/Quality Control
RIB	Rapid Infiltration Basin
RPS	Rapid Periphyton Survey
SBIO	DEP Statewide Biological Database
SCI	Stream Condition Index
SJRWMD	St. Johns River Water Management District
SOP	Standard Operating Procedure
STF	Sports Turf Fertilizer
STORET	Florida Storage and Retrieval Database
SWIM	Surface Water Improvement and Management
TDEP	Total Atmospheric Deposition Model
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
UFA	Upper Floridan aquifer
UF–IFAS	University of Florida Institute of Food and Agricultural Sciences
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
UTF	Urban Turfgrass Fertilizer
WAFR	Wastewater Facility Regulation (Database)
WBID	Waterbody Identification (Number)
WIN	Florida Watershed Information Network Database
WMD	Water Management District
WWTF	Wastewater Treatment Facility
yr	Year

Executive Summary

Gemini Springs 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 has determined that 24 of the 30 OFS are impaired for the nitrate form of nitrogen. Gemini Springs is one of the impaired second magnitude OFS.

Gemini Springs is located in the Lake Monroe Planning Unit of the Middle St. Johns River Basin in Seminole and Volusia Counties. The BMAP area is approximately 27,290 acres (**Figure ES-1**). Gemini Springs is located in the City of DeBary. The BMAP area includes portions of the City of DeBary, City of Lake Mary, City of Sanford, Seminole County, and Volusia County.

Gemini Springs Priority Focus Area (PFA)

The PFA (**see Appendix C**) comprises 3,096 acres and includes a region in the northern part of the springshed for Gemini Springs. The PFA represents the area in the basin where the aquifer is most vulnerable to inputs and where there are the most connections between groundwater and Gemini Springs.

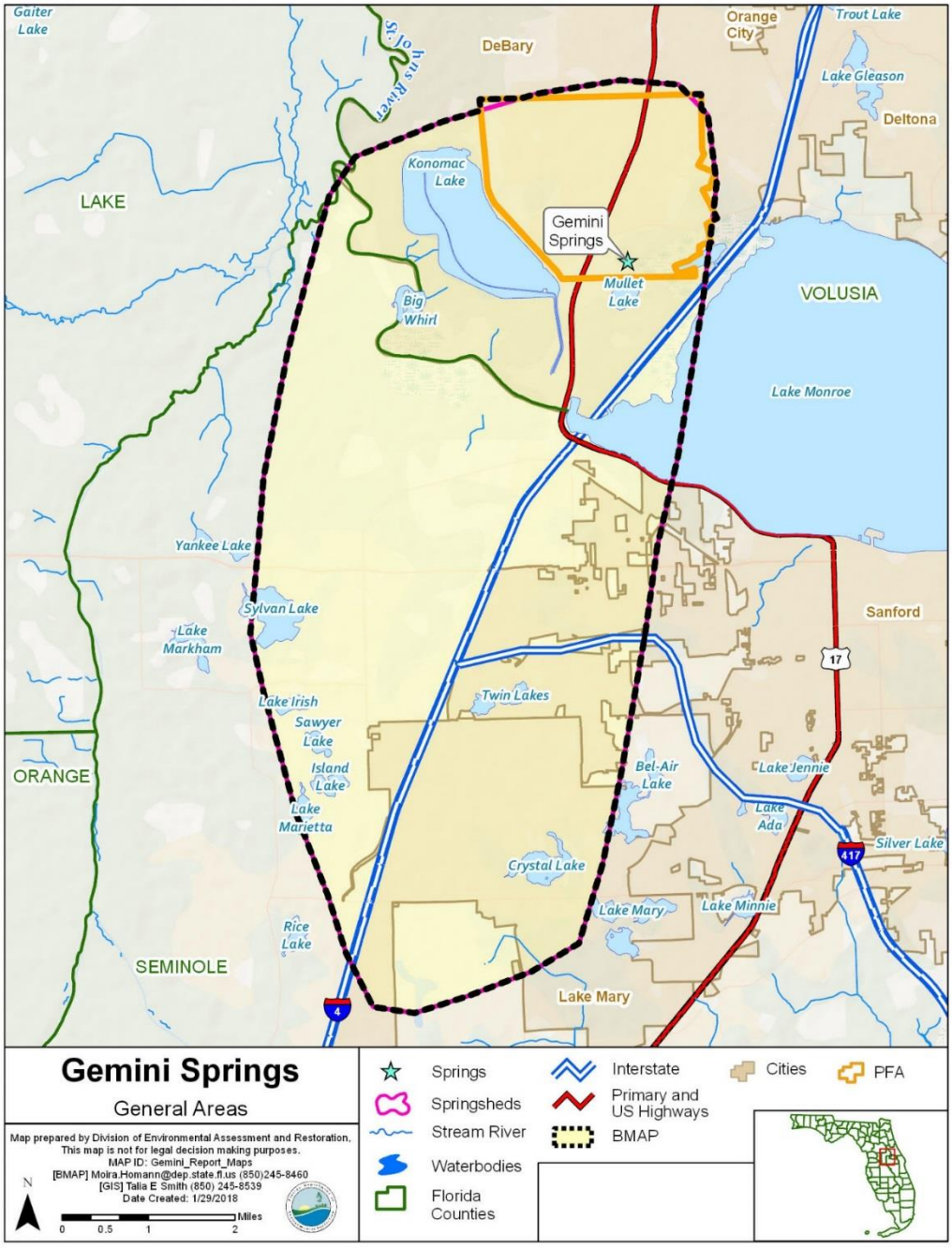

Figure ES-1. Gemini Springs BMAP and PFA boundaries

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

Gemini Springs was identified as impaired because of a biological imbalance caused by excessive concentrations of nitrate in the water. In 2017, a total maximum daily load (TMDL)

for nitrate was developed as a water quality restoration target for Gemini Springs. The TMDL established monthly average nitrate-nitrite target of 0.35 milligrams per liter (mg/L).

Urban turfgrass fertilizer (UTF) represents 46 % of the nitrogen loading to groundwater, onsite sewage treatment and disposal systems (OSTDS or septic systems; the terms are used interchangeably throughout this document) 41 %, and sports turfgrass fertilizer (STF) 4 % 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 14,270 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 4,281 lb-N/yr (30 %) within 5 years.
- An additional 7,135 lb-N/yr (50 %) within 10 years.
- The remaining 2,854 lb-N/yr (20 %) within 15 years.
- For a total of 14,270 lb-N/yr within 20 years.

The policies and submitted projects included within this BMAP are estimated to achieve a reduction of 14,010 to 18,865 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 farm fertilizer (FF), livestock waste (LW), STF; wastewater treatment facility (WWTF) upgrades; projects to reduce 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. 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 DOH for all OSTDS within the PFA on lots of less than one acre 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 the BMAP area (inside and outside the PFA).

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, Including Reuse (mg/L)
Greater than 100,000	3	3
20,000 to 100,000	3	6
Less than 20,000	6	6

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

- **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. Gemini Springs is an impaired second 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 Gemini Springs Basin was initiated in 2018.

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

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality criteria. Gemini Springs is a Class III waterbody 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 the resources.

DEP adopted a nutrient TMDL for Gemini Springs in 2017 (see **Table 1)**. The TMDL established a target of an annual average of 0.35 milligrams per liter (mg/L) of nitrate-nitrite to be protective of the aquatic flora and fauna. The period of record for water quality data evaluated for the TMDL was 2008 through 2013, as well as more recent data from 2013 through 2016.

Table 1. Restoration target for Gemini Springs

Waterbody or Spring Name	Waterbody Identification (WBID) Number	Parameter	TMDL (mg/L)
Gemini Springs	2893	Nutrients (Nitrate-Nitrite), annual average	0.35

1.3 BMAP Requirements

Section 403.067(7), F.S., provides DEP with 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 this 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 Gemini Springs BMAP area (**see Figure 1**) comprises 27,290 acres located in the Lake Monroe Planning Unit of the Middle St. Johns River Basin. Gemini Springs is located in the City of DeBary and also includes portions of the City of Lake Mary, City of Sanford, Seminole County, and Volusia County.

This area includes the surface water basin as well as the groundwater contributing areas for the springs (or springshed). The springshed for the OFS was delineated or approved by St. Johns River Water Management District (SJRWMD) with input from the Florida Geological Survey (FGS). A springshed is the area of land that contributes water to a spring or group of springs, mainly via groundwater flow.

1.5 Priority Focus Area (PFA)

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

1.5.1 Description

Nitrogen sources are more likely to influence groundwater quality under certain conditions. For example, where soils are sandy and well drained, less nitrogen is converted to gas and released into the atmosphere or taken up by plants, compared with other soil types. Therefore, local soil types 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. These conditions, and others, were considered in the delineation of the PFA (see **Appendix C**).

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

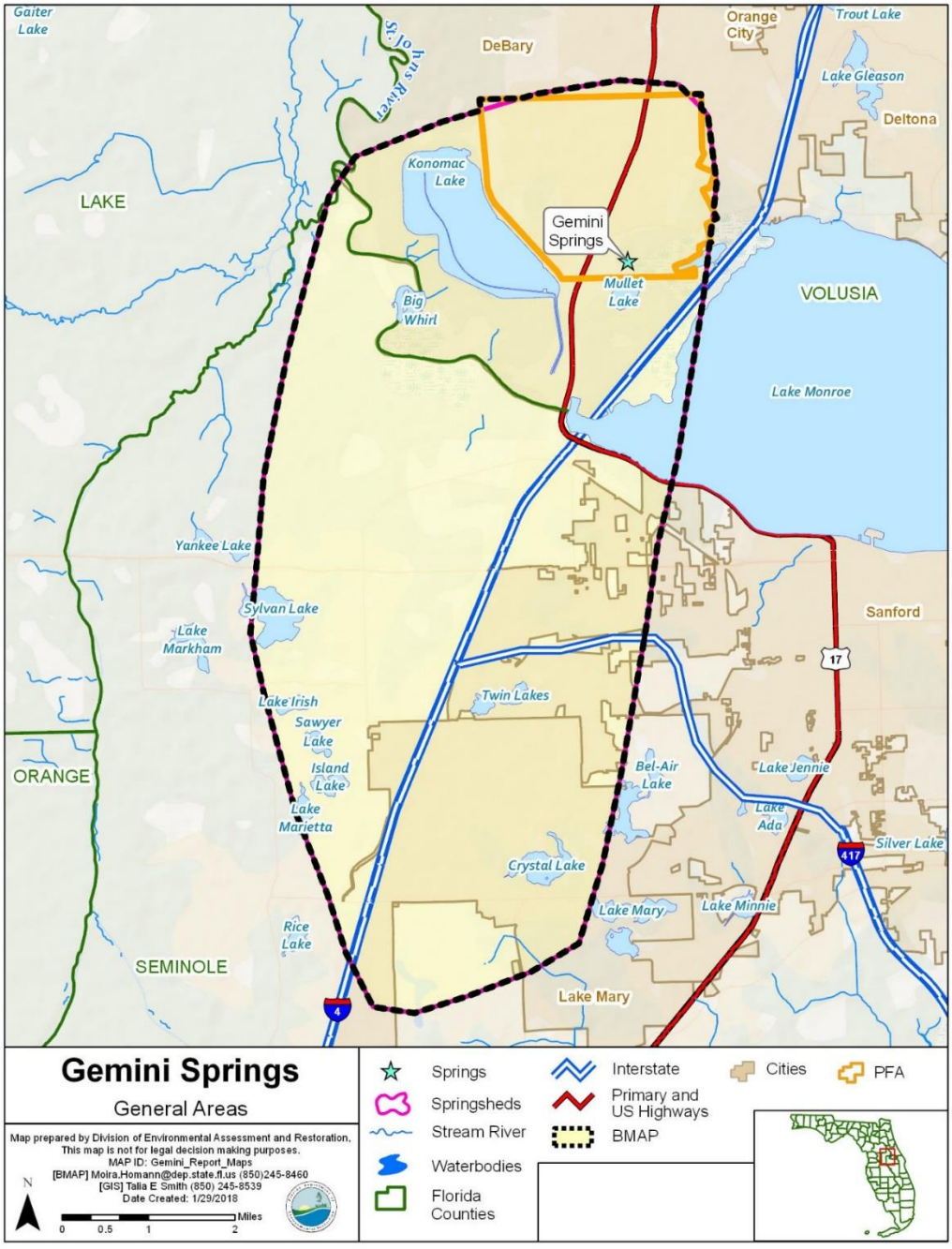

Figure 1. Gemini Springs BMAP and PFA boundaries

1.5.2 Additional Requirements

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

- New domestic wastewater disposal facilities, including rapid infiltration basins (RIBs), with permitted capacities of 100,000 gpd or more, except for those facilities that meet an

advanced wastewater treatment (AWT) standard of no more than 3 mg/L total nitrogen (TN) on an annual permitted basis.

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

- New facilities for the disposal of hazardous waste.

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

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

1.5.2.1 Biosolids and Septage Application Practices

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

All permitted biosolids application sites that are agricultural operations must be enrolled in the 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 to 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 Gemini Springs Basin, while other references provide 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** identifies the stakeholders who participated in the development of this BMAP.

During the development of the Gemini Springs 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, 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 22, 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 TMDL.

1.8 Description of BMPs Adopted by Rule

Table 2 identifies 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 TMDL

2.1 Allocation of Pollutant Loads

2.1.1 Nutrients in the Springs and Spring Systems

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

DEP developed the 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 be considered 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). 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. 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 to the NSILT:

- Low recharge (1 to 5 inches per year [in/yr]).
- Medium recharge (5 to 15 in/yr).
- High recharge (15 in/yr or greater).

In the NSILT, DEP applies different attenuation factors to different types of sources, so that various biological, chemical, and hydrogeological effects can be estimated. The attenuation that is applied means that the amount of nitrogen leaving a source (such as a livestock operation or a just-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-nitrite TMDL is 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	21,633	41%
UTF	24,289	46%
Atmospheric Deposition	2,511	5%
FF	451	1%
Sports Turfgrass Fertilizer (STF)	2,457	4%
LW	58	0.1%
Wastewater Treatment Facility (WWTF)	1,687	3%
Total	**53,086**	**100%**

2.1.3 Assumptions and Considerations

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

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

- **OSTDS Load Contribution** – A per capita contribution to an OSTDS of 9.012 lb-N/year 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 (2.57 for Seminole County and 2.38 for Volusia County) and additional information on the amount of time spent away from home by the school-age population and labor force (adjusted effective persons per household of 2.05 for Seminole County and 1.97 for Volusia 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 that 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 FDOH data. Future BMAPs and the associated OSTDS loading calculations may be adjusted based on improved data on the number, location, and type (conventional and enhanced nitrogen reducing) of existing septic systems, and may include additional OSTDS installed since BMAP adoption.

- **PFA** – The PFA provides a guide for focusing strategies where science suggests efforts will best benefit the springs. The PFA boundary 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, 2009, 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 lag between when nitrogen input to the UFA occurs and ultimately when that load arrives at the Gemini Springs. The impact of this delay is not fully known.

- **Implementation Schedule** – BMAP implementation is intended to be 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 the 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. The process acknowledges that there is some uncertainty associated with the outcomes of proposed management strategies and the estimated response in nitrogen 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 nitrogen load to groundwater while the minimum flows and levels (MFLs) established for specific springs address water flows and levels. To maximize efforts between the two programs, spring protection projects should provide both water quality and quantity benefits.

2.1.4 Loading by Source

Based on the NSILT results, the pie chart in **Figure 2** depicts the estimated percentage of nitrogen loading to groundwater by source in the springshed. UTF represents 46 % of the total nitrogen loading to groundwater, OSTDS 41 %, and STF 4 %. Stormwater loading to groundwater is incorporated into the various source categories.

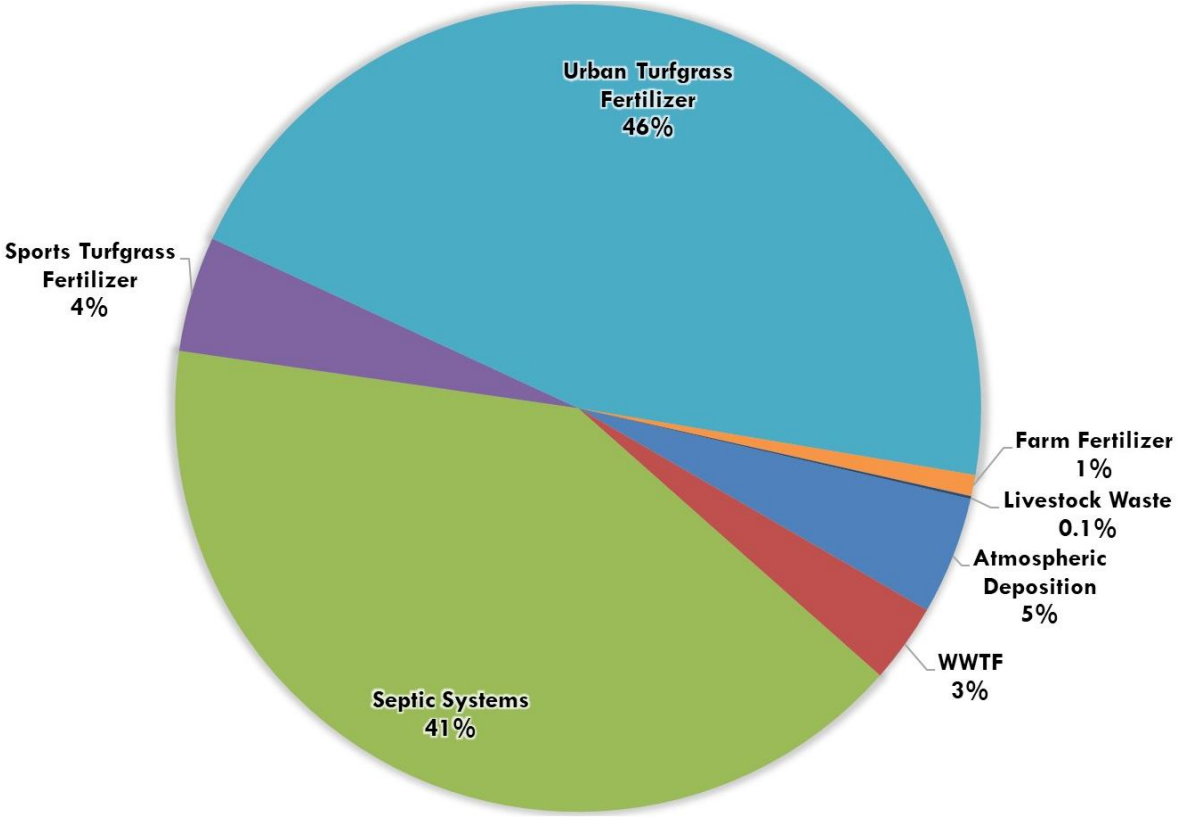

Figure 2. Loading to groundwater by source in the Gemini Springs BMAP area

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 calculations 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	20,496	Upper 95% confidence interval - nitrate data and flow data from 2011 to 2017 (1.2 mg/L and 9.03 cubic feet per second [cfs])

Description	Nitrogen Loads (lb-N/yr)	Notes Regarding Data Used
TMDL Load	6,226	TMDL target is 0.35 mg/L and using the same flow data from 2011 to 2017
Required Reduction	**14,270**	

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 five-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 2.2** 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%)
4,281	7,135	2,854	14,270

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 14,270 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 14,010 and 18,865 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 Gemini Springs Basin.

Table 6. Summary of potential credits for the Gemini Springs 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	10,126 – 14,800	Credits are based on lots of less than one acre inside the PFA being remediated by either enhancing onsite system or connecting to sewer. An estimated 2,788 lb-N/yr have been provided as OSTDS remediation projects which may be on these lots, on lots of one acre or greater in the PFA, or in the larger BMAP area. Any projects on lots of one acre or greater in the PFA or outside the PFA would add additional reductions to the estimates listed.
UTF	2,502	DEP approved credits (6 %) for public education activities as well as credits identified for stakeholder stormwater projects.
STF	243	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	68	15 % BMP credit on FF load to groundwater, assuming 100 % owner-implemented and verified BMPs on all fertilized lands
LW	6	10 % BMP credit on load to groundwater, assuming 100 % owner-implemented and verified BMPs at all livestock facilities.
WWTF	1,020	Achieved by BMAP WWTF policy.
Total Credits from BMAP Policies and Submitted Projects	**13,965 – 18,639**	
Advanced Agricultural Practices and Procedures	45 – 226	Includes 10 % to 50 % reduction from 100 % of fertilized acres with a change in practice.
Total Credits	**14,010 – 18,865**	**Load reduction to meet the TMDL at the spring vent is 14,270 lb-N/yr.**

2.4 OSTDS Management Strategies

Overall there are currently around 2,334 OSTDS in the PFA, based on FDOH estimates. This BMAP lists one specific projects (**Appendix B**) that reduces nitrogen loading from existing

OSTDS on variably sized parcels by a total of 2,788 lb-N/yr. **Figure 3** shows the locations of all OSTDS in the BMAP area.

In addition to the listed project, DEP assessed the overall OSTDS loading compared with other nitrogen sources in the PFA, as well as the relative loading in the wider BMAP area. Based on these assessments, DEP has determined that for the Gemini Springs BMAP area, OSTDS contribute more than 20 % of nonpoint source nitrogen pollution to the OFS. Per the Gemini Springs NSILT, septic systems contribute 41 % pollutant loading in the springshed area and 49 % of the pollutant loading in the PFA. Cumulatively, nitrogen loading from OSTDS within this springshed result in the significant degradation of groundwater that impacts the Gemini Springs 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**.

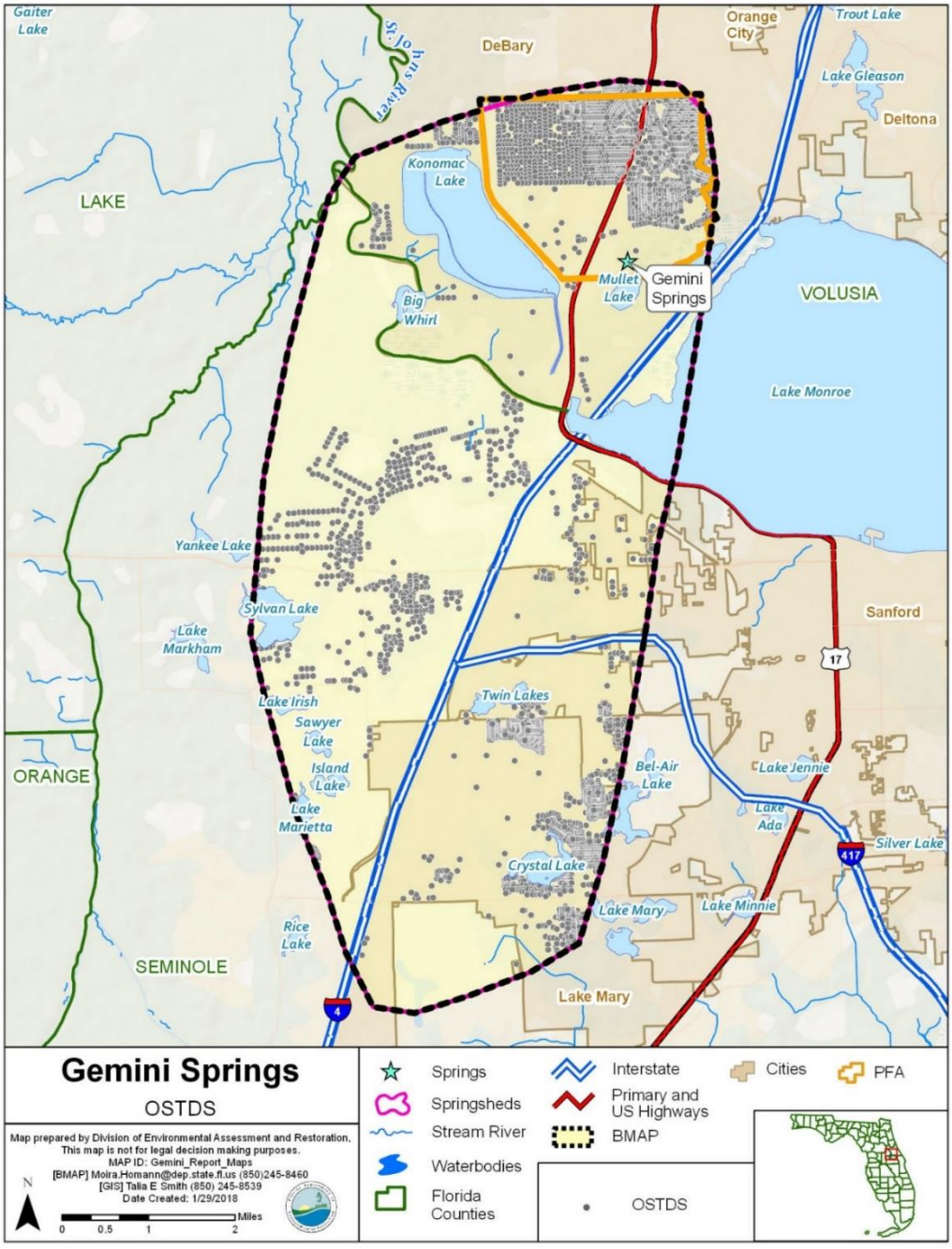

Figure 3. OSTDS locations in the Gemini Springs BMAP area and PFA

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 effective population, which is the estimated number of people per household with consideration to age distribution to

account for school or working age population who likely have access to sewer connected facilities during away from home hours (i.e., 2.01 average effective population 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 5.3 in high recharge areas, 2.9 in medium recharge areas, and 0.6 in low recharge areas for each enhanced OSTDS and an estimated nitrogen reduction of 7.7 in high recharge areas, 4.3 in medium recharge areas, and 0.9 in low recharge 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	Replaced OSTDS
Nitrogen Input	18	–	–
Attenuation (0.5)	9.1	–	–
Low Recharge (0.1)	0.9	0.6	0.9
Medium Recharge (0.5)	4.5	2.9	4.3
High Recharge (0.9)	8.2	5.3	7.7

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 they 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 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 1,051 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 **Section 2.5.3.** Local stormwater projects that treat urban runoff, including nitrogen from urban fertilizer are also in place (see **Appendix B**) for a total estimated reduction to groundwater of 1,045 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 in Appendix B
Fertilizer Ordinances and Public Education Activities	1,051
Stormwater Improvements	1,045
Total Project Credits	**2,096**

Since there is uncertainty about the data used in the NSILT to estimate the UTF loading to groundwater, DEP will work toward collecting better data by documenting reductions with the stakeholders. Also, DEP will work with 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 1,457 lb-N/yr reduction can be achieved. Currently, these credits total 1,051 lb-N/yr. Thus, an additional 406 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	121
Pet Waste Ordinance	0.5	121
Landscape Ordinance	0.5	121
Irrigation Ordinance	0.5	121
FYN Program	3.0	729
Public Education Program	1.0	243
Total Possible Credits	**6.00**	**1,457**

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 5 golf courses covering 548 acres in the Gemini Springs BMAP area. All of the golf course acreage is located in high recharge areas. There are 2 sports fields covering 13 acres in the BMAP area. All of the sports field acreage is located in high recharge areas.

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 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 estimates of reductions from STF sources is 244 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	240
Sports Fields BMPs	6	4
Total Possible Credits		**244**

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 830 acres of land in the springshed area are considered agricultural, of which 60 acres are livestock lands, 339 acres are identified as crop fertilizer lands, and 430 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 451 lb-N/year, or 1 % 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 livestock 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 58 lb-N/year, or 0.1 % 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 SJRWMD 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 390 acres in the Gemini Springs BMAP area (390 of 830 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 68 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 livestock operations, owner-implemented BMPs are expected to achieve a reduction of 6 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 93 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. SJRWMD 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 Fertilization	311
Precision Irrigation	7
Soil Moisture Probes	7
Cover Crops	254

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 85 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	193	451	338	226	113	45
75	145	338	254	169	85	34
50	97	226	169	113	56	23
25	48	113	85	56	28	11
10	19	45	34	23	11	5

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 Gemini Springs BMAP area, treated effluent containing nitrogen is discharged to sprayfields and RIBs, and is reused for irrigation water. The nitrogen load from WWTFs is 1,687 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 Gemini Springs BMAP area, including 4 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 Gemini Springs Basin with discharges greater than 0.1 mgd and those with discharges less than 0.1 mgd.

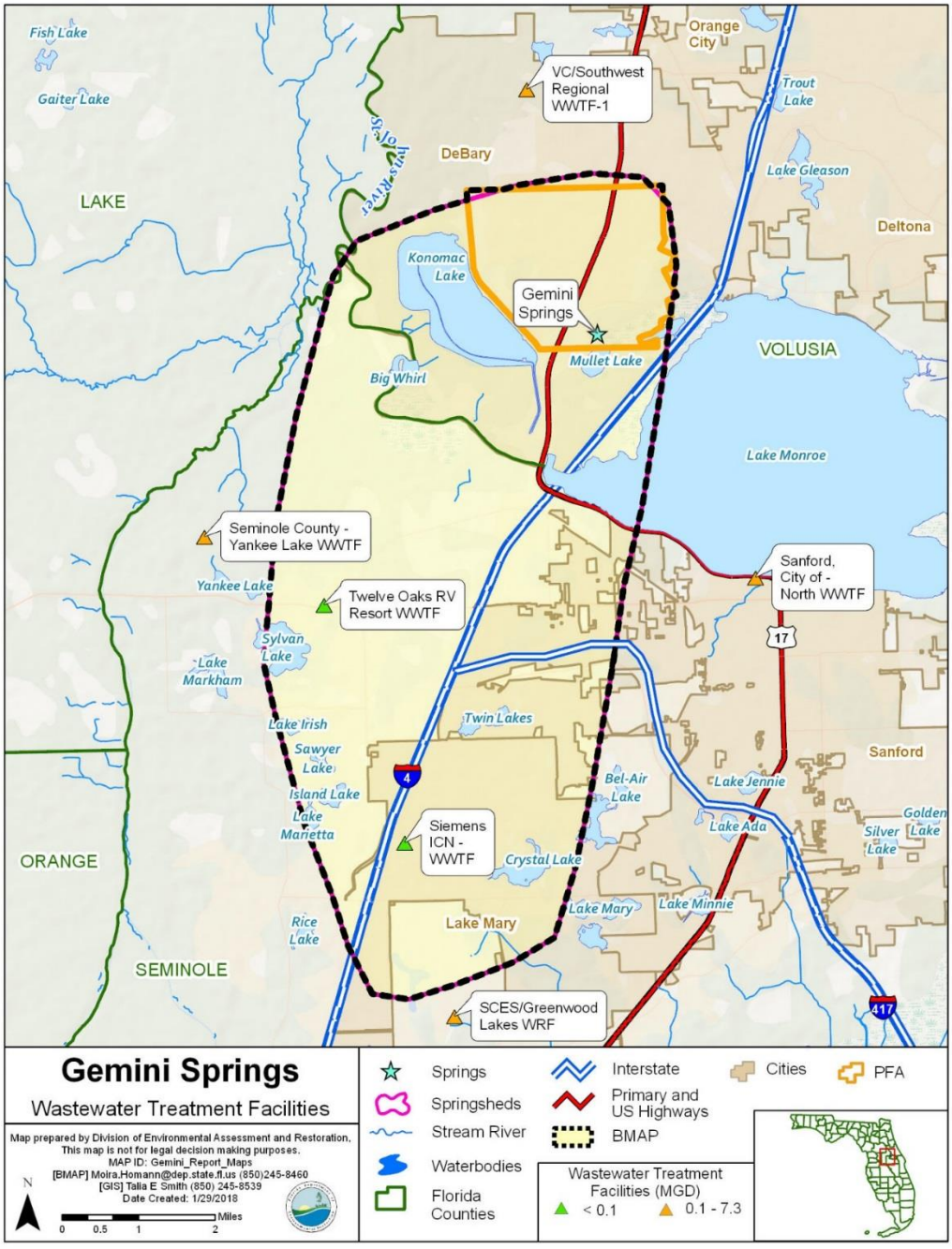

Figure 4. Locations of domestic WWTFs in the Gemini Springs BMAP Area

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 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, 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 set forth in **Table 13** will be applied as an annual average to all new and existing WWTFs with a DEP-permitted discharge or disposal area. New effluent standards will take effect at the time of permit renewal or no later than five years after BMAP adoption, whichever is sooner.

Table 13. Wastewater effluent standards for the BMAP area

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

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

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

2.8.3 Prioritized Management Strategies and Milestones

Based on the current volumes of discharge and effluent concentrations, the estimated reductions to be achieved through the implementation of these revised wastewater standards are 1,020 lb-N/yr. There are not currently any 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 developed 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 the 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 Gemini Springs Basin. **Table 14** identifies known land conservation purchases in the BMAP area.

Table 14. Stakeholder conservation land purchases

Lead Entity	Name of Conservation Purchase	Description	Purchase Status	Cost	Acreage Acquired	Year Acquired
Volusia County	Lake Monroe Park	Lake Monroe Park is one of Volusia County's oldest and most popular parks. The park reopened to the public in July 2004 after a $1.2 million renovation and improvement project. The park provides public access to Lake Monroe.	Completed	$100	42	1988
City of DeBary	River City Nature Park	The Park is a 113-acre triangular-shaped property that abuts the St. Johns River for a distance of about 2300 feet on its south side and will provide public access to the natural environment of the St. Johns River. The City plans to create a new outdoor conservation and recreation area in the form of a passive waterfront park, with family picnic shelters, fishing pier, playground, and nature walks with interpretive signs describing natural communities and habitats.	Completed	$960,000	113	2004
Seminole County	Black Bear Wilderness Area	This site's approximately 1600 acres in northwest Seminole County features a variety of wetland habitats within the floodplain of the St Johns River. Wet Prairie, Hydric Hammock and Cypress Swamps form a mosaic of habitat diversity which host wildlife such as the White-tailed deer, Swallow-tailed Kite and the Florida Black Bear. Its' large size and proximity to other public lands, make this site an important piece in a puzzle connecting natural areas between the Wekiva / St. John's basins and the Ocala National Forest.	Completed	$450,000	1,600	1993
Seminole County	Sylvan Lake Park	Sylvan Lake Park is located in the Sanford/Lake Mary area adjacent to Lake Sylvan. The park features both passive and active recreational areas as well as recreational programming**.**	Completed	$503,000	66	1974
City of Sanford	Derby Park	City park with natural areas as well as built amenities in Sanford, Florida.	Completed	$170,000	22	1984

State of Florida	Seminole County Port Authority	Conservation easement as part of a permit.	Completed	N/A	22	2000
Volusia County	Gemini Springs Park	210-acre was purchased in through the combined efforts of Volusia County, the Trust for Public Lands, the St. Johns River Water Management District and the Florida Communities Trust. Gemini Springs is a second magnitude OFS.	Completed	$5,650,000	1,550	1994

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, TMDL, 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 are tracking plan implementation, monitoring water quality and pollutant loads, and holding periodic meetings.

3.3 Water Quality 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 and groundwater at the beginning of the BMAP period and during implementation.

- Document nutrient trends in the Gemini Springs Basin.

- 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 Parameters, Frequency, and Network

To achieve the objectives listed above, the monitoring strategy will focus 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 associated springs. Supplemental indicators will be monitored primarily to support the interpretation of core water quality parameters. The monitoring network is established for a variety of purposes.

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

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

Table 15. Core water quality indicators and field parameters

Core Parameters
TN
Total Kjeldahl Nitrogen
Nitrate as Nitrogen
Orthophosphate as Phosphorus
Total Phosphorus (TP)

Table 16. Supplemental water quality indicators and field parameters

Supplemental Parameters
Specific Conductance
Dissolved Oxygen (DO)
pH
Temperature
Total Suspended Solids (TSS)
Total Dissolved Solids (TDS)
Turbidity
Chloride
Color

3.3.3 Biological Monitoring

Biological resource responses represent improvements in the overall ecological health of the Gemini Springs Basin (see **Table 17**). Several types of biological monitoring will be carried out to assess the health of the Gemini Springs.

Table 17. 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

RPS are conducted to assess the abundance and variety of algae. An LVS are conducted to assess the types and density of vegetation present 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 and/or springs. In addition, habitat assessments (HAs) are conducted to assess the conditions and habitat present to support the SCI evaluation. Water quality samples should also be collected with the biological monitoring.

3.3.4 Data Management and Assessment

As of June 30, 2017, water quality data in Florida are entered by the entity collecting the data into the Florida Watershed Information Network (WIN) Database, which has replaced the Florida Storage and Retrieval System (STORET). DEP pulls water quality data directly from WIN and U.S. Geological Survey (USGS) databases for impaired waters evaluations and TMDL development. Data providers are required to upload their data regularly, so the information can be used as part of the water quality assessment process and for annual reporting. Data providers should upload their data to WIN upon 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 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:
    a. Florida Watershed Recovery Act (Section 403.067, F.S.)
    b. 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/
- SJRWMD 2002 Middle St. Johns River Surface Water Improvement and Management (SWIM) Plan: https://www.sjrwmd.com/static/plans/2002_MSJRB_SWIM_Plan.pdf
- SJRWMD 2018 Consolidated Annual Report: https://www.sjrwmd.com/static/plans/2018-SJRWMD-Consolidated-Annual-Report.pdf
- SJRWMD Springs: https://www.sjrwmd.com/waterways/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, 2009, count toward the overall nitrogen reduction goals.

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

Table B-1. Stakeholder projects to reduce nitrogen sources

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
City of Sanford	SAN-001	Street Sweeping	Street sweeping throughout the city.	Street Sweeping	Completed	Not Provided	N/A	UTF	187	N/A	City/Stormwater Utility	N/A
City of Sanford	SAN-002	Education Efforts	FYN, landscaping ordinance, irrigation ordinance, Public Service Announcements (PSAs), pamphlets, website, illicit discharge program.	Education Efforts	Completed	Not Provided	N/A	UTF	111	N/A	City/Stormwater Utility	N/A
City of DeBary	DB-01	Fertilizer ordinance	Citywide fertilizer ordinance to reduce application.	Regulations, Ordinances, and Guidelines	Completed	Not Provided	N/A	UTF	25	N/A	N/A	N/A
City of DeBary	DB-02	Illicit Discharge Education	Website, pamphlets, inspection program, call-in number.	Public Education Efforts	Completed	Not Provided	N/A	UTF	50	N/A	N/A	N/A
City of DeBary	DB-03	Irrigation Ordinance	Citywide restrictions on irrigation practices.	Regulations, Ordinances, and Guidelines	Completed	Not Provided	N/A	UTF	25	N/A	N/A	N/A
City of DeBary	DB-04	Gemini Springs Septic Tank Abatement Program	Phase I: 360 septic tanks will be removed and converted to central sewer during the first 5 years (overall 1,200 septic tanks will be converted in the next 15 years).	OSTDS Phase Out	Planned	TBD	2023	OSTDS	2,788	$9,720,000	City of DeBary, Volusia County (additional funding to be requested from SJRWMD and/or FDEP)	100% (City of DeBary and Volusia County) until funding by SJRWMD and/or FDEP is secured
FDOT District 5	FDOT-01	SR 46 - missing from model	Grass swales without swale blocks or raised culverts.	Bioswales	Completed	Not Provided	2012	UTF	7	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-02	77160-3404-02 (Pond 1-NW)	On-line retention BMPs.	On-line Retention BMPs	Completed	2004	2004	UTF	20	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-03	77160-3404-06 (Pond 4-11)	Wet detention pond.	Wet Detention Pond	Completed	2004	2004	UTF	22	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-04	77160-3404-05 (Pond 4-1)	Wet detention pond.	Wet Detention Pond	Completed	2004	2004	UTF	9	Not Provided*	Legislature	N/A

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
FDOT District 5	FDOT-05	77160-3404-07 (Pond 5)	Wet detention pond.	Wet Detention Pond	Completed	2004	2004	UTF	10	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-06	77160 3436 (pond A, A-1)	Wet detention pond.	Wet Detention Pond	Completed	2000	2012	UTF	31	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-07	77160-3439-01 (Pond 1)	Wet detention pond.	Wet Detention Pond	Completed	2010	2006	UTF	2	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-08	FM 242702 79110-3403-06 (RR-3)	Wet detention pond.	Wet Detention Pond	Completed	2001	2004	UTF	14	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-08a	FM 242702 79110-3403-04 & 05 (Pond QQ3 & QQ-5)	Wet detention pond.	Wet Detention Pond	Completed	2001	2004	UTF	12	Not Provided*	Legislature	N/A
FDOT District 5	FDOT-09	Not Provided	The project entails construction of a new state-of-the-art Regional Transportation Management Center (RTMC) for the Florida Department of Transportation and the Florida Highway Patrol Dispatch. There is a pond being built with the project.	On-line Retention BMPs	Underway	2017	2019	UTF	TBD	Not Provided*	Legislature	N/A
City of Lake Mary	LM-01	Fertilizer ordinance	Fertilizer ordinance.	Regulations, Ordinances, and Guidelines	Completed	2017	N/A	UTF	17	N/A	N/A	N/A
Seminole County	SC-01	Elder RSF	RSF to collect and treat stormwater runoff.	Wet Detention Pond	Completed	Not Provided	2007	UTF	16	$3,884,496	Not Provided	Not Provided
Seminole County	SC-02	Lockhart Smith RSF	RSF to collect and treat stormwater runoff.	Wet Detention Pond	Completed	Not Provided	2007	UTF	96	$3,504,755	Not Provided	Not Provided
Seminole County	SC-03	Street Sweeping	Street sweeping throughout the county.	Street Sweeping	Completed	Not Provided	N/A	UTF	9	Not Provided	Not Provided	Not Provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Seminole County	SC-04	Education Efforts	FYN, landscaping ordinance, irrigation ordinance, pet waste ordinance, PSAs, pamphlets, website, illicit discharge program and standard credit for fertilizer ordinance.	Public Education Efforts	Completed	Not Provided	N/A	UTF	822	Not Provided	Not Provided	Not Provided
Seminole County	SC-05	Seminole County Fertilizer Ordinance	Reduction of nitrogen and phosphorus sources, through public education and restrictions on usage.	Regulations, Ordinances, and Guidelines	Completed	10/01/18	N/A	UTF	TBD	150,000	ad valorem taxes & FFL cost shares	$28,000 annual city cost share total/$37,000 county portion
Seminole County	SC-06	Black Bear Wilderness Area	Previous land use = natural land; management focus = preservation, passive recreation; acreage = 1,650.	Land Acquisition	Underway	Not Provided	2015	UTF	N/A	Not Provided	Not Provided	Not Provided
Seminole County	SC-07	Gravity Main Testing and Repairs	Lateral repair – 1512 Cherry Ridge., 2067 North Umbria, 169 Killarney Ct., Shadowmoss. Gravity main repair – 844 Preserve Terr., International Dr. and County Road 46A, Lake Rena Dr. Smoke test and seal laterals – Alaqua Lakes, Heathrow Woods # 1 & 2 LS, Lake Forest 1 & 2, Lake Forest 1 & 2. Additional work – Lake Forest 3 & 4, Aster Farms.	Sanitary Sewer Collection System Rehabilitation, Maintenance, or Replacement	Completed	Not Provided	Prior to 2015	WWTF	N/A	$401,878	Not Provided	Not Provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
Seminole County	SC-08	Lift Station Rehab	Seal wet well and rehabilitate lines (Wilson School LS, Breckenridge LS, Stockbridge LS, Lake Forest #5 LS, Buckingham LS, Retreat at Wekiva LS, Aster Farms LS, Bel-Aire #3 LS, Bel-Aire #1 LS, Heathrow Master LS).	Sanitary Sewer Collection System Rehabilitation, Maintenance, or Replacement	Completed	Not Provided	Prior to 2015	WWTF	N/A	$324,353	Not Provided	Not Provided
Volusia County	VC-01	Education and Outreach	Public education about fertilizer, wastewater, lawn clippings, pet waste, water conservation.	Public Education Efforts	Completed	2012	N/A	UTF	0	Not Provided	Not Provided	Not Provided
Volusia County	VC-02	Street Sweeping	Street sweeping.	Street Sweeping	Completed	2012	N/A	UTF	661	Not Provided	Not Provided	Not Provided
Volusia County	VC-03	Lemon Bluff Road	Grass swales without swale blocks or raised culverts.	Bioswales	Completed	2012	2011	UTF	1	$145,000	Not Provided	Not Provided
Volusia County	VC-04	Lemon Bluff Road Ramp	Grass swales without swale blocks or raised culverts.	Bioswales	Completed	2012	2011	UTF	0	$55,550	Not Provided	Not Provided
Volusia County	VC-05	DeBary Avenue Expansion	DeBary Avenue - Doyle Road expansion.	Wet Detention Pond	Completed	2012	2012	UTF	9	Not Provided	Not Provided	Not Provided
Volusia County	VC-06	Lake Winnemissett Non-contributing Basin	Non-contributing Basin, not included in the TMDL model.	Non-contributing Basin	Completed	2012	2012	UTF	139	N/A	N/A	N/A
Volusia County	VC-07	Roadside Ditch Cleaning	Ongoing roadside ditch cleaning throughout county.	BMP Cleanout	Completed	2016	N/A	UTF	TBD	Not Provided	Not Provided	Not Provided
Volusia County	VC-08	Fertilizer ordinance	Fertilizer restrictions including summer ban on nitrogen and phosphorus.	Regulations, Ordinances, and Guidelines	Completed	2015	N/A	UTF	0	Not Provided*	Volusia County general fund	Not Provided

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/yr)	Cost Estimate	Funding Source	Funding Amount
FDACS	FDACS-01	Agricultural Farm Fertilizer BMP Implementation	Enrollment and verification of BMPs by agricultural producers.	Agricultural Farm Fertilizer BMP Implementation	Planned	2018	2023	FF	68	N/A	N/A	N/A
FDACS	FDACS-02	Agricultural Livestock Waste BMP Implementation	Enrollment and verification of BMPs by agricultural producers.	Agricultural Livestock Waste BMP Implementation	Planned	2018	2023	LW	6	N/A	N/A	N/A
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 Reduction Credits	Planned	2018	TBD	STF	240	N/A	N/A	N/A
Golf Courses	GC-02	Golf Course Reduction Credits	6 % BMP credit on sports field load to groundwater, assuming 100 % BMP implementation.	Golf Course Reduction Credits	Planned	2018	TBD	STF	4	N/A	N/A	N/A
Wastewater Utilities	WU-01	WWTF Policy Reductions	Achieved by WWTF policy if implemented BMAP-wide, achieving 3 or 6 mg/L.	WWTF Policy Reductions	Planned	2018	TBD	WWTF	1,020	N/A	N/A	N/A
Various	OSTDS-01	Enhancement of Existing OSTDS - Voluntary	Repair, upgrade, replacement, drainfield modification, addition of effective nitrogen reducing features, initial connection to a central sewerage system, or other action to reduce nutrient loading, voluntarily taken by the owner of an OSTDS within the BMAP.	OSTDS Enhancement	Underway	2018	N/A	OSTDS	TBD	TBD	DEP	TBD

Lead Entity	Project Number	Project Name	Project Description	Project Type	Project Status	Start Date	Estimated Completion Date	Nitrogen Source Addressed by Project	Estimated Nitrogen Load Reduction (lbs/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. Gemini Springs PFA Report

During the development of the 2018 Gemini Springs BMAP, the PFA was defined as the area of the basin where the Floridan aquifer is generally most vulnerable to pollutant inputs and where there is a known connectivity between groundwater pathways and an OFS. As required by the Florida Springs and Aquifer Protection Act, DEP defined a PFA which is incorporated by reference into this BMAP. Information on this and other springshed PFAs are available at the following link: http://publicfiles.dep.state.fl.us/dear/PFAs.

Appendix D. OSTDS Remediation Plan

The Florida Aquifer and Springs Protection Act specifies that if, during the development of a BMAP for an OFS, DEP identifies OSTDS as contributors of at least 20 % of nonpoint source nitrogen pollution in a PFA or if DEP determines remediation is necessary to achieve the TMDL, the BMAP shall include an OSTDS remediation plan. Based on the Gemini Springs NSILT estimates and GIS coverages, OSTDS contribute approximately 41 % pollutant loading in the BMAP and 49 % in the PFA. Irrespective of the percent contribution from OSTDS, DEP has determined that an OSTDS remediation plan is necessary to achieve the TMDLs and to limit the increase in nitrogen loads from future growth.

D.1 Plan Elements

D.1.1 Installation of New OSTDS

Per statute, new OSTDS on lots of less than one acre are prohibited within PFA, 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 PFA, 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 PFA on lots of less than one acre.

- 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 reduction 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 central 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 Gemini Springs NSILT, a planning tool that provides estimates of nitrogen loading to groundwater based on best available scientific data at

for a particular geographic area. The NSILT results were peer reviewed by SJRWMD, FDOH, and FDACS. Additional technical support information concerning the NSILT can be found in **Appendix E**.

Monitoring and research:

- Improve understanding of the ecological responses to nutrient enrichment and reductions (DEP/SJRWMD/universities).
- Maintain and expand water quality monitoring programs (SJRWMD/DEP).
- Report annual status and trends (SJRWMD).
- Evaluate new and emerging technologies (SJRWMD).
- Research and develop advanced septic systems (FDOH/DEP/UF–IFAS).
- Monthly water sampling at the spring (Volusia County/SJRWMD).

Completed project:

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

Ongoing projects:

- Quarterly springs water quality monitoring (SJRWMD).
- Stream water quality monitoring (SJRWMD).
- UFA nutrient modeling (SJRWMD).
- Springs Initiative modeling (SJRWMD).

Proposed projects:

- Groundwater quality monitoring for BMAP assessment (DEP/SJRWMD).

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 41 % of the pollutant loading to groundwater in the BMAP and 49 % in the PFA. **Table D-1** lists the number of existing OSTDS

in the PFA 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 PFA	Credit for Enhancement (lb-N/yr)	Credit for Sewer (lb-N/yr)
High	1,889	10,009	14,628
Medium	38	112	163
Low	10	6	9
Total	**1,937**	**10,126**	**14,800**

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.

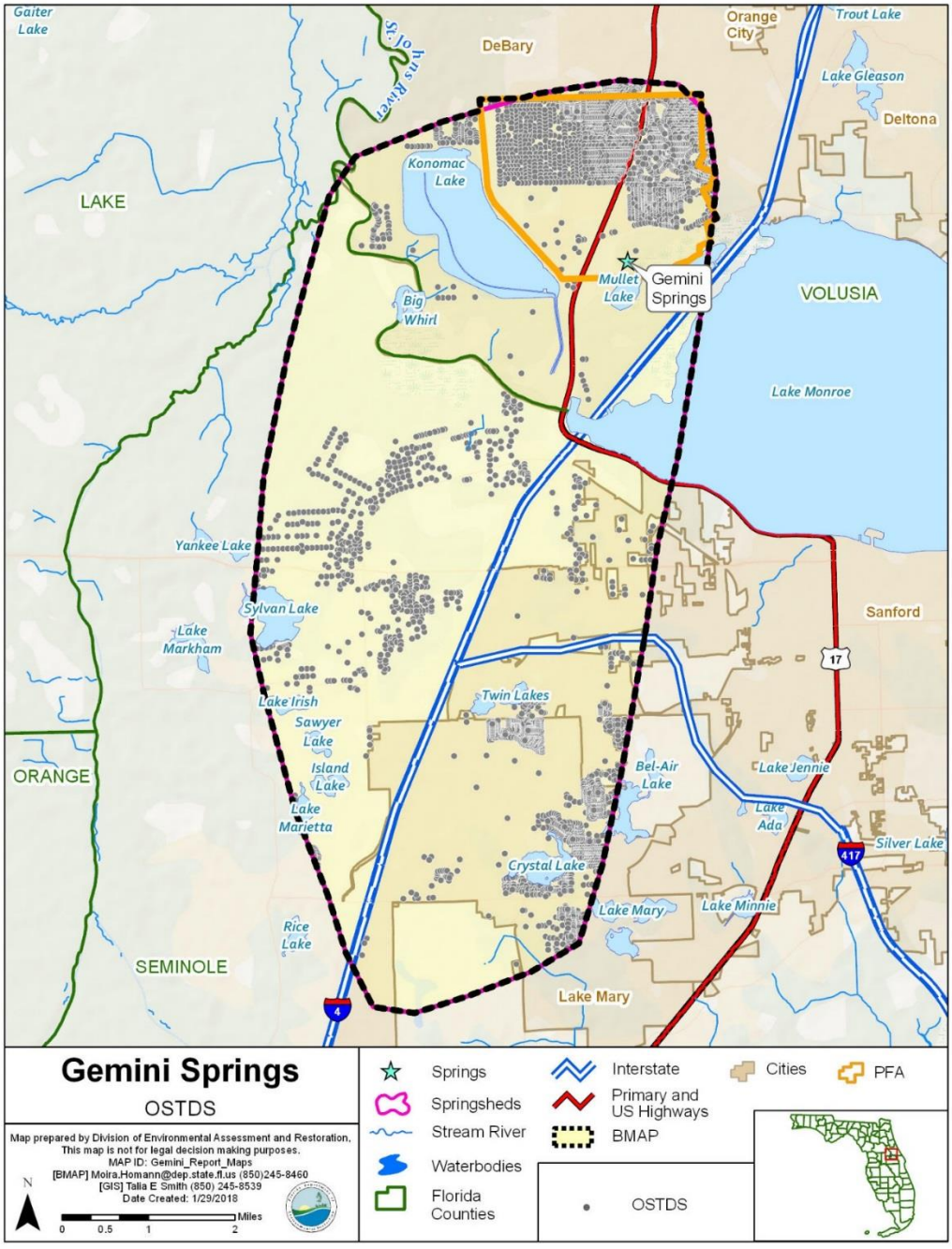

Figure D-1. Locations of OSTDS in the PFA in the Gemini Springs BMAP

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 January 25, 2018 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 (**Table D-2**).

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.

Table D-2. Prioritized target audiences, messaging, and materials/resources

Audience	Messaging	Materials/Resources
Homeowners Associations	It's not personal/political – we are all part of the solution for our springs and protecting water is our shared responsibility	Social media with consistent message
Citizens	Cost to retrofit or sewer/funding options	Community meetings
Media/Chamber of Commerce/OSTDS Industry/Environmental Groups	Impacts of TN to the environment (and regulatory requirements)	Utility inserts

The management strategies listed in **Table D-3** 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-3. Stakeholder educational activities to implement the OSTDS remediation plan

Lead Entity	Activity Number	Activity Name	Description of Activity	Activity Status	Partners	Estimated Start Date	Estimated Completion Date	Cost Estimate	Funding Source	Funding Amount
UF-IFAS	IFAS-E-1	OFS OSTDS Campaign, Phase 1	Implement social marketing campaign that links septic systems to springs.	Planned	N/A	2018	2020	$30,000	TBD	TBD
UF-IFAS	IFAS-E-2	OFS OSTDS Campaign, Phase 2	Create on-line clearinghouse of fact sheets, videos, public service announcements, etc.	Planned	N/A	2018	2018	$7,000	TBD	TBD
UF-IFAS	IFAS-E-3	OFS OSTDS Campaign, Phase 3	Presentations to realtors and distribution of information kits for home buyers.	Planned	N/A	2018	2018	$10,000	TBD	TBD
UF-IFAS	IFAS-E-4	OFS OSTDS Campaign, Phase 4	Six to eight septic system workshops for elected officials.	Planned	N/A	2018	2019	$5,000	TBD	TBD
UF-IFAS	IFAS-E-5	OFS OSTDS Campaign, Phase 5	Homeowner workshops with field demonstrations.	Planned	N/A	2018	2020	$25,000	TBD	TBD

Appendix E. Technical Support Information

E.1 NSILT Data

An NSILT was completed on Gemini Springs for the Gemini Springs 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 Gemini Springs 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 largely based on the SJRWMD Floridan Aquifer Recharge Map which was updated in 2015. The exception is that the area south of the St. Johns River where all the recharge rates were adjusted to be low recharge. This was performed because the Gemini Springshed underlays the Middle St. Johns River surface watershed. In this area, it is expected that most nitrogen that reaches the land surface travels over the surface or through shallow subsurface flows to the St. Johns River, and not to deeper groundwater. To represent the lower contribution of groundwater to Gemini Springs from this area, the aquifer recharge rate was adjusted; as the river also serves as the boundary between Volusia County and Seminole County in this location, the adjusted recharge area corresponds to the springshed section in Seminole County.

Land Use
Land use information is from SJRWMD based on the 2009 Florida Land Use Cover and Forms Classification System (FLUCCS) and local county property appraiser offices within the BMAP boundary.

E.1.2 Estimating Nitrogen Inputs to the Land Surface

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 Gemini Springs 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 Volusia Country and Seminole County were reported as 2.37 and 2.57, respectively. Also used were 2010 U.S. Census Bureau data to look at population age distribution to account for school or working age population who likely have access to sewer connected facilities during away from home hours. The collection of data was used to estimate the effective population and OSTDS usage. This resulted in a per capita contribution of 9.012 lb-N/yr and 1.97 and 2.05 effective persons per household in Volusia County and Seminole County, respectively.

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 Gemini Springs 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 contributing area and subdivided into three categories based on property value specific to the county: high, medium, and low.

In 2009, a survey in the Wekiva River Basin was conducted by the University of Central Florida (UCF) Stormwater Management Academy (Souto et al. 2009). This survey provided information on residential fertilizer use habits in the BMAP area.

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

Nonresidential parcels are assumed to be fertilized by a commercial service provider. While application rates and frequencies are recommended in the *Green Industries BMP Manual* (DEP 2010), the UCF study indicated that commercial application rates in this region are slightly higher. The nonresidential parcel fertilization rates are estimated based on the UCF survey results.

Residential parcels are evaluated by estimating the survey information cited above, relying on information taken from the UCF study. According to this survey, some surveyed residents (16 %) did not fertilize their lawns, 51 % applied fertilizer to their own lawns 2.88 times a year, and 33 % had lawn service contractors apply fertilizer on average of 4.76 times a year (Souto et al. 2009). 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 golf courses are estimated using voluntary surveys completed by some of the golf course superintendents in the contributing area. For those golf courses that did not complete a survey, the statewide annual average application rate (previously vetted by golf course professionals) of 4.5 lb-N/1,000 square feet on 72 % of the golf course area (Sartain 2002; 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,

parks, and recreational areas. The fertilizer application rate for turf grass at sports facilities of 32.67 lb-N/ac was used, based on the 2009 study data for lawn service company fertilization practices (Souto et al. 2009).

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 springshed are adjusted by estimating the land use percentages in the contributing area compared to the full county land uses to get a percentage of livestock-related land uses in the NSILT area. County-level land use information from the FSAID was used to estimate livestock populations within the springshed. For beef cattle, the 2016 U.S. Department of Agriculture Survey was used to cross-reference the beef cattle population numbers in the 2012 census.

FF

Agricultural fertilizer is applied at varying rates depending on crop type and farm practices. The amount of irrigated lands and crop types was based on the 2015 FSAID Irrigated Lands Geodatabase (ILG). Beyond the areas specified by the ILG, additional agricultural areas were identified based on the SJRWMD land use data and by county property appraiser data. Only 80 % of the nursery operation acreage was included in order to account for spacing between liners and rows, which limits the fertilizer application area at nurseries. Estimated application rates are based on UF-IFAS recommendations and producer feedback. The crop fertilizer application rates were applied to the applicable agricultural acres based on crop type to calculate the nitrogen input from farm fertilizer.

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 U.S. Department of Agriculture [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

N Source Category	Low-Level Attenuation (%)	Attenuation Used for This Analysis (%)	High-Level Attenuation (%)
Atmospheric Deposition	85	90	95
WWTFs-RIBs	10	25	40
WWTFs-Sprayfield	50	60	75
WWTF-Reuse	50	75	85
Septic Tanks and WWTF Drain fields	40	50	75
Livestock Operations	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 SJRWMD recharge map previously described. To account for variations in recharge rates to the UFA, non-attenuated nitrogen inputs in high rate recharge areas are multiplied by a weighting factor of 0.9, while nitrogen inputs are multiplied by a weighting factor of 0.5 for medium rate recharge areas and 0.1 for low. Groundwater discharge areas were not included in the calculations of nitrogen loads to the groundwater contributing area, as these areas do not contribute nitrogen to the aquifer.

Estimated Nitrogen 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 vent.

E.2 NSILT 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 SJRWMD. Failure either to implement BMPs or conduct monitoring may result in enforcement action by DEP.

Growers who implement BMPs may be eligible for cost-share funding from FDACS, SJRWMD, 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 Gemini Springs BMAP area using the FSAID IV geodatabase.

Table F-1 summarizes the land use data for agriculture in the Gemini Springs Basin. Based on the FSAID IV geodatabase, the total agricultural lands within the Gemini Springs Basin is 830 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 Gemini Springs is Improved Pasture which comprises 50% 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 Gemini BMAP.

Table F-1. Agricultural land use within the Gemini BMAP

Agricultural Nitrogen Loading Category	Acres
Crop Fertilizer Lands only	339
Livestock Lands only	60
Crop Fertilizer and Livestock Lands	430
Total	**830**

Table F-2. Fertilized crop lands within the Gemini BMAP

*In NSILT only 25% of pasture lands assumed to be fertilized

Crop Type	Application Rate (lbs/acre)	Acres*
Citrus	200	7.14
Container Nursery	90	34.68
Field Crops	90	253.68
Greenhouse	150	6.46
Greenhouse Nursery	90	6.92
Horse Farms	80	44.15
Improved Pasture	90	386.00
Ornamental Container	90	8.61
Ornamentals	90	15.17
Tree Nurseries	200	6.61
Total	-	**769.7**

Table F-3. Livestock lands within the Gemini BMAP

Livestock Category	Acres
Horse Farms	44.15
Improved Pasture	386.00
Unimproved Pastures	14.93
Woodland Pastures	45.15
Total	**490.55**

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.

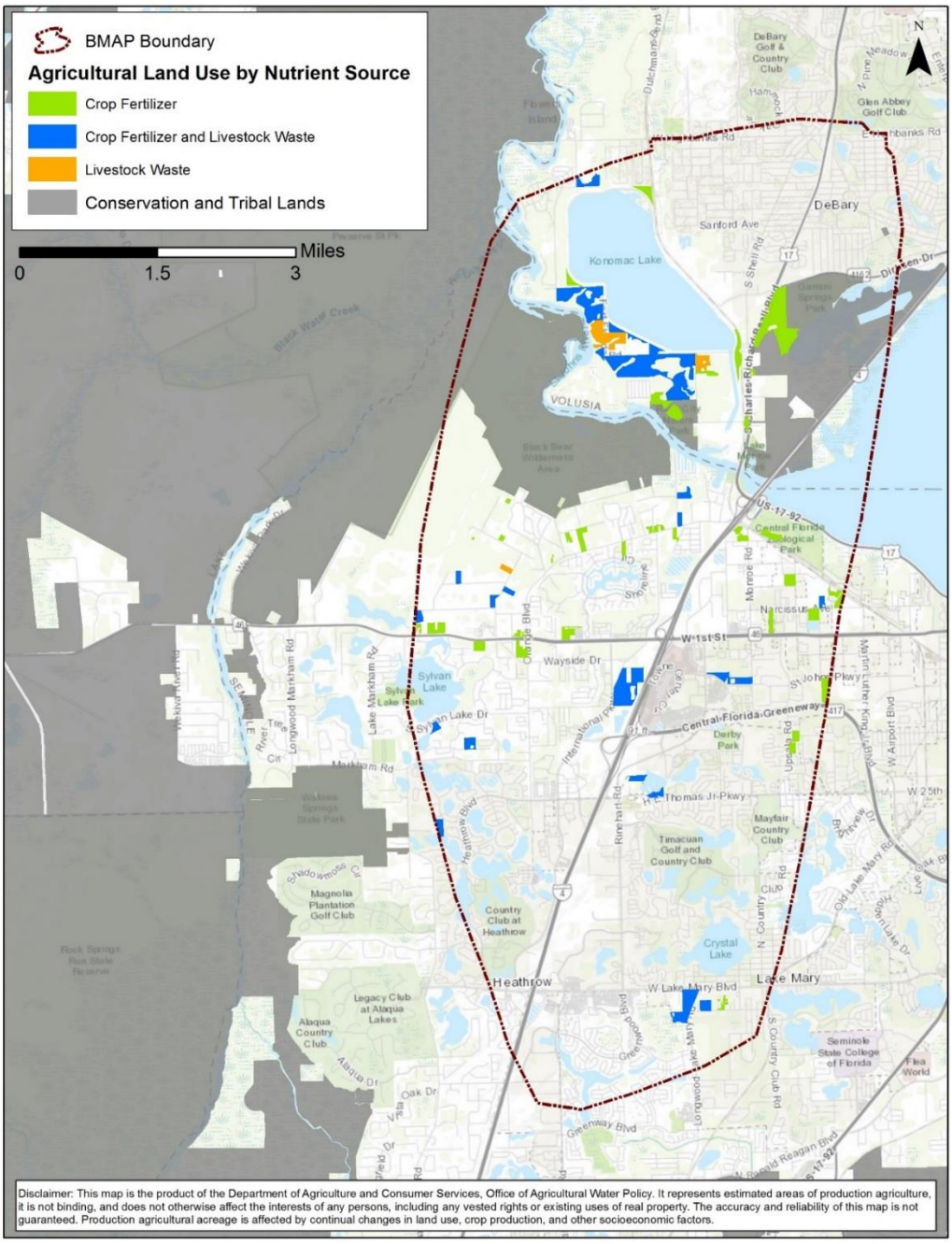

Figure F-1. Agricultural lands in the Gemini BMAP area

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) 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 Gemini Springshed 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 the tables.

As of December 31, 2017, NOIs cover 390 agricultural acres in the Gemini Springs 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 Gemini Springs BMAP as of December 31, 2017

Related FDACS BMP Programs	NOI Acreage Enrolled	Agricultural Land Use Acres within NOIs
Cow/Calf	350.04	190.29
Nursery	39.77	24.85
Total	**389.81**	**215.14**

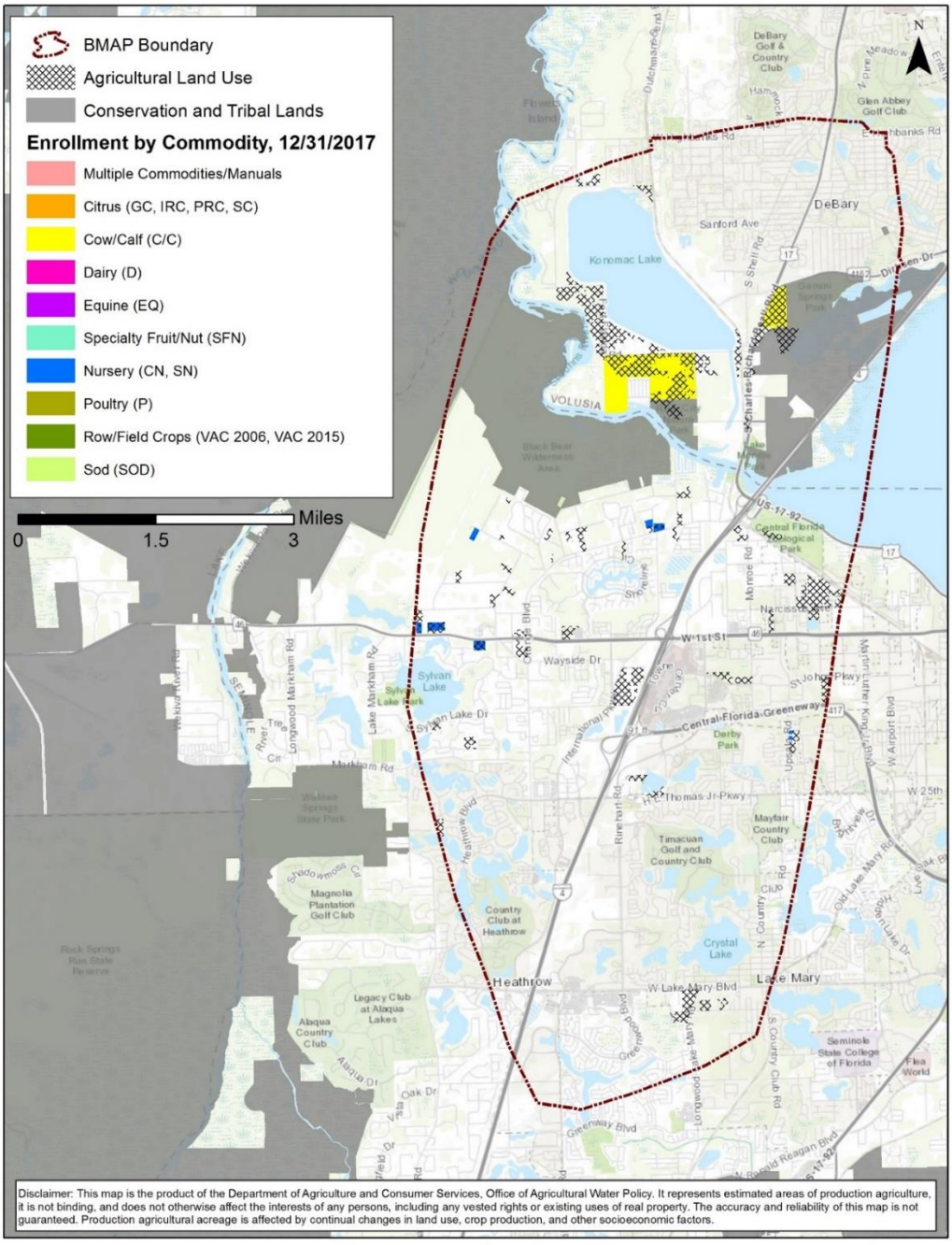

Figure F-2. BMP enrollment in the Gemini Springs BMAP as of December 31, 2017

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

OAWP works with producers to submit NOIs to implement the BMPs applicable to their operations, provides technical assistance to growers, and distributes cost-share funding, as available, to eligible producers for selected practices. OAWP follows up with growers through

site visits to evaluate the level of BMP implementation and record keeping, identify areas for improvement, if any, and discuss cost-share opportunities.

When DEP adopts a BMAP that includes agriculture, it is the agricultural producer's responsibility to implement BMPs adopted by FDACS to help achieve load reductions. If land use acreage corrections and BMP implementation do not fully account for the current agricultural load reduction allocation, it may be necessary to develop and implement additional projects and practices that reduce nutrients from agricultural nonpoint sources. In that case, FDACS will work with DEP and SJRWMD 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 SJRWMD activities. If a reevaluation of the BMPs is needed, FDACS will also include SJRWMD 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 Gemini Springs springshed.

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.

Category	Name	Description
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
Seminole County	Ordinance No. 71-7	Pollution Control	Ordinance	Completed
Seminole County	Ordinance Nos. 74-7, 99-30, and 2013-12	Rules and Regulations Governing Public Water, Wastewater, and Reclaimed Water Systems	Ordinance	Completed
Seminole County	Ordinance No. 2017-6	Proper Use of Fertilizers	Ordinance	Completed
Seminole County	FLU Policy 1.6	The County shall continue to coordinate with the state of Florida, SJRWMD, The Nature Conservancy, the Trust for Public Lands, the Congress of Regional Leaders of myregion.org, and all other agencies involved in preservation of environmental assets to create a countywide linked open space and Greenways/Trails/Blueways system that assists in permanent preservation of county and regional environmental assets.	Comprehensive Plan	Completed
Seminole County	FLU Policy 5.17(E)2	Developments shall make efficient use of existing public facilities, such as potable water and sanitary sewer, with no need for expanded treatment plant capacity. Florida-friendly landscaping shall be used to minimize demand for irrigation water and reuse water shall be used for necessary irrigation. OSDS shall not be permitted. All stormwater management facilities shall comply with any federal requirements to limit TMDLs.	Comprehensive Plan	Completed
Seminole County	Conservation Objective 1	The County shall continue to make use of new and existing studies as the basis for establishing programs to that protect both the quantity and quality of groundwater resources and recharge areas.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 1.4	The County shall continue to evaluate the use of septic systems and effluent reuse systems within most effective recharge areas and determine any long-term negative impacts on groundwater quality and, if appropriate, adopt and develop additional regulations governing these systems.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Seminole County	Conservation Policy 2.1	The County shall, through its ongoing water quality monitoring program, identify areas of need for more intense sampling and shall partner with the appropriate agencies to accomplish these investigations. The County shall, with each Evaluation and Appraisal Report, evaluate the need for more intense sampling to address the continuous nature of surface water quality programs and processes.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.2	The County shall continue to implement, as part of the federal and state mandated TMDL policies, a program to identify and improve surface water quality associated with stormwater runoff within receiving waters, which are below established standards.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.3	The County shall evaluate every five years, after coordination with the Agricultural Extension Agency, Natural Resources Conservation Service and other appropriate agencies, its Water Conservation and Sensitive Lands Plan and BMPs to minimize agricultural, horticultural and silvicultural impacts to both surface water quantity and quality, wetland and floodplain areas. This evaluation shall include a review and incorporation of any applicable new BMPs established by the Division of Forestry, DEP, SJRWMD, FDACS, and other agencies.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.6	The County shall continue to evaluate and, if appropriate, enact, alternative development (design, construction and maintenance) standards which enhance water quality…	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.7	The County shall continue to coordinate and pursue joint programs with and seek funding, where available, from SJRWMD, DEP, and other agencies for surface water management studies and improvements programs. Specific programs that require further coordination include, but are not limited to, Surface Water Improvement Program, joint projects toward the restoration of Lake Jesup, TMDL Program, and the protection of the Econ and Wekiva River Basins.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Seminole County	Conservation Policy 2.8	The County shall develop and distribute to homeowner's associations, civic groups, schools and other organizations, educational brochures addressing surface water and lake improvement practices and related matters such as Florida-friendly landscaping for properties within the WSA and all other impaired watersheds identified by the DEP TMDL Program.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.9	The County shall continue to support and expand existing environmental programs (Natural Lands Education, Watershed Action Volunteers, Lake Watch, Florida Yards and Neighborhoods, and Parks Education) and pursue alternatives to expand the public's knowledge of environmental programs through education, the media and other available avenues of communication. The County shall continue to provide public access to environmental data by expanding the Countywide Watershed Atlas and the Natural Lands Program web sites.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.10	The County shall work cooperatively with DEP to develop a proactive approach to the TMDL process through the County's monitoring program, National Pollution Discharge and Elimination System (NPDES) program, Lake Management program, and County's Watershed Atlas project…	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.11	The County shall amend the land development code by 2010 to incorporate low impact development (LID) practices to stormwater management that conserve and protect natural resource systems, reduce infrastructure costs, and mitigate potential environmental impacts.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 2.12	The County shall adopt the recommendations of the Florida Consumer Fertilizer Task Force, established by the Florida Legislature, and shall adopt BMPs into the land development code by January 1, 2010, to reduce and eliminate pollution to county waterways from improper use of consumer fertilizers.	Comprehensive Plan	Completed
Seminole County	Conservation Policy 4.1	The County shall continue to rely on the Florida Department of Health (FDOH) to develop and implement guidelines and standards to regulate the location and use of septic systems on soils with low or very low potential.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Seminole County	Drainage Objective 1	The County will continue to implement a program to systematically identify and correct existing surface water quality and stormwater management deficiencies and meet future needs. Emphasis should be placed on maximizing use of existing facilities and discouraging urban sprawl.	Comprehensive Plan	Completed
Seminole County	Drainage Policy 2.4	The County shall continue to require the dedication of conservation easements as a means of protecting the functions of floodways and water quality.	Comprehensive Plan	Completed
Seminole County	Drainage Policy 3.4	The County shall continue to rely on the land development code and encourage nonstructural techniques such as LID to ensure stormwater runoff be treated to reduce the pollutant loads discharged into receiving waters. Waters that have been identified as "impaired" and assigned TMDLs, may require additional or more stringent treatment.	Comprehensive Plan	Completed
Seminole County	Drainage Policy 5.5	The County shall consider establishing a TMDL Program for all surface water bodies once such programs have been established for impaired bodies of water.	Comprehensive Plan	Completed
Seminole County	Potable Water Policy 1.7	The County shall continue to require all development to enter into reclaimed customer agreements as a condition of service. Actual implementation of such agreements shall be based on, but not limited to, the following considerations: availability of effluent supply, distance from existing facilities, the nature of the soils and the nature of the development.	Comprehensive Plan	Completed
Seminole County	Sanitary Sewer Policy 4.2	Existing package plants (i.e., for schools, mobile home parks) shall be requested by the County to connect to the County system when it becomes available.	Comprehensive Plan	Completed
Seminole County	Sanitary Sewer Policy 4.4	The County shall continue to require new development to connect to the County's wastewater system or other municipal or private utility systems where possible.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Seminole County	Sanitary Sewer Policy 4.5	Outside the adopted Urban Service Area, the County shall: (A) Continue to rely primarily upon individual septic tanks as the method of providing sewer service to the residents and other occupants outside the urban services area. (B) Encourage private central systems that exist as of the adoption date of this Plan to continue to provide an adequate level of service to users in their respective service areas, although the County shall discourage them from expanding their service areas. (C) New development outside adopted central sewer service areas shall not be designed nor constructed with central water and/or sewer systems. (D) Public and private central systems may be permitted in the future if it is clearly and convincingly demonstrated by the proponents of the system expansion that a health problem exists in a built but unserved area for which there is no other feasible solution. In such cases, the service area expansion plans will be updated concurrent with an area wide administrative land use update.	Comprehensive Plan	Completed
Volusia County	Ordinance No. 2014-06	Florida-Friendly Fertilizer Use	Ordinance	Completed
Volusia County	Ordinance No. 87-35	Pollution Control	Ordinance	Completed
Volusia County	Ordinance No. 88-15	Stormwater Management	Ordinance	Completed
Volusia County	Ordinance No. 2009-05	Stormwater Discharge Pollutant Control	Ordinance	Completed
Volusia County	Ordinance No. 92-89	Stormwater Utility	Ordinance	Completed
Volusia County	Ordinance No. 91-37	Wastewater Residual Management	Ordinance	Completed
Volusia County	Ordinance No. 96-15	Reclaimed Water Service	Ordinance	Completed
Volusia County	FLU Policy 1.1.1.9	The County shall coordinate with the cities and consider joint agreements to create future water and sewer service areas.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Volusia County	FLU Policy 1.1.1.11	Urban areas are required to have central potable water and sanitary sewer service, except for the following: Lot sizes ranging from one (1) acre up to 2.49 acres shall require central potable water, but may utilize an individual waste water disposal system. Lot sizes 2.5 acres or larger in size may utilize individual water and wastewater disposal systems.	Comprehensive Plan	Completed
Volusia County	FLU Policy 1.2.2.6	Septic tanks and drain fields shall be sited to protect environmentally sensitive areas from the discharge of improperly treated effluent, consistent with the Conservation and Coastal Management Elements.	Comprehensive Plan	Completed
Volusia County	FLU Policy 1.2.2.12	Agriculture and silviculture operations shall adhere to accepted BMPs for surface water management and erosion control.	Comprehensive Plan	Completed
Volusia County	FLU Objective SG 1.2	To protect and enhance environmentally sensitive corridors, wildlife habitat, connected wetlands, and natural hydrologic functions throughout Volusia County, the County adopts the Environmental Core Overlay or "ECO" Map as a component of the Future Land Use Map series.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.3	Volusia County shall continue to require "advanced secondary treatment" of wastewater (including high-level chlorination and sand filtration) at all County owned wastewater treatment plants with capacities of 0.1 MGD or more.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.5	Central sewer is not required for non-urban areas, except as required by Chapter 64E-6, F.A.C. Lines should only be extended if the absence of such facilities would result in a threat to the public health or safety or a designated rural area is inside an approved sewer service area with an agreement that describes the method and timing of when these services would be provided, or the comprehensive plan is amended to change rural areas to urban areas.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Volusia County	Sanitary Sewer Policy 6.1.1.8	Except as may otherwise be permitted by this sub-element, the extension of wastewater lines and the establishment of central wastewater systems outside of sewer service areas (county, municipal, or other as established by an adopted service area agreement) shall be prohibited unless such extension or facility construction will mitigate existing or potential problems of public health, safety, or welfare or other exceptions under the guidelines delineated in the Future Land Use Element.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.13	Septic tanks are only allowed under any one of the following applicable circumstances provided that the septic tank has been approved by FDOH…	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.14	Volusia County shall require all sewage treatment and disposal systems including septic tanks to be located and constructed in a manner consistent with all applicable local, state, and federal regulations, including the applicable goals, objectives, policies, and level of service standards contained in this comprehensive plan.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.15	An existing septic tank system may be upgraded, provided that a central sanitary sewer system is not available. However, connection to a central sanitary sewer system is required where said system is available in lieu of upgrading an existing septic tank system.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.16	The establishment of central wastewater service outside of sewer service areas is prohibited except for Rural Communities, Rural Villages, and Rural Recreational areas as provided for by this sub-element or where DEP, the County Development Review Committee or other appropriate agency, has determined that such a facility is necessary to correct existing or potential problems of public health, safety, or welfare.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.1.19	The location and siting of new package treatment plants shall be prohibited in areas where the disposal of effluent will result in the lowering of the ambient quality, where such information is available, of surface water or groundwater unless such discharge can be shown to be of overriding public interest.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Volusia County	Sanitary Sewer Policy 6.1.2.1	Volusia County shall replace and/or consolidate, when it is determined to be feasible, smaller package plants owned by the County with "advanced secondary" sewage treatment plants or enlarge existing plants.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.2.5	Existing package treatment plants shall be connected to a central sewer system when connection to said system is available. When an existing privately-owned package treatment facility is phased out and connected to a central public wastewater system, the owner of said private plant may be required to assume the cost of the connection.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.2.6	Volusia County shall require the utilization of a central sewer system where connection to a central system is available. The use of existing septic tanks serving land uses within the sewer service areas may continue in the manner consistent with the requirements specified by the County's comprehensive plan and local and state regulations.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.3.1	Volusia County shall require use of recovered wastewater for irrigation and non-potable use for all new development and other appropriate uses, where such use can be feasibly implemented and permitted by DEP as determined by Volusia County's land development regulations	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.3.2	Volusia County shall comply with state regulations for water quality, especially with respect to wastewater plant operations and effluent disposal and, if necessary, develop an appropriate alternative management strategy which may include reduction in wastewater effluent loadings and discharge rates.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.3.6	Volusia County may, where practical and economically feasible, develop and implement an environmentally sound program for the use of natural systems, such as wetlands, for wastewater disposal provided that the implementation of such a program does not present a hazard to public health.	Comprehensive Plan	Completed
Volusia County	Sanitary Sewer Policy 6.1.3.8	Volusia County shall, to the extent feasible, provide facilities to allow the use of recovered wastewater for agricultural and other purposes, where County or other utility owners supply it.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Volusia County	Sanitary Sewer Policy 6.1.5.2	Volusia County shall negotiate sewer service area agreements with adjacent municipalities to better coordinate the orderly, efficient, and economical provision of wastewater service.	Comprehensive Plan	Completed
Volusia County	Drainage Objective 9.1.1	Volusia County shall fund and complete comprehensive watershed studies for all areas currently developed, or developing with essentially urban land uses, and areas where the Future Land Use Map has designated essentially urban land uses within the unincorporated county, as part of an overall Stormwater Master Plan. The County shall continue to assess other watersheds for flooding and pollution problems and for changes in land use.	Comprehensive Plan	Completed
Volusia County	Drainage Objective 9.1.2	Volusia County shall at a minimum maintain current standards regulating the design, construction, and management of drainage systems used for stormwater management.	Comprehensive Plan	Completed
Volusia County	Drainage Policy 9.1.2.6	BMPs for control of erosion and sedimentation shall be employed for all construction, urban development, and agricultural activities in order to protect natural waterbodies, water courses and wetlands from siltation…	Comprehensive Plan	Completed
Volusia County	Drainage Policy 9.1.3.1	Volusia County shall maintain an effluent reuse and disposal program to recharge wetlands and groundwater supplies and providing irrigation water thereby conserving potable water resource and improving surface water quality of the county.	Comprehensive Plan	Completed
Volusia County	Groundwater Policy 10.1.1.11	Prime (or high) aquifer recharge areas appropriate for development shall be developed so as to continue to maintain pre-development net retention and new stormwater management projects in existing developed areas should be designed in a fashion that enhances aquifer recharge.	Comprehensive Plan	Completed
Volusia County	Groundwater Policy 10.1.1.12	Volusia County shall protect recharge lands through both fee simple and less than fee simple acquisition techniques, land use controls, or other methods deemed appropriate.	Comprehensive Plan	Completed
Volusia County	Groundwater Objective 10.1.2	Volusia County shall not allow the degradation of the Floridan and surficial aquifers' water quality.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
Volusia County	Conservation Objective 12.1.1	To prevent the further degradation of the ambient water quality of the county's surface water resources, and to restore to acceptable levels those surface waters which exceed federal, state and local pollutant standards.	Comprehensive Plan	Completed
Volusia County	Conservation Policy 12.1.1.1	An ongoing surface water quality monitoring network, incorporating the standards and activities provided in the Coastal Management Element shall continue…	Comprehensive Plan	Completed
Volusia County	Conservation Policy 12.1.1.2	The County shall continue to initiate and encourage surface water restoration programs which will, at minimum: identify and initiate the cleanup of highly polluted aquatic systems; identify those areas of the county where on-site sewage disposal systems are determined to be, or have the potential to be significant surface water pollution sources; and coordinate with stormwater facility redesign activities where necessary.	Comprehensive Plan	Completed
Volusia County	Conservation Policy 12.1.1.4	Onsite sewage disposal systems and associated drain fields shall continue to be limited within the flood plain of surface water bodies as provided for in land development regulations, to the extent that such systems are designed and located so as to not contribute to the degradation of ambient water quality.	Comprehensive Plan	Completed
Volusia County	Conservation Objective 12.1.2	To protect and enhance the natural hydrologic functions and wildlife habitat attributes of surface water resources, including estuarine and oceanic waters, as well as waters which flow into estuarine and oceanic water, and the floodplains associated with these waters.	Comprehensive Plan	Completed
Volusia County	Conservation Objective 12.1.3	To protect and appropriately utilize the physical and ecological functions of natural drainage ways and drainage patterns.	Comprehensive Plan	Completed
Volusia County	Conservation Objective 12.2.1	To provide for the protection of areas determined to be environmentally sensitive, and direct growth away from such areas.	Comprehensive Plan	Completed
City of DeBary	Ordinance Nos. 04-09 and 04-17	Fertilizer Management	Ordinance	Completed
City of DeBary	Ordinance No. 02-09	Control of Illicit Discharges to the Stormwater System and Waters of the State	Ordinance	Completed
City of DeBary	Ordinance No. 05-05	Stormwater Utility	Ordinance	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of DeBary	Natural Resources Objective 4.3	The City will carry out a program of activities to appropriately manage water resources (including groundwater resources and surface water resources such as lakes, ponds, streams, shorelines, and rivers) consistent with the need for the growth of the community and the needs of the environment.	Comprehensive Plan	Completed
City of DeBary	Natural Resources Policy 4.302	The City will cooperate with the Volusia County Public Health Unit, DEP, and/or other agencies to monitor water quality in surface water bodies. Where trends indicate a reduction of water quality, steps will be taken to identify the sources of pollution and to help mitigate the adverse impacts.	Comprehensive Plan	Completed
City of DeBary	Natural Resources Policy 4.303	While there is not a present indication of the need to provide sewer service to older residential areas, the City may cooperate with Volusia County Utilities and/or other sewer providers to establish the feasibility, the potential cost, and possible methods for extension of sewer service.	Comprehensive Plan	Completed
City of DeBary	Natural Resources Objective 4.7	The City shall implement a green infrastructure program to provide clean air and water through the efficient and sustainable use of the natural resource network to reduce negative impacts of future development patterns and to lessen the need for expensive grey infrastructure installations.	Comprehensive Plan	Completed
City of DeBary	Public Facilities Objective 7B.2	The City will continue to coordinate with all service providers to maximize the use of existing sanitary sewer facilities so as to discourage urban sprawl, support high density mixed use developments within the Southeast Mixed Use Area/Transit Oriented Development Overlay District, and encourage the establishment of a single, coordinated sanitary sewer system to serve the city.	Comprehensive Plan	Completed
City of DeBary	Public Facilities Policy 7B.201	The City will continue to help coordinate the expansion of the various sanitary sewer systems serving the city. A specific purpose of this coordination will be to ensure that areas of the city requiring service will obtain such service in a timely and cost-effective manner.	Comprehensive Plan	Completed
City of DeBary	Public Facilities Policy 7B.302	The City will continue to coordinate all service providers to monitor non-residential land uses to help prevent improper use of the sewer system.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of DeBary	Public Facilities Policy 7C.101	The City will continue improving stormwater management facilities to serve developed areas…	Comprehensive Plan	Completed
City of DeBary	Public Facilities Policy 7C.103	Where available funds for improvement to stormwater management facilities are not specifically restricted, the highest priority will be given to providing services in developed areas experiencing structural flooding. High priority may also be given to water quality improvements related to EPA's TMDL Program for watershed planning and restoration.	Comprehensive Plan	Completed
City of DeBary	Public Facilities Objective 7C.2	The City will carry out a program of activities to help protect the functions of natural drainage features and natural groundwater recharge areas, and to maintain water quality in these natural systems.	Comprehensive Plan	Completed
City of Sanford	Ordinance No. 4413	Regulating the Proper Use of Fertilizers	Ordinance	Completed
City of Sanford	Code 1973; Ordinance Nos. 3510, 3895, 4315	Sewer Use and Discharge Regulations	Ordinance	Completed
City of Sanford	Code 1973; Ordinance Nos. 1989 and 3945	Reclaimed Water Reuse Program	Ordinance	Completed
City of Sanford	Code 1973; Ordinance No. 1994	City of Sanford Nonresidential On-Site Sewage Compliance Permit Ordinance	Ordinance	Completed
City of Sanford	Code 1973; Ordinance No. 3065	Stormwater Management Utility	Ordinance	Completed
City of Sanford	FLU Objective 1-1.18	The City shall implement joint planning procedures, including a commitment to develop consistent Future Land Use Map concepts for the unincorporated urban area plus transportation, water, sewer and drainage facilities and services. The City and Seminole County shall maintain land development regulations which implement the mutually agreed upon program for coordinating development within the unincorporated area.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Sanford	FLU Objective 1-2.6	The City shall maintain land development regulations which incorporate concepts for managing land, water and energy resources which are responsive to unique development and conservation issues identified in the City's comprehensive plan. The City will promote the use of US Green Building Council approved building techniques and low impact development techniques.	Comprehensive Plan	Completed
City of Sanford	Infrastructure Policy 4-2.4.2	All new development shall be required to hook up to the existing central water and wastewater system and reclaimed water system. If not within the required reclaimed water connection distances as listed in the "Utilities Standards and Specifications and Design Standards for Water Conservation", new development shall use the lowest quality available water for irrigation purposes. The distance from a reclaimed water line shall be measured along the path of the City's future reclaimed water lines.	Comprehensive Plan	Completed
City of Sanford	Infrastructure Objective 4-3.2	The City shall assist in assuring implementation of State regulations imposing mandated standards for inspections, operation, and maintenance of on-site wastewater treatment systems. The City shall require residents connect to the public wastewater system where available. When wastewater facilities are not available, the City shall enforce the following design, collection performance, and disposal criteria for wastewater facilities…	Comprehensive Plan	Completed
City of Sanford	Infrastructure Objective 4-5.1	The City shall regulate land development to ensure that the natural functions of wetlands, river basins, lakes and ponds, natural drainage corridors, and floodplains are maintained and perpetuated.	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Sanford	Infrastructure Policy 4-5.1.4	The City's surface water management program shall protect and preserve the hydrological and ecological functions of water resources while permitting the most favorable beneficial uses to occur. The City shall promote both land and water management programs and practices that limit runoff and enhance percolation in order to increase the quantity and protect the quality of groundwater. Land use controls shall be used to accomplish this program. The programs shall be updated based on improved knowledge of problems, issues, and best management practices.	Comprehensive Plan	Completed
City of Sanford	Infrastructure Policy 4-5.1.5	The City shall manage stormwater based on watershed management plans. Implementing strategies shall provide a basis for evaluating the performance of existing off-site drainage facilities, identifying existing and potential future problems or issues, and funding necessary structural and non-structural system improvements for effective surface water management. Existing structures which cause adverse impacts to water resources or sensitive natural resources shall be identified and corrective measures shall be coordinated with appropriate entities. No new development shall be allowed which overloads existing off-site facilities or unduly increases the potential for flooding.	Comprehensive Plan	Completed
City of Sanford	Infrastructure Objective 4-6.1	The City shall maintain the functions of natural groundwater aquifers and regulate development that may present a threat to the natural aquifer recharge process…	Comprehensive Plan	Completed
City of Sanford	Infrastructure Policy 4-6.1.1	The City shall assist with protecting groundwater from point and non-point pollution sources by including the SJRWMD in the review of development plans located within areas designated as "most effective" recharge areas. This review process shall ensure conservation and efficient use of water as it travels through groundwater systems…	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Sanford	Infrastructure Policy 4-6.1.5	New development shall be coordinated with appropriated State agencies to ensure that state water quality standards are met. Storm water discharge facilities shall be designed so as not to degrade the receiving water body below the minimum conditions necessary to ensure the suitability of water for the designated use of its classification.	Comprehensive Plan	Completed
City of Sanford	Conservation Objective 5-1.2	Coordinate with Seminole County, SJRWMD, as well as federal, state, and regional entities having water-related jurisdiction, in order to conserve and protect the quality and quantity of current and projected future water sources and surface water run-off.	Comprehensive Plan	Completed
City of Sanford	Conservation Policy 5-1.2.3	The City shall incorporate and enforce regulations requiring that agricultural activities shall… use BMPs and practices in order to reduce pesticide and fertilizer run-off, prevent soil erosion, and preserve water quality.	Comprehensive Plan	Completed
City of Sanford	Conservation Policy 5-1.2.4	The City shall incorporate the following performance standards in order to protect water quality: a. All new residential subdivisions as well as multiple family and nonresidential development within the city which are served by existing or planned future expansions to the City's wastewater collection and disposal system shall be required to connect to the public wastewater system. b. In areas where developments cannot be connected to the public sewer, private wastewater disposal systems are acceptable as interim measures provided such facilities are approved by the City Utilities Director's office. Notwithstanding all private wastewater disposal systems shall be designed to facilitate mandatory hookups to the public wastewater system when the public system becomes available. c. The City shall promote application of innovative concepts in wastewater collection and disposal including wastewater reuse through such programs as use of reclaimed water for spray irrigation... Development that are not required to connect to the existing reclaimed water system shall be required to install irrigation lines connected to an alternative water supply system…	Comprehensive Plan	Completed

Lead Entity	Strategy Name	Description	Strategy Type	Status
City of Sanford	Conservation Objective 5-1.13	Establish an intergovernmental coordination mechanism in order to manage natural resources and assist in implementing appropriate laws, ordinances, and plans of existing state, regional and local agencies sharing responsibilities for managing natural resources within the City.	Comprehensive Plan	Completed
City of Lake Mary	Ordinance No. 1569	Proper Use of Fertilizer	Ordinance	Completed
City of Lake Mary	Ordinance Nos. 118 and 1518	City Wastewater System	Ordinance	Completed
City of Lake Mary	Ordinance No. 538	Resource Protection Standards	Ordinance	Completed