FINAL

BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Daily Maximum Loads Adopted by the Florida Department of Environmental Protection

in the

Lake Jesup Basin

developed by the
Lake Jesup TMDL Basin Working Group

in cooperation with the
Florida Department of Environmental Protection
Division of Environmental Assessment and Restoration
Bureau of Watershed Restoration
Tallahassee, Florida 32399

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BMAP	Basin Management Action Plan
BMP	Best Management Practice
BOD	Biological Oxygen Demand
BWG	Basin Working Group
CDM	Camp Dresser and McKee
CDS	Continuous Deflective Separation (Unit)
CWP	Center for Watershed Protection
DO	Dissolved Oxygen
EMC	Event Mean Concentration
EPA	U. S. Environmental Protection Agency
ERP	Environmental Resource Permit
F.A.C.	Florida Administrative Code
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOH	Florida Department of Health
FDOT	Florida Department of Transportation
F.S.	Florida Statutes
FSA	Florida Stormwater Association
FWC	Florida Fish and Wildlife Conservation Commission
FWRA	Florida Watershed Restoration Act
FYN	Florida Yards and Neighborhoods Program
GIS	Geographic Information System
HSPF	Hydrologic Simulation Program – Fortran (model)
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
MG	Million Gallons
MGD	Million Gallons Per Day
MS4	Municipal Separate Storm Sewer System
MSJR	Middle St. Johns River
MT	Metric Ton
NELAC	National Environmental Laboratory Accreditation Conference
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OAWP	Office of Agricultural Water Policy
OOCEA	Orlando Orange County Expressway Authority
PBS&J	Post, Buckley, Schuh & Jernigan
PLRG	Pollutant Load Reduction Goal
PSA	Public Service Announcement
QA/QC	Quality Assurance/Quality Control
RSF	Regional Stormwater Facility
SCI	Stream Condition Index
SJRWMD	St. Johns River Water Management District
SOP	Standard Operating Procedure
STORET	STOrage and RETrieval (Database)
TAZ	Transportation Analysis Zone

TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TOC	Total Organic Carbon
TP	Total Phosphorus
TSI	Trophic State Index
TSS	Total Suspended Solids
UF–IFAS	University of Florida–Institute of Food and Agricultural Sciences
USACE	United States Army Corps of Engineers
USGS	U.S. Geological Survey
WAV	Watershed Action Volunteers
WBID	Waterbody Identification
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

THE LAKE JESUP BASIN

Lake Jesup is one of the largest lakes in Central Florida and is part of the St. Johns River system. Lake Jesup has a surface area of about 10,660 acres (16.7 square miles) and drains a watershed of about 86,382 acres (135 square miles), including a large portion of Seminole County, a small portion of Orange County, the entire City of Winter Springs, and portions of the following municipalities: Altamonte Springs, Casselberry, Eatonville, Lake Mary, Longwood, Maitland, Orlando, Oviedo, Sanford, and Winter Park. At high stage levels, Lake Jesup has surface area up to 16,000 acres.

TOTAL MAXIMUM DAILY LOADS

Total Maximum Daily Loads (TMDLs) are water quality targets, based on state water quality standards, for specific pollutants (such as nitrogen and phosphorus). The Florida Department of Environmental Protection (FDEP) identified Lake Jesup to be impaired by nutrients, and, in 2006, adopted TMDLs for Total Phosphorus (TP) and Total Nitrogen (TN) for the lake, as shown in the table below.

WBID(S)	TMDL (LBS/YR)	TARGET CONCENTRATION (MG/L)	WASTELOAD ALLOCATION NPDES STORMWATER	LOAD ALLOCATION (NONPOINT)
2981 (Including 2981A)	41,888 TP	0.096	34%	34%
2981 (Including 2981A)	545,203 TN	1.27	50%	50%

THE LAKE JESUP BASIN MANAGEMENT ACTION PLAN

Due to the extensive role of nitrogen fixation in Lake Jesup and the current lack of information related to in-lake nutrient cycling, the focus of this BMAP is to achieve reductions in TP loads from sources external to the lake. Reducing external TP sources is necessary to achieve and then maintain in-lake conditions, and is therefore a crucial component of restoring Lake Jesup's water quality. The total required TP reductions from stormwater runoff and septic tanks were allocated to the responsible entities in the basin. These entities include 11 cities and towns, two counties, three transportation agencies, and agriculture. Since there are several technical uncertainties that require additional information before they can be addressed, the required reductions are spread over a 15-year timeframe. This phased approach assigns one-third of the required reductions in each of three five-year periods. Therefore, this BMAP addresses the first one-third of the required reductions.

In order to obtain information about the uncertainties to revise the TMDL and BMAP allocations in future iterations, a water quality monitoring plan and research studies will be implemented over the next five years, concurrently with projects to reduce external TP loads. FDEP anticipates the need to recalculate the BMAP allocations upon completion of the first five-year implementation period at which time water quality data at a sufficient spatial and temporal resolution should be available to support new calculations.

KEY ELEMENTS OF THE BMAP

This BMAP addresses the key elements required by the Florida Watershed Restoration Act (FWRA), Chapter 403.067, Florida Statutes (F.S.), including the following:

- Document how the public and other stakeholders were encouraged to participate or participated in developing the BMAP (**Section 1.2.1** and **Appendix C**);
- Equitably allocate pollutant reductions in the basin (**Section 3.2.4** and **Section 3.3**);
- Identify the mechanisms by which potential future increases in pollutant loading will be addressed (**Section 3.2.5** and **Section 4.2.6**);
- Document management actions/projects to achieve the TMDLs (**Section 4.2** and **Appendix D**);
- Document the implementation schedule, funding, responsibilities, and milestones (**Appendix D**); and
- Identify monitoring, evaluation, and a reporting strategy to evaluate reasonable progress over time (**Section 5.1**).

ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION

With implementation of the projects outlined in this BMAP, reductions in the external phosphorus loads to Lake Jesup are expected to improve the water quality conditions of the lake. The following outcomes are anticipated from BMAP implementation:

- Improved water quality in Lake Jesup and its tributaries;
- Decreased concentration of TP in the water column, which leads to improvement in water quality characteristics of the lake;
- Greater understanding of the sources in the basin, in-lake nutrient cycling, and effectiveness of the management actions;
- Enhanced understanding of basin hydrology, water quality, and pollutant sources; and
- Enhanced public awareness of pollutant sources, impacts, and management actions.

BMAP COST AND TIMEFRAME

Costs were provided for 46% of the activities identified in the BMAP, with an estimated total cost of more than $35 million. In addition, annual operation and maintenance costs were provided for 11% of the projects for a total of $2.5 million. The funding sources range from local contributions to legislative appropriations. Technical stakeholders and Basin Working Group (BWG) members will continue to explore new opportunities for funding assistance to ensure that the activities listed in this BMAP can be maintained at the necessary level of effort.

BMAP FOLLOW-UP

As a part of BMAP follow-up, FDEP, the Basin Working Group, and technical stakeholders will track implementation efforts and monitor water quality in Lake Jesup. The results will be used to evaluate whether the plan is effective in reducing external TP loading and that the lake is responding to these reductions. The Basin Working Group will meet at least every 12 months to discuss implementation issues, consider new information, and determine what other management strategies are needed to meet the TMDLs, if necessary.

BENEFITS OF THE BMAP PROCESS

The Basin Working Group members provided endorsement of the BMAP on behalf of the entities they represent and are committed to ensuring the plan is implemented to achieve the required TP reductions. In addition to this endorsement, the entities are providing FDEP with letters of commitment or resolutions of support to ensure that as staff and board members change over time, the entity has a way to show support for the BMAP and the efforts included.

CHAPTER 1: PLAN CONTEXT, PURPOSE, AND SCOPE

Lake Jesup is one of the largest lakes in Central Florida and is part of the St. Johns River system. Lake Jesup has a surface area of about 10,660 acres (16.7 square miles) and drains a watershed of about 87,322 acres (136.4 square miles), including a large portion of Seminole County, a small portion of Orange County, the entire City of Winter Springs, and portions of the following municipalities: Altamonte Springs, Casselberry, Eatonville, Lake Mary, Longwood, Maitland, Orlando, Oviedo, Sanford, and Winter Park. At high stage levels, Lake Jesup has surface area up to 16,000 acres. This Basin Management Action Plan (BMAP) represents the joint efforts of multiple stakeholders to prepare a restoration plan for the lake to implement the adopted Total Maximum Daily Load (TMDL). This BMAP includes prioritized projects to limit external phosphorus loading into the lake and concurrent research projects to guide effective long-term restoration efforts. The BMAP was developed as part of the State of Florida TMDL program.

Stakeholder involvement is critical to success of the entire TMDL program. Stakeholder involvement is particularly essential to develop, gain support for, and secure commitments in a BMAP. The Florida Department of Environmental Protection (FDEP) invited all interested stakeholders to participate in Lake Jesup BMAP development, and facilitated participation to ensure that all voices were heard and opinions considered. This approach fostered a sense of cooperation among stakeholders and ultimately led to the development of a restoration plan that is scientifically defensible and expected to achieve real results through the use of a 15-year phased implementation approach.

1.1 WATER QUALITY STANDARDS AND TOTAL MAXIMUM DAILY LOADS

Florida's water quality standards are designed to ensure that surface waters can be used for their designated uses, such as drinking water, recreation, and shellfish harvesting. Currently, most surface waters in Florida, including Lake Jesup, are categorized as Class III waters, which mean they must be suitable for recreation and must support the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

Under Section 303(d) of the Federal Clean Water Act, each state must identify its "impaired" waters, including estuaries, lakes, rivers, and streams, which do not meet their designated uses. FDEP is responsible for developing the state list of impaired waters. The administrative and technical processes for listing impaired waters and establishing TMDLs are authorized by Section 403.067, Florida Statutes (F.S.) [known as the Florida Watershed Restoration Act (FWRA)] and the Identification of Impaired Surface Waters Rule, Chapter 62-303, Florida Administrative Code (F.A.C.). The FWRA contains provisions that guide the development of BMAPs and other TMDL implementation approaches. **Appendix B** contains a summary of the statutory provisions related to BMAP development.

FDEP develops and adopts TMDLs for impaired waterbodies. A TMDL is the maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses. TMDLs are developed and implemented as part of a watershed management cycle, based on the state's 52 river basins. Lake Jesup is located within the Group 2 Middle St. Johns River (MSJR) Basin.

A nutrient TMDL was adopted for Lake Jesup in 2006, which identifies the Total Phosphorus (TP) and Total Nitrogen (TN) load the lake can receive and still maintain its Class III designated

uses. By establishing this assimilative capacity, the TMDL also established required reductions needed to meet the target. The Lake Jesup nutrient TMDL is described in more detail in **Section 1.2.3**.

The Lake Jesup BMAP contains strategies to implement the Lake Jesup nutrient TMDL through reduction and prevention of pollutant discharges through various means. The project types contained in the BMAP reflects the array of sources and stakeholder relationships that exist in this complex watershed. Although this is currently the only BMAP for the Lake Jesup Basin, other BMAPs may be developed in the future to address individual waterbody identification numbers (WBIDs) within the larger watershed or additional parameters.

1.2 The Lake Jesup Basin Management Action Plan

The focus of this BMAP is to achieve reductions in external TP loads to the lake. The focus on TP and external loads in particular was driven by the significant role of nitrogen fixation in Lake Jesup (refer to **Section 2.5.1** for additional detail) and the magnitude of unknowns regarding internal nutrient cycling in the lake (refer to **Section 2.4**).

Detailed allocations were calculated and assigned (see **Section 3.3**) to the responsible entities in the basin. These entities include 11 cities and towns, two counties, three transportation agencies, and agriculture. Allocations are spread over a 15-year timeframe with a phased approach that assigns required reductions in each of three five-year periods. Because one-third of the required reduction will be achieved in each five-year BMAP period, this BMAP addresses the first third of the TMDL reductions for TP. The BMAP outlines specific projects that will be implemented by local entities to achieve required external TP load reductions and a schedule for implementation. Concurrent with project implementation, water quality monitoring (refer to **Section 5.1**) will be used to track the reductions achieved by projects and the lake's response to the reduction in external TP loading and to determine what additional actions, if any, should be taken to achieve the TMDLs. A research plan (see **Section 5.2**) is also included to provide additional data for the basin to help refine the TMDL and BMAP allocations in future cycles, as necessary. FDEP anticipates the need to recalculate the BMAP allocations upon completion of the first five-year implementation period at which time water quality data at a sufficient spatial and temporal resolution should be available to support the calculations.

1.2.1 Stakeholder Involvement

Beginning prior to TMDL adoption the technical stakeholders provided input on the land uses, event mean concentrations (EMCs), best management practice (BMP) efficiency values, and other aspects of model development and restoration targets. The model used for the TMDL originated with Seminole County and was expanded during TMDL development for use in the entire Lake Jesup watershed. BMAP technical meetings began in 2006 to solicit stakeholder input on data collection, compilation and review of the model development and approach, and technical aspects of the BMAP.

In addition to discussions on the technical issues of TMDL development, FDEP solicited further input from key stakeholder groups at the management level by convening the Lake Jesup Basin Working Group (BWG) in July 2007. The BWG developed the following mission statement:

> *The mission of the Lake Jesup Basin Working Group is to make recommendations to the Florida Department of Environmental Protection to work toward restoring impaired waterbodies through development of an effective, equitable, and cost-efficient Basin Management Action Plan to implement the Total Maximum Daily Loads.*

The BWG reviewed the major issues regarding the development of the BMAP and detailed allocations and made formal recommendations to FDEP for adoption in the BMAP. This BMAP document is a compilation of input from technical stakeholders, BWG members, and the general public as discussed at Lake Jesup BMAP workshops and meetings.

Florida's Government-in-the-Sunshine law (http://myfloridalegal.com/sunshine; Section 286, F.S.) provides a right of access to governmental proceedings at both the state and local levels. The Sunshine Law is intended to expose government's decision-making process to public scrutiny, including all of the deliberations that precede a final action. This philosophy is consistent with the transparent nature of the BMAP process. Basin Working Group and public meetings were formally publicized in accordance with Section 286, F.S., including publication of notices in the Florida Administrative Weekly. Informally, notification of all meetings was sent to a wide email distribution list and every attempt was made to meet on the same day (3rd Thursday), time (1:00 PM - 4:00 PM), and location (Lake Sylvan Park, Sanford, Florida) each month to facilitate attendance.

1.2.2 Plan Purpose and Scope

The purpose of this BMAP is to implement external load reductions to achieve the TP TMDL adopted by FDEP for the Lake Jesup Basin and build a solid scientific foundation that will provide for future consideration of key lake issues about which there is insufficient understanding. There are other water quality concerns that will benefit from the actions that address this TMDL; however, this BMAP does not address all the water quality issues in the basin.

This BMAP focuses on Lake Jesup (TMDL waterbody identification numbers [WBIDs] 2981 and 2981A), which is located in central Florida (**Figure 1**), on the northeast side of the MSJR Basin. The majority of the watershed lies within Seminole County, with a portion on the southwest end that extends into Orange County.

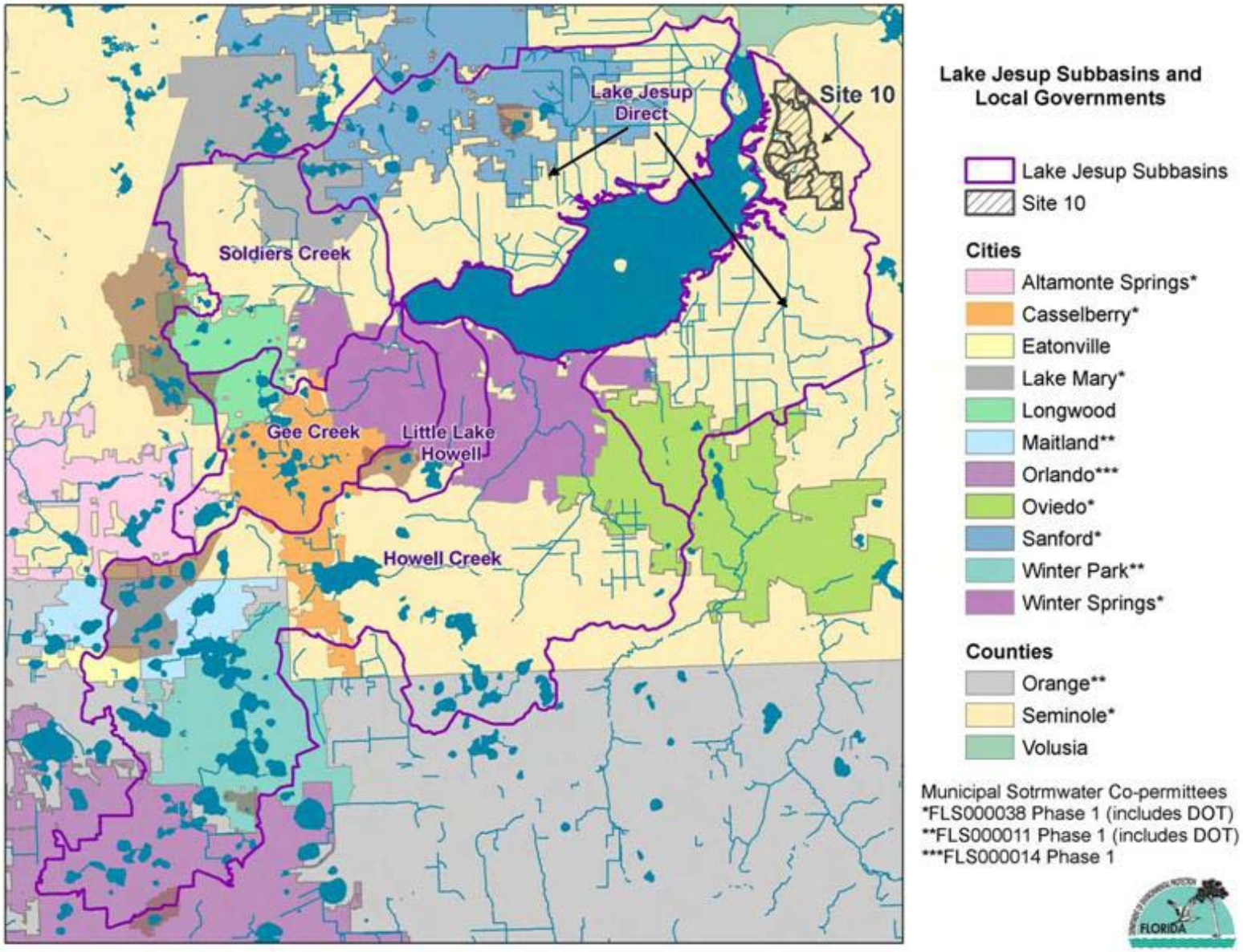


FIGURE 1: LAKE JESUP AND LOCAL GOVERNMENT JURISDICTIONS IN THE BASIN

1.2.3 Measurable Goals and Milestones

With implementation of the projects outlined in this BMAP, reductions in the external phosphorus loads to Lake Jesup are expected to improve the water quality conditions of the lake. The following outcomes are anticipated from BMAP implementation:

- Improved water quality in Lake Jesup and its tributaries;
- Decreased TP concentrations in the water column, which leads to improvement in water quality characteristics of the lake;
- Greater understanding of the sources in the basin, in-lake nutrient cycling, and effectiveness of the management actions;
- Enhanced understanding of basin hydrology, water quality, and pollutant sources; and
- Enhanced public awareness of pollutant sources, impacts, and management actions.

The projects included in this BMAP are anticipated to reduce 10,167.5 lbs/yr of TP that were or currently are estimated to be entering Lake Jesup and its tributaries. This estimated reduction is 54% of the total TMDL nonpoint source required reductions based on current information. For the stormwater projects submitted, information on the area treated was provided for 49% of the projects for a total stormwater treatment area of 14,090 acres. Costs were provided for 46% of the activities identified in the BMAP, with an estimated total cost of more than $35 million. In addition, annual operation and maintenance costs were provided for 11% of the projects for a total of $2.5 million.

1.2.4 Efforts that Affect the BMAP

In addition to this BMAP, there are other projects and efforts that are occurring in the Lake Jesup Basin and surrounding watershed, which will affect the benefits achieved by the BMAP. Although these projects support the goals of the BMAP, their expected impacts cannot be quantified at this time. Additional information about these projects will be provided in future iterations of the BMAP. The related efforts include:

- Lake Jesup Interagency Restoration Strategy (see **Section 4.2.3**);
- TMDLs and Pollutant Load Reduction Goals (PLRGs) for upstream waterbodies;
- U.S. Army Corps of Engineers (USACE) Lake Jesup outlet modification;
- State Road 46 bridge reconstruction; and
- Changes to the application of reuse water at Site 10.

1.3 Lake Jesup Nutrient TMDL

TMDL development involves three primary steps: (1) establish a water quality target; (2) calculate existing loads; and (3) calculate load reductions needed to achieve the target. The Lake Jesup nutrient TMDL is based on achieving a target trophic state index (TSI) of 65 in the lake. Because the TSI is based on nitrogen, phosphorus, and chlorophyll concentrations, this translated into target concentrations for TP and TN of 0.094 mg/L and 1.32 mg/L, respectively. TP and TN loadings from the watershed were estimated with a pollutant loading model originally developed by Post, Buckley, Schuh & Jernigan (PBS&J) for Seminole County, but expanded for use in the Lake Jesup TMDL. This model uses runoff coefficients, soil types, and land uses to estimate TN and TP loading. Surface runoff loading was considered with loads from baseflow, septic tanks, precipitation directly onto the lake's surface (atmospheric deposition), and inflow from the St. Johns River in the TMDL to develop a full picture of nutrient inputs to the system. These loading estimates were then input into the Bathtub Eutrophication Model to establish the relationship between TN and TP loadings and in-lake TN, TP, and chlorophyll *a* concentrations.

The model was calibrated against the measured in-lake TN, TP, and chlorophyll *a* concentrations. The final step was to adjust the external loadings to the lake until the target TSI was achieved. The loadings that achieved the target TSI were used to calculate the required reductions in TP and TN in the TMDL (refer to **Table 1**). Additional detail about TMDL development can be found in the Lake Jesup TMDL report (FDEP, 2006).

1.3.1 Pollutant Reduction and Discharge Allocations

Under the FWRA, the TMDL allocation in rule may be an "initial" allocation among point and nonpoint sources, with a "detailed" allocation to specific sources established in the BMAP. **Table 1** lists the TMDL and initial pollutant load allocations adopted by rule for Lake Jesup. These reductions were modified during the BMAP process as part of the development of detailed allocations. The detailed BMAP allocations are discussed in **Chapter 3**.

TABLE 1: TMDLS IN LAKE JESUP

WBID(S)	TMDL (LBS/YR)	TARGET CONCENTRATION (MG/L)	WASTELOAD ALLOCATION NPDES STORMWATER	LOAD ALLOCATION (NONPOINT)
2981 (Including 2981A)	41,888 TP	0.096	34%	34%
2981 (Including 2981A)	545,203 TN	1.27	50%	50%

CHAPTER 2: TECHNICAL FOUNDATION

2.1 JURISDICTIONS, POPULATION, AND LAND USE

The Lake Jesup watershed occupies a highly urbanized area within Seminole and Orange counties. Eleven municipalities are located in the watershed, including Altamonte Springs, Casselberry, Eatonville, Lake Mary, Longwood, Maitland, Orlando, Oviedo, Sanford, Winter Park, and Winter Springs. According to 2003 data from the U. S. Census Bureau, the population densities in Seminole and Orange counties were 1,184.9 and 987.8 person/square mile, respectively, which were significantly higher than the state average of 296.4 person/square mile. The area is also undergoing rapid population growth. From 1990 through 2000, the population of Seminole and Orange counties increased by 27.0% and 32.3%, respectively.

The Lake Jesup Basin drains about 86,382 acres into Lake Jesup. Land use categories were classified as shown **Table 2**. **Figure 2** shows the distribution of the major land uses in the watershed. As shown in the table, active land uses (agriculture, golf course, residential, commercial, institutional, industrial/utility, and transportation facilities) occupy 51,273 acres (59%) of the watershed. Over half of this area is medium-density residential. As shown in **Figure 2**, urban and built-up areas almost entirely cover the western and southern parts of the Lake Jesup basin. The remaining 41% of the watershed consists of natural areas, including undeveloped forest and rural land, open water, and wetlands.

Approximately 10% of the watershed is in public ownership. The St. Johns River Water Management District (SJRWMD) brought approximately 3,850 acres around the lake into public ownership since 1984 and has targeted additional areas for acquisition. Other government agencies, including local governments, have purchased an additional 4,700 acres of floodplain around the lake.

TABLE 2: LAND USE CLASSIFICATIONS IN THE LAKE JESUP BASIN

LAND USE	ACREAGE	PERCENT
Medium-Density Residential	26,194	30.3
Forest and Rural Open	11,965	13.9
Wetlands 1 (impacted)	11,359	13.1
Wetlands 2 (unimpacted)	7,917	9.2
Agriculture	5,582	6.5
Commercial	4,860	5.6
Transportation Facilities	4,044	4.7
Water	3,868	4.5
High-Density Residential	2,177	2.5
Low-Density Residential	2,598	3.0
Institutional	2,112	2.4
Site 10	1,252	1.4
Industrial/Utility	1,908	2.2
Golf Course	546	0.6
Total	**86,382**	**100.0**

2.1.1 OVERVIEW OF AGRICULTURE IN THE LAKE JESUP BASIN

The primary agricultural land uses in the Lake Jesup watershed are cow-calf operations, citrus groves, and field-grown palm nurseries. Other agricultural land uses include ornamental plant container nurseries, field crops, sod production, and equine operations. Most of the agricultural acreage is located within areas that drain directly to the lake (the Lake Jesup "proper" subbasin)

and within the Howell Creek subbasin. **Figure 3** shows the approximate location of agricultural lands in the Lake Jesup BMAP area. **Table 12** in **Section 4.2.5** provides a summary of these agricultural lands within the entire basin.

Citrus and palm nursery operations are concentrated primarily on the northwest side of the lake near the airport, and southeast of the lake in an area known as the Black Hammock. Due to urban encroachment, grove health issues (freeze/disease), and recent flooding, many citrus operations either have been abandoned or have significantly lowered their production acreage. In recent years, some of this citrus acreage has been shifted to field-grown palm production.

There are several commercial cow-calf operations in the watershed, consisting primarily of improved and woodland pastures. Most of the remaining land use that might be characterized as cow-calf operations are small, noncommercial plots scattered throughout residential areas.

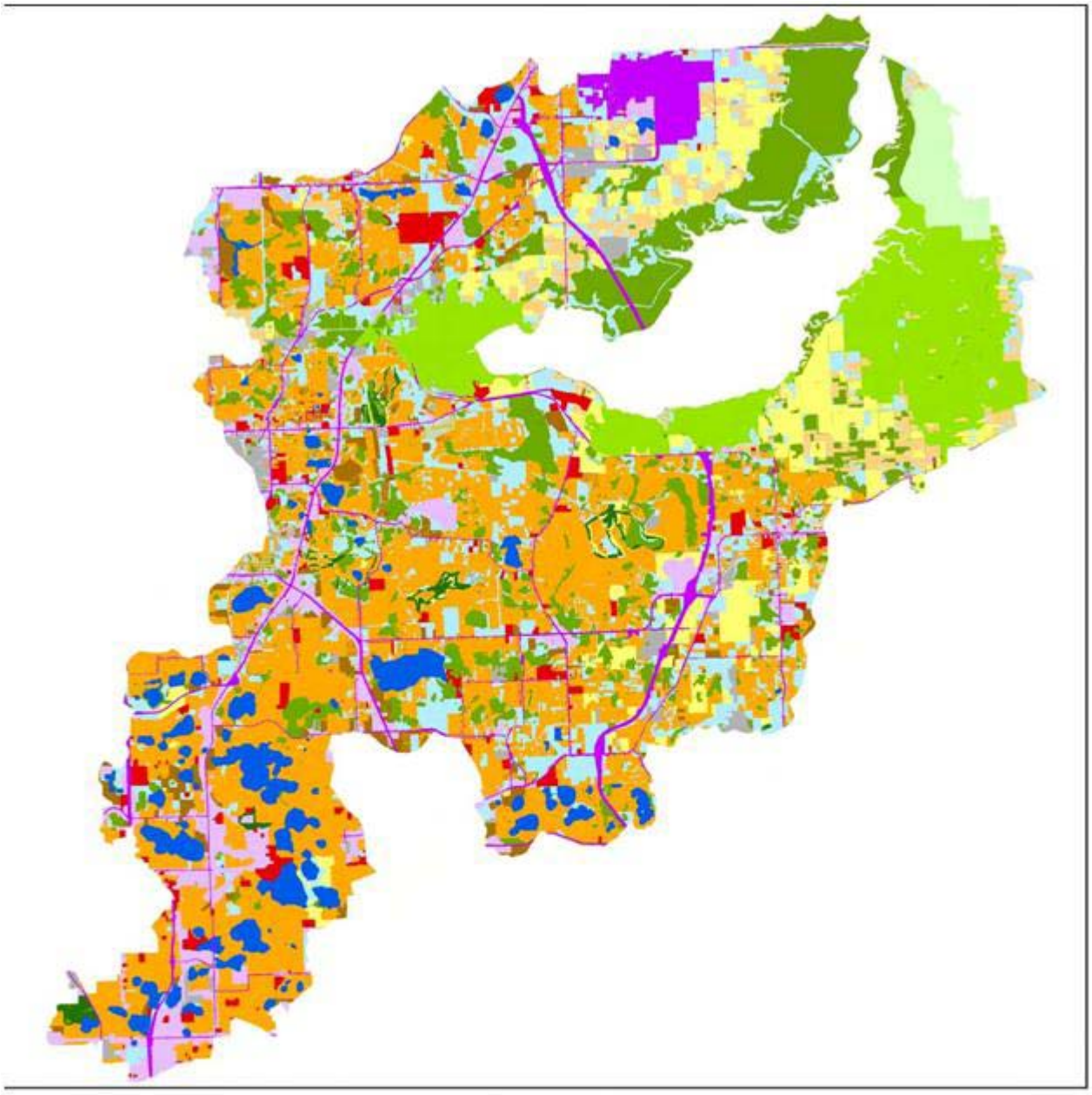


FIGURE 2: LAND USES IN THE LAKE JESUP BASIN

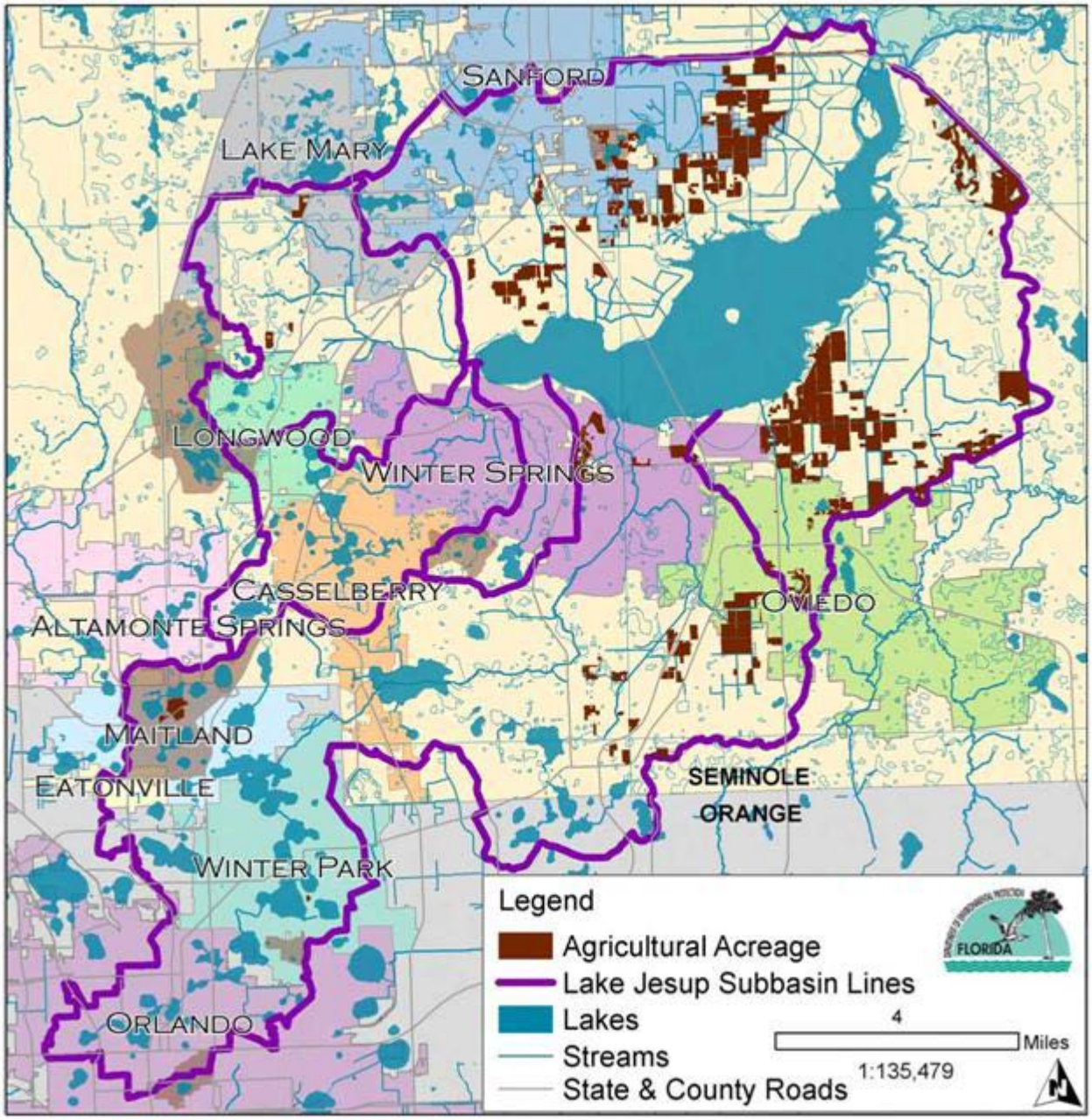


FIGURE 3: AGRICULTURAL ACREAGE IN THE LAKE JESUP BASIN (EXCLUDING SILVICULTURE)

2.2 HYDROLOGY

Lake Jesup is low-lying and shallow, with an average depth of approximately four feet (FDEP, 2006). Lake elevation follows the water surface elevations of the St. Johns River at its confluence with Lake Jesup. Although Lake Jesup usually discharges to the St. Johns River, when local rainfall is lower than regional rainfall (particularly to the south) the river rises, and water flows from the St. Johns River into the lake (Keesecker, 1992). Estimates of mean hydraulic residence time in the lake range from 82-99 days (Brezonik and Fox, 1976; U.S. Environmental Protection Agency, 1977; and Keesecker, 1992).

For the purposes of the TMDL modeling, the Lake Jesup watershed was split into five sub-basins that correspond to the primary tributaries: Gee Creek, Howell Creek, Lake Jesup (the area immediately connected to the lake), Little Lake Howell, and Soldiers Creek (**Figure 1**). A long-term average of about 70,052 acre-feet of surface runoff is discharged into Lake Jesup annually, based on data from 1995 through 2002. The area directly connected to Lake Jesup has the highest discharge, accounting for about 45% of the total surface runoff, followed by Howell Creek (34%), Soldiers Creek and Gee Creek sub-basins together (19%) and Little Lake Howell (3%) (FDEP, 2006).

Contributions of TP loadings from the different sub-basins show a trend similar to that of surface runoff. The long-term annual average TP discharge through surface runoff is about 14.5 metric tons. The watershed immediately connected to Lake Jesup produces about 37% of the total TP loading through surface runoff; the Howell Creek sub-basin contributes 41%; the Soldiers Creek and Gee Creek sub-basins contribute about 10% and 9%, respectively; and the Little Lake Howell sub-basin contributes the smallest amount, about 3% (FDEP, 2006).

2.3 Spatial and Temporal Water Quality Trends

The annual average TP concentration in Lake Jesup ranged from 0.14 to 0.19 mg/L with an average concentration of approximately 0.16 mg/L from 1995-2002. The variation in the annual average TP during the period of record appeared to be relatively small. Larger variations were observed for annual average TN and chlorophyll *a* concentrations. Annual average TN and chlorophyll *a* concentrations from 1995 through 2002 ranged from 1.99 to 4.47 mg/L and from 51.3 to 159.9 µg/L, respectively. The long-term annual average TN and chlorophyll *a* concentrations were 2.93 mg/L and 93.3 µg/L, respectively. The long-term annual average TSI for the lake is 77.9 and equates to poor water quality.

During BMAP development, mean TP concentrations from the STORET database were calculated at various points in the tributaries to Lake Jesup. The purpose of these calculations was to determine those tributaries that had the highest concentrations of TP at their mouths and where concentrations increased substantially within each tributary. There were data available for eight tributaries: Howell Creek, Gee Creek, Soldiers Creek, Little Lake Howell Creek, Salt Creek, Six Mile Creek, Navy Canal, and Sweetwater Creek. With the exception of Little Lake Howell Creek and Navy Canal, the concentrations at the stations nearest the mouths of all tributaries were similar to or higher than the TP concentration in Lake Jesup. This indicates that control of phosphorus sources in these tributaries would likely be necessary if improvements in the lake were to occur.

Soldiers Creek and Sweetwater Creek had concentrations more than double those of Lake Jesup, and Salt Creek had concentrations about 1.5 times those of Lake Jesup. Although the concentrations in Sweetwater Creek and Salt Creek were high, these creeks have low flow, and consequently, low loads. However, this is an area of Lake Jesup that frequently had fish kills, suggesting that the nutrient inputs may have periodically led to algal blooms and low dissolved oxygen. There are alternative explanations (such as toxic inputs, discharge of low dissolved oxygen, or high biological oxygen demand) for this phenomenon; however, only nutrient data were analyzed in this study.

In Howell Creek, the tributary with the most monitoring stations, TP concentrations tripled below Lake Maitland and doubled again below Bear Creek, indicating significant sources of phosphorus upstream of these areas. In Gee Creek, concentrations doubled below Lake Triplet/Secret and slowly increased to the discharge into Lake Jesup. Soldiers Creek

downstream of State Road 419 had concentrations more than double those at State Road 419. Salt Creek TP concentrations declined by about one-third from the upstream-most station to the other station in the creek, although data for the upstream station were limited. Other tributaries either had similar concentrations at all stations or there was only one station upstream of Lake Jesup.

2.4 Technical Uncertainties Addressed Through Modification of TMDL Information and BMAP Assumptions

The Lake Jesup TMDL and BMAP were developed with the best information available at the time (2004-2005 and 2006-2009, respectively). During these processes, a number of significant data gaps were identified, some of which were pertinent to the BMAP and others that need to be addressed prior to any future recalculation of the TMDL. The following text describes how each uncertainty was addressed. **Section 5.2** contains details of the research projects mentioned below.

- Nitrogen-fixation – At the time of the TMDL, information on the rate of nitrogen-fixation in Lake Jesup was not available. Instead, results from a study in Lake George were used to estimate nitrogen-fixation in Lake Jesup. To improve understanding of the lake dynamics and to obtain lake-specific data on nitrogen-fixation, several studies were completed and are planned in Lake Jesup. These studies will be used in future recalculation of the TMDL to revise the estimated rate of nitrogen-fixation and to help determine the relative loading from nitrogen-fixation versus external sources to the lake. This information will be included in the next cycle of the TMDL and will be used to revise the BMAP allocations, as necessary. Due to this uncertainty, this BMAP focuses on external TP load reductions. Upon recalculation of the TMDL, the need to modify the BMAP to include external TN load reductions will be evaluated.
- Sediment flux – Information varies widely about sediment flux (mineralization and resuspension from the sediments to the water column, mass deposition from the water column to the sediments, and diffusion) rates in Lake Jesup and the total loading that is contributed to the lake from this process. Studies have been and will be conducted to improve estimates of this rate and relative loading. This information will be used to refine the TMDL and BMAP, as necessary, in the next iteration.
- Water quality – Because of the uncertainties associated with the in-lake processes, the relationship between water chemistry and biological parameters in Lake Jesup is not understood in detail. This makes it difficult to predict the biological response associated with BMAP implementation. This relationship will be further studied as information from the in-lake processes is collected and may result in change to the TMDL target concentrations and TMDLs.
- Annexations – The boundaries of the cities and counties in the Lake Jesup BMAP have changed since the time of the TMDL due to annexation. The jurisdictional boundaries from the TMDL, as they existed in 2006, were used when allocating loads in this BMAP. However, in the next iteration of the BMAP, the revised boundaries will be considered and the allocations adjusted accordingly.
- Agricultural loads – Since the TMDL verified period, the total agricultural acreage and the distribution of acreage across the commodity types has changed. In the next iteration of the TMDL, updated land use information will be incorporated to reflect the current agricultural uses in the basin. In addition, any changes in land use from agriculture to development will be accounted for and the local government in which the development occurred will be responsible for any load reductions from that area. FDEP and the Florida Department of Agriculture and Consumer Services (FDACS) will work

together to determine how to account for loads from fallow agricultural land and will coordinate with any local governments that will be allocated loads from previous agricultural lands if the land use changes.

- Legacy agricultural loads – Portions of the basin had previously been used for agriculture and it is not known to what extent nutrients from fertilizers are still in the soils in these areas. In addition, the rate that these nutrients are leaching from the soils into the groundwater or surface runoff, and ultimately into Lake Jesup, is unknown.
- Attenuation – An attenuation factor was not applied to the allocations in this BMAP to account for assimilation in the watershed. The extensive spatial monitoring data that are necessary to determine this attenuation factor are currently not available. However, the primary objective of the monitoring strategy is to provide sufficient data to support recalculation of the allocations at a scale that incorporates natural attenuation (see **Section 5.1**). Further, ongoing monitoring will identify emerging "hotspots" (areas with high phosphorus concentrations). The allocations in the next TMDL cycle may be revised based on this information to address natural attenuation, hotspots, and sources not previously incorporated.
- Watershed loads – Two of the objectives of the BMAP monitoring strategy (**Section 5.1**) are to track trends in loading from the tributaries to Lake Jesup and to track inflow and outflow loads from each jurisdiction in the basin. The information gathered from this monitoring, in addition to research study efforts, will help improve the understanding of loads from different areas in the Lake Jesup watershed and refine the loading estimates in the TMDL during the next cycle to better reflect conditions in the Lake Jesup basin, specifically. This information will also be considered during the reevaluation of the BMAP allocations to ensure the estimated loading is attributed to correct jurisdiction.
- Noncontributing areas – Throughout the basin, there are areas that are considered to be "noncontributing" because the surface loads from these areas do not flow to Lake Jesup. For this BMAP, loads from these areas were removed from the required reduction calculations and load reduction efforts in these areas were not given credit. Loads associated with noncontributing areas are shown in a separate column of the allocation table. In the next iteration of the BMAP, additional information will be collected to refine the boundaries of the noncontributing areas and allocation recalculations will address the issue of noncontributing areas, both those identified currently and those that may be identified in the future by individual stakeholders.
- Site 10 – Consistent with the facility's National Pollutant Discharge Elimination System (NPDES) permit, the City of Sanford is implementing a revised monitoring plan for Site 10. This will allow better calculation of loads from the site for refinement in the next iteration of the BMAP (refer to **Section 5.1.3.4** for details of the monitoring plan). The purpose of this monitoring is to obtain a better estimate of the nutrient loads in the runoff from the residuals and reuse applications on the site, and to determine if the measures implemented by the City are sufficiently reducing the loads from the site to the lake. In addition, FDEP and SJRWMD may study the effects of nutrient leaching from the residuals that have built up on the site and these residuals may need to be removed as part of future BMAP efforts. In this first iteration of the BMAP, a new EMC for stormwater from Site 10 was applied in the allocation calculations. Further, a groundwater study was completed to investigate the possibility of high phosphorus groundwater leaching from the site into the lake (FDEP, 2008; see **Appendix G**).
- Septic tanks – FDOH conducted a statewide inventory of septic tanks, which should provide better data about the number of tanks in the basin. In addition, FDEP is implementing a septic tank study, *Preliminary Evaluation of Septic Tank Influences on Nutrient Loading to the Lower St. Johns River Basin and Its Tributaries*. This study will

help to obtain better estimates of the concentration of nutrients from septic tanks and the distance from surface waters that septic tanks have a water quality impact. The information from these studies will be utilized in the next TMDL cycle to improve the estimated loading from septic tanks in the basin. The entities are also working to determine the locations of septic tanks within their jurisdictions in close proximity to surface waters to improve loading estimates in the next iteration of the TMDL. In addition, there are jurisdictional area issues related to placing some of the septic tanks on sewer. The utility boundaries do not always correspond with the jurisdictional boundaries and this issue will need to be resolved in order to effectively remove septic tanks that could be impacting surface waters. Local governments have also expressed concern that reductions associated with septic tanks have been allocated solely to them and not in part to FDOH. FDOH permitting rules are important for the control of loads from new septic tanks and proper maintenance of existing tanks. This will be a consideration in future iterations of the BMAP.

- Reclaimed water loads – Current watershed loading models do not address the loading associated with the use of reclaimed water for irrigation since the EMCs do not change in areas where it is likely that both fertilization and reclaimed irrigation occur. Available data from reuse studies will be considered for the next iteration of the TMDL modeling.
- Groundwater loads – Surficial groundwater loading is generally estimated from a limited number of samples, relative to surface water loads. Hot spots of nutrient loads in groundwater may exist in the basin. In addition to the Site 10 monitoring, SJRWMD and Seminole County are planning studies to determine the groundwater loading in the basin.
- EMCs – For the next iteration of the TMDL, the EMCs used in the model will be reevaluated and any updated information will be used to modify the EMCs, as necessary, for the land uses in the basin. For instance, the TMDL model included only one EMC for all agricultural land uses. In the next iteration of the TMDL and BMAP, consideration will be given to including more specific EMC values to match the commodity types and conditions in the Lake Jesup Basin. FDEP and FDACS will coordinate on appropriate values to include in the model. Monitoring work on Site 10 will also help to select an appropriate EMC for the site.
- Consumptive use projects – The focus of this BMAP is on external sources of loading to Lake Jesup. Studies are being conducted on lake processes, including sediment flux and nitrogen fixation, to determine the contributions of internal loading and how that loading should be addressed, if needed. Therefore, consumptive use projects are not considered for pollutant removal credit in this first iteration of the BMAP. Stormwater reuse projects are not considered "consumptive uses." Because these projects reduce external loads to the lake, stormwater reuse projects may be considered for credit at FDEP's discretion.
- In-lake treatment projects – There is a study underway to test a regional project that will draw water from the lake, clean the water, and return it to the lake. If this project, or something similar, is determined to be feasible, FDEP will consider providing credit for participation in this project. However, the main focus of this BMAP is on reducing external TP sources to the lake.
- Provisional BMP efficiencies – Several of the BMP activities included in the project lists were assigned provisional TP reduction estimates for the purposes of this first iteration of the BMAP. These provisional estimates were based on the best available information at the time. However, there are studies currently being conducted across the state, which will provide better estimates of the BMP efficiencies and this information will be used in the next iteration of the BMAP to revise the project reductions. These

provisional BMPs are: (1) street sweeping, (2) Stormceptor, (3) continuous deflective separation (CDS) units, and (4) public education and outreach efforts (see **Section 4.2.4**). If the new information on these BMPs indicates lower efficiencies than what was estimated for this BMAP, the entities that listed these BMPs may need to provide additional projects to make up for the difference in reductions. If new information shows a greater effectiveness than provided in the provisional values, this additional credit will be provided.

2.5 TMDL MODIFICATIONS

2.5.1 RATIONALE FOR THE TP FOCUS

As noted earlier, the Lake Jesup nutrient TMDL included reductions for TN as well as TP. However, nitrogen-fixation appears to be a significant percentage of the TN inputs to the lake and this contribution has not been quantified. In order to move forward with efforts to improve the lake water quality, this BMAP focuses only on the TP reductions. Concurrent with the BMAP process and implementation, studies to determine the effects of nitrogen-fixation have been completed and are being conducted (refer to **Section 5.2**). The information from these studies will be utilized to refine the TMDL and BMAP, as necessary, and to guide future project implementation efforts. Because nitrogen-fixation typically occurs in fresh waterbodies with high TP concentrations it is essential to reduce TP so that the lake's internal TN sources can be controlled. Also, as many management actions to reduce TP external loads will also reduce TN external loads, the focus on the TP TMDL in this BMAP should also partially address the TN TMDL.

2.5.2 TMDL REVISIONS DURING THE BMAP PROCESS

During the BMAP process, several modifications were made to the TMDL based on new information that was provided by the stakeholders in the basin. These changes fall into four main categories: (1) BMPs; (2) land uses; (3) load allocations; and (4) septic tanks. The modifications to the TMDL in each of these categories are described in detail below.

2.5.2.1 **BMPs**

The TMDL model estimated the starting point load for the surface runoff based on EMCs, land use, soil types, and rainfall. The original model also included estimated reductions associated with some of the BMPs that were in place at the time of the verified period. This suite of BMPs was based on information provided by the stakeholders. However, because BMP implementation is not uniform across the watershed, the model was updated during the BMAP process to focus on gross starting point loads, without any BMPs in place. This allowed credit to be provided for these BMPs as projects, thus applying credit directly to the entity which implemented the BMP instead of distributing credit across the entire watershed. The model included BMPs on the City of Sanford's Site 10 facility; however, these BMPs were related to the application of residuals on the site and not to stormwater controls. These BMPs were removed and not considered for BMAP credit because the Site 10 BMAP allocation only addresses stormwater loads and, therefore, only stormwater BMPs would be counted. In addition, the BMPs that were assigned to wetland areas were removed because most of the treatment occurred in a wet or dry pond before discharge to the wetland (Walter and Kelly, 2008).

2.5.2.2 Land Uses

Several revisions to the land use from the TMDL model were made during the BMAP process. It was determined that the Seminole County land use separated out internal subdivision roadways; whereas Orange County's internal roads were not separated. The internal roadways in Seminole County were converted to residential land uses because the residential land use types and EMCs include these roadways. This modification made the consideration of roadway runoff consistent throughout the basin. The model also included a land use category for agriculture/golf course. These two types of land use were separated out in the updated modeling to provide flexibility in assigning loading characteristics. However, since there are no EMCs specific to golf courses, the EMC remained the same as the one used for agriculture. In addition, after using aerial photography to compare Orange County's high density residential areas to the rest of the basin, an area of single family housing units in the Lake Burkett area of Orange County, identified as high density residential in the TMDL, was reclassified as medium density residential in the watershed to be consistent with density criteria applied to other jurisdictions (Walter and Kelly, 2008).

In addition to the land use changes described above, the City of Sanford Site 10 facility (refer to **Section 3.2.3** for additional information) was separated out as a distinct land use category. The loading estimate in the TMDL for Site 10 only accounted for the stormwater loads from the site and not the loads from application of reuse water and residuals. In order to recalculate the total TP loading from Site 10, several items were needed: (1) an updated land use map for the site; (2) an updated site boundary showing the portions that flow to the Lake Jesup Basin; (3) an updated runoff coefficient; and (4) an updated EMC. The updated land use information was based on the SJRWMD 2004 land use cover. The updated site boundary was provided by Camp Dresser and McKee (CDM), a consultant for the City of Sanford. Based on the site conditions from the reuse application activities, an updated runoff coefficient was calculated. An EMC that matched the specific conditions on Site 10 was not available; therefore, the EMC was calculated by extrapolating from information in two pasture runoff studies. Using the above information, a total TP loading for Site 10 was calculated as 4,121 lbs/yr of TP. Of this total load, approximately 632 lb/yr of TP is associated with surface runoff from the site while the remaining 3,489 lbs/yr of TP is attributed to the reuse water and residuals applications (Walter and Kelly, 2008). The estimate for the reuse water and residuals applications will need to be reevaluated in future iterations of the TMDL and BMAP because this load has been reduced by the City due to changes in the uses on site.

2.5.2.3 Load Allocations

When calculating the detailed allocations for the BMAP, FDEP, after discussions with the technical stakeholders, determined that all natural areas, including conservation areas, water, and wetlands, should be separated and not assigned an allocation. The loads from these areas are considered natural background and actions are not needed to reduce loading from these sites. Separating the water, wetland, and conservation areas in the allocation calculations benefited the jurisdictions that had taken an active role in wetland and other land conservation.

The Florida Department of Transportation (FDOT), Orlando Orange County Expressway Authority (OOCEA), and Turnpike Enterprise were identified as stakeholders and were assigned allocations. Adding these entities affected the allocations to the other stakeholders in the basin because loads from right-of-ways and roadways owned by these entities were allocated to the applicable transportation entity, not the local government in which the road exists. In addition, FDACS and agriculture were added as stakeholders. This change affected the other stakeholders in a similar way as the transportation break out. Loads from agricultural areas

were assigned to the “agriculture” allocation category, not the local government in which the area exists.

2.5.2.4 Septic Tanks

The TMDL included loading from functioning septic tanks that were within 200 meters of a surface waterbody. Information on the location and number of septic tanks in each jurisdiction is not consistently well known across all jurisdictions and, at the time of the TMDL, some of the needed data on septic tanks were not available. The TMDL septic tank loading estimate did not include Eatonville, Orlando, or Winter Park and did not include complete information for Maitland and Orange County. During the BMAP process, these entities (with the exception of Eatonville), provided information on septic tank counts and location in the basin based on their wastewater billing information. Information for Eatonville was obtained from the Florida Department of Health (FDOH) CENTRAX database, which tracks septic tank permits. The additional information from these entities was included in the calculations for the starting point septic tank load for the BMAP allocation calculations.

Also during the BMAP process, several stakeholders raised the issue that the FDOH regulation for permitting septic tanks is based on a 75 foot setback from surface waters, as opposed to the 200 meter (656 feet) distance used in the TMDL. The 75 foot setback was used in this BMAP while additional studies are ongoing throughout the state to determine a more appropriate septic tank setback distance that would be protective of water quality. The septic tank starting load for the BMAP allocations was revised to include septic tanks within 75 feet of surface waters throughout the watershed.

CHAPTER 3: PHOSPHORUS SOURCES AND DETAILED ALLOCATIONS

3.1 BMAP ALLOCATION PROCESS

The focus of this BMAP is on reducing external sources of TP (watershed surface runoff and near-field septic tanks). The detailed allocations described in this chapter were calculated by dividing the reduction required for each source to the entities based on their relative loading. The septic tank load reductions were only assigned to those entities that have jurisdiction over the loading (i.e., the cities, towns, and counties in the basin).

3.2 LOADING SUMMARY

3.2.1 STORMWATER

The major source of external loading in the Lake Jesup Basin is from surface runoff. During rain events, stormwater moves pollutants from sources such as fertilizers, pet waste, and roadways to the lake and its tributaries. An estimated total of 32,849 lbs/yr of TP enter the lake through stormwater runoff and reducing this load to the lake is a key component of the TMDL. The updated surface runoff starting load based on the TMDL modifications described in **Section 2.5.2** was used to allocate the 16,314 lbs/yr of TP reductions among the allocation entities.

3.2.2 SEPTIC TANKS

The total septic tank starting load that was recalculated during the BMAP process was similar to the starting load estimated in the TMDL. Therefore, the total reduction required from septic tanks (3,307 lbs/yr of TP) in the TMDL was allocated to the local governments that have jurisdiction over septic tanks. This allocation was determined based on the relative proportion of septic tank loads by entity, based on septic tanks located within 75 feet of a surface water. Stormwater and septic tank loads were then consolidated to provide a single nonpoint source loading from each entity.

3.2.3 CITY OF SANFORD "SITE 10" FACILITY

The Sanford Reuse Land Application Facility ("Site 10") is located on the northeastern shore of Lake Jesup. Site 10 is approximately 1,868 acres, of which 1,252 acres are in the Lake Jesup Basin. Agriculture (pastures and citrus groves) and wetlands are the major land uses on the site. The City of Sanford NPDES permit allows discharge to a permitted capacity slow-rate reuse system on Site 10, including reclaimed water storage on site in two holding ponds. The water from the ponds is used to irrigate the hay fields and citrus groves on the site. In addition, the previous permit identified Site 10 as an area where land application of residuals occurred and this application began in May 1997 (CDM, 2007). Residuals application on Site 10 was discontinued in 2008 and the current permit prohibits land application of residuals on Site 10.

As noted above, the TMDL only accounted for the surface runoff loads from the site and did not estimate the TP loads associated with the reuse water and residual application activities. During the BMAP process, the stakeholders requested that the total loading from Site 10 be determined. To help accomplish this, two studies were conducted: one by CDM as a consultant for the City of Sanford (*City of Sanford Site 10 Data Evaluation*) and one by the FDEP Ground Water Protection Section (*Ground Water Assessment Report for Site 10)*. CDM and FDEP used two different models with different assumptions and EMC values, which resulted in different loading estimates. Details on both of these studies can be found in **Appendix G**. The purpose of the CDM analysis was to model runoff from the site with revised land use

information. This analysis estimated that the site has a stormwater loading of 883 lbs/yr of TP or 573 lbs/yr of TP with BMPs in place (CDM, 2007). The FDEP assessment focused on shallow ground water conditions on Site 10. The purpose of this assessment was to provide current information for shallow groundwater in the hay field areas that drain to Lake Jesup. The TP concentrations from the monitoring wells ranged from non-detect to 5.3 mg/L, with a median for the four hay fields of 0.76 mg/L. A portion of the TP concentration was also attributed to natural conditions in the area (FDEP, 2008).

The 632 lbs/yr of TP that was calculated as the surface runoff load (refer to **Section 2.5.2.2**) was included in the allocation table as the starting point load for Site 10, which provided the basis for the required reduction. Since the load from the reclaimed water and residual applications were not originally considered in the TMDL, the 3,489 lbs/yr of TP from these sources was not included in the BMAP allocations. However, the City of Sanford has proposed projects to reduce the loading from these sources on Site 10 and also monitoring to determine water quality improvements. The projects to address these loads are discussed in **Section 4.1.2** and the proposed monitoring efforts are discussed in **Section 5.1.3.4**. In the next cycle of the TMDL, the monitoring data will be used to provide a better estimate of the total load from Site 10 and this information will be incorporated into the TMDL and allocations.

3.2.4 Derivation of BMAP Required Reductions

The TMDL included estimates of TP loading from baseflow, groundwater (mainly from the surficial aquifer), and atmospheric deposition; however, the TMDL did not require reductions from any these sources. A portion of the load from these sources is considered natural background or is associated with upstream sources and is, therefore, an uncontrollable source in this BMAP. However, some of these sources originate in the basin and studies to determine the extent of groundwater and baseflow loading are planned (see **Section 2.4** and **Section 5.2**). The TP loading from the St. Johns River into Lake Jesup (associated with a 3,968 lbs/yr reduction identified in the TMDL) can be attributed to sources upstream of the basin. Therefore, the load reduction assigned to the river in the TMDL is not addressed in this BMAP. This load from the river should be reduced over the next five to ten years through projects in the Upper St. Johns River Basin and eventual projects related to other Middle Basin TMDLs. The starting loads, target loads, and required reductions in the TMDL are shown in **Table 3**, as well as the total reductions that will be addressed in a BMAP over the next 15 years.

TABLE 3: DERIVATION OF BMAP REQUIRED TP REDUCTIONS

SOURCE	STARTING LOADS FROM TMDL (LBS/YR)	LOADS TO MEET TARGET FROM TMDL (LBS/YR)	REQUIRED REDUCTIONS IN TMDL (LBS/YR)	TOTAL REQUIRED BMAP REDUCTIONS (LBS/YR)
Surface[1]	32,849	16,535	16,314	16,314
Baseflow	7,275	7,275	0	0
Septic Tanks	5,953	2,646	3,307	3,307
Groundwater	1,323	1,323	0	0
Atmospheric	6,834	6,834	0	0
River	11,244	7,276	3,968	0
Total	**65,478**	**41,889**	**23,589**	**19,621**

[1] The starting load from the TMDL includes the stormwater loads from urban areas, agriculture, and Site 10. Because the Site 10 facility does not have a permitted surface water discharge, there was no allocation provided in the TMDL for the wastewater facility. See Sections 2.5.2.2 and 3.2.3 for more information about how loads from the facility are addressed in this BMAP.

In addition to the sources included in the TMDL, there is the potential that in-lake processes are contributing TP loading. However, as noted in **Section 2.4**, there is currently not enough

information to quantify the loading contribution from these sources. For this reason, this BMAP focuses on reductions from external loads until more information is available on the in-lake processes. The 19,621 lbs/yr of TP reduction identified in **Table 3** was divided among the stakeholders in accordance with the load-based allocations.

3.2.5 Land Use Change and Population Growth Impacts

Future growth impacts from 2005 through 2025 were evaluated for the Lake Jesup Basin. In addition to the value of considering future growth from a resource standpoint, Paragraph 403.067(7)(a)(2), F.S., requires that BMAPs "identify the mechanisms by which potential future increases in pollutant loading will be addressed." This analysis focuses on population growth as a measure of the location and intensity of future growth in the basin to address the potential future increases in pollutant loading.

As new land is developed, less rain filters into the ground, and runoff and the pollutants carried in that runoff increase. Population growth also affects pollutant loading by increasing the intensity of activities such as traffic, lawn fertilization, pet ownership, and others. To maintain the load reductions gained through BMAP implementation, local governments, businesses, citizens, and others will need to practice pollution prevention on a continuing basis through land use decisions, ordinance adoption and enforcement, public education efforts, BMPs, personal habits, and other means.

3.2.5.1 **Analysis of Future Growth**

Transportation Analysis Zone (TAZ) data were selected as the primary data source for evaluating future population projections in the Lake Jesup Basin. The TAZ data for Orange and Seminole counties were provided by METROPLAN ORLANDO, which is the metropolitan planning organization for Orange, Osceola, and Seminole counties. TAZs are areas delineated by state and/or local transportation officials for tabulating traffic-related data; especially journey-to-work and place-of-work statistics. TAZ data are based on U.S. Census data and Bureau of Economic and Business Research projections, and the data are reviewed closely by local planners during their compilation. TAZ data include a variety of demographic and transportation statistics. For this analysis, only the population estimates were used. Population data were aggregated across all housing types (e.g., single family, multifamily). These future growth estimates do not include increases in commercial or industrial activities not associated with increases in residential population.

Population estimates for each TAZ in 2015, 2020, and 2025 were used to calculate population density by TAZ. To provide a more accurate estimate of anticipated population density, land uses incompatible with development (open-water and conservation areas) were removed from the total acreage of each TAZ. Population density and density change over time were then calculated using these revised TAZ acreages. The population density growth estimates provided a general sense of the location and intensity of increasing density in the basin. **Figure 4** through **Figure 6** show the population density estimates in 2015, 2020, and 2025 with areas highlighted that have a greater than 50% increase in population density over a five-year period.

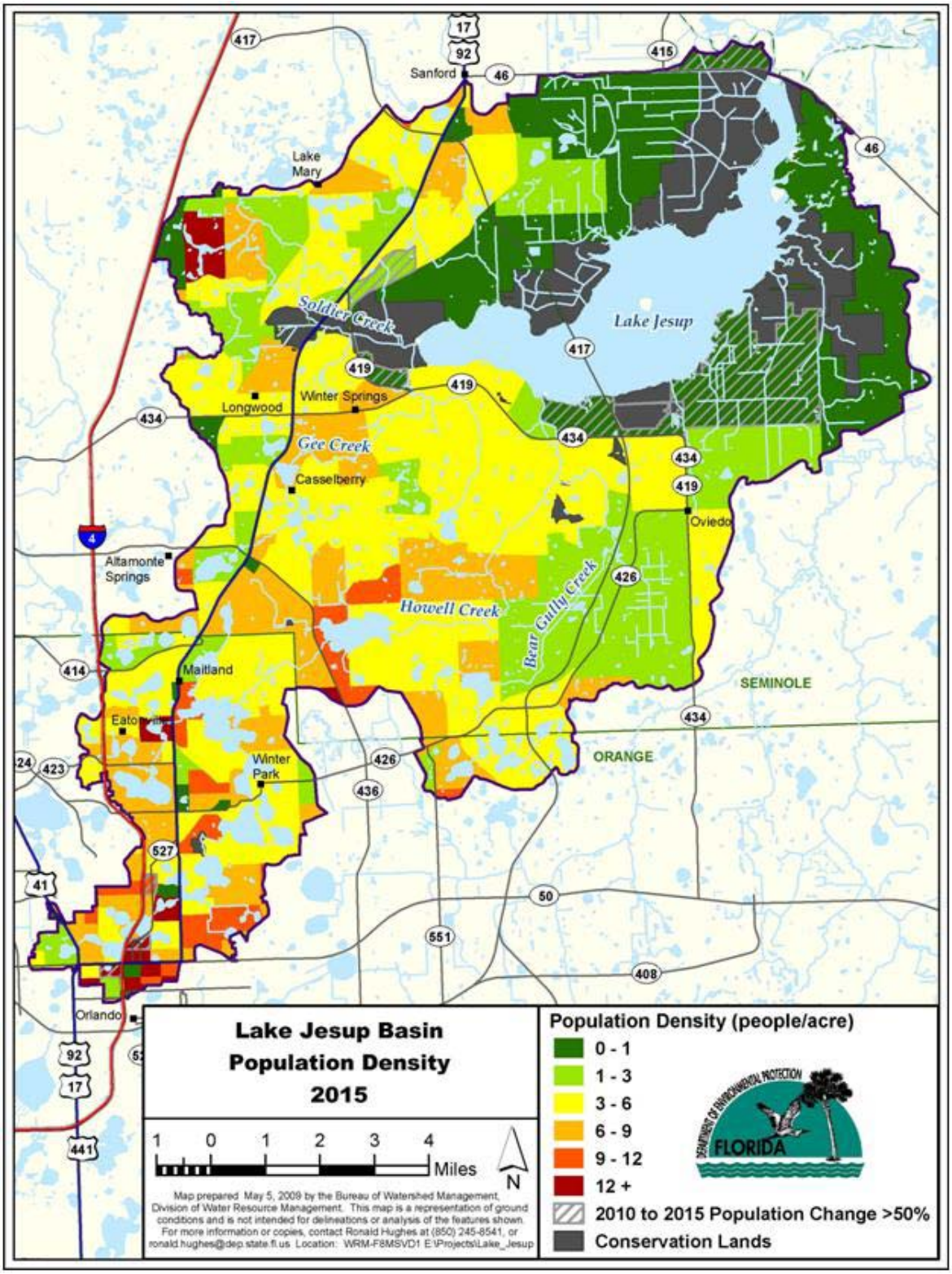


FIGURE 4: LAKE JESUP BASIN ESTIMATED POPULATION DENSITY IN 2015

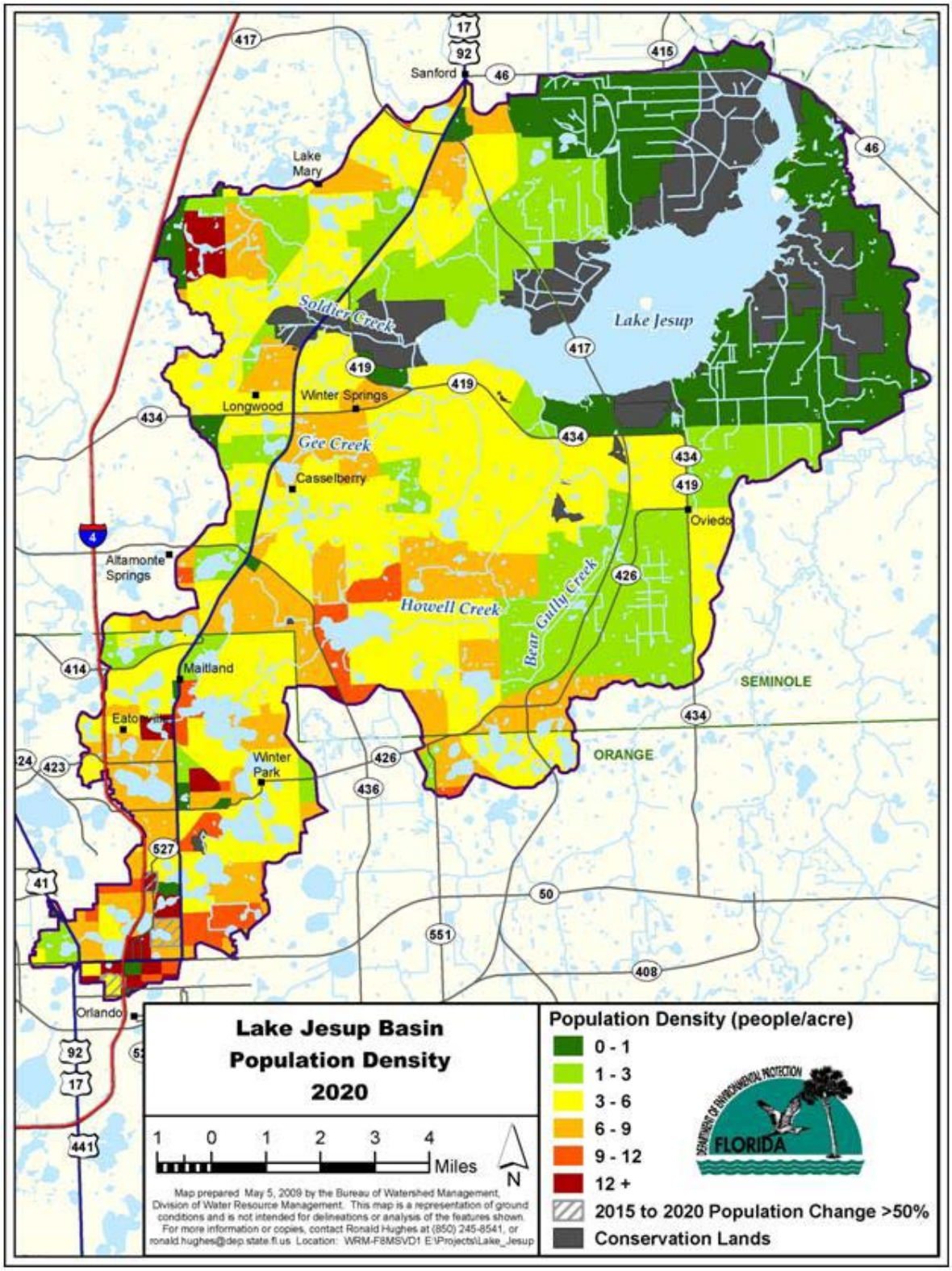


FIGURE 5: LAKE JESUP BASIN ESTIMATED POPULATION DENSITY IN 2020

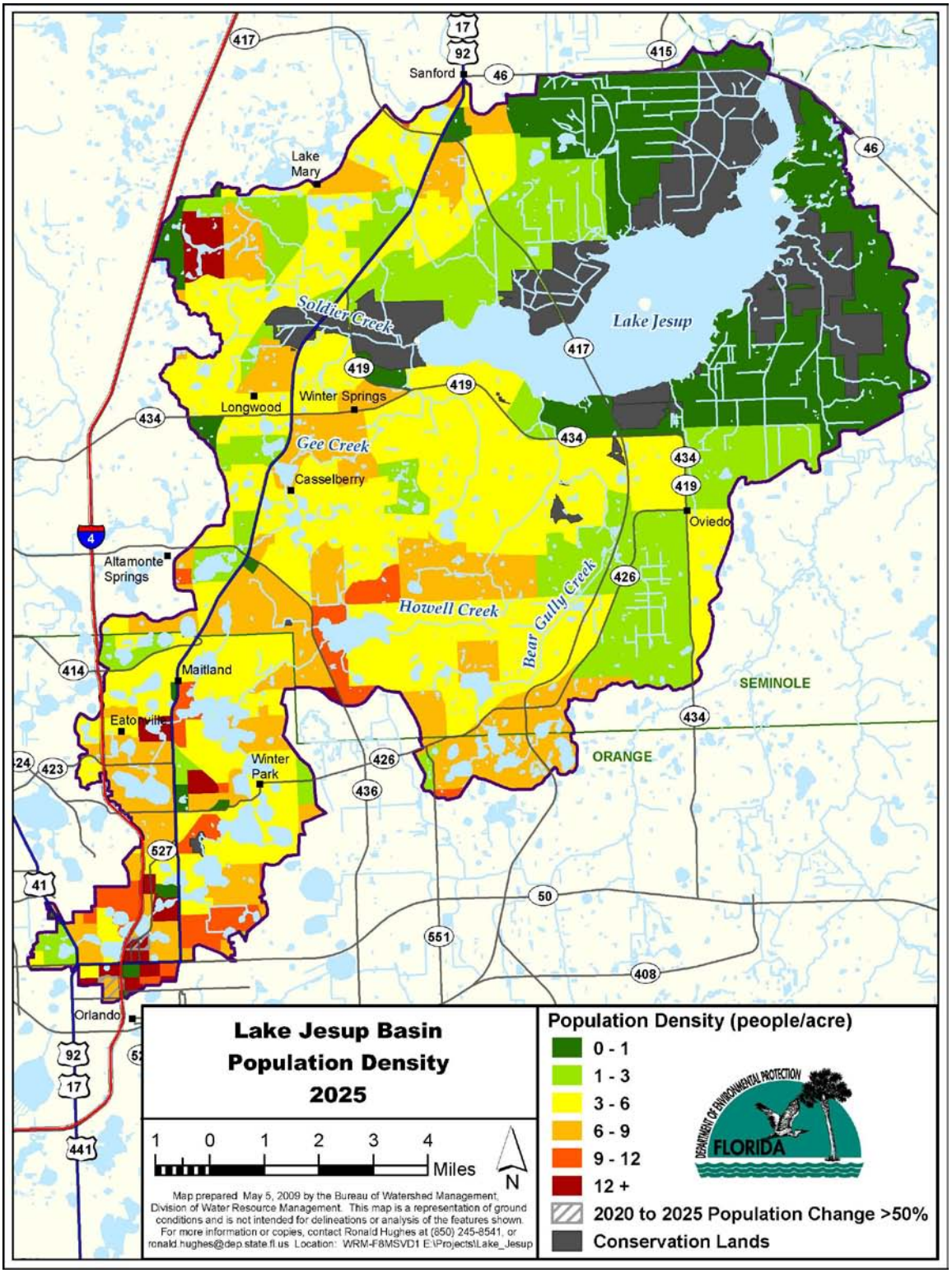


FIGURE 6: LAKE JESUP ESTIMATED POPULATION DENSITY IN 2025

3.2.5.2 Impacts of Future Growth

As shown in the above figures, there are some areas of expected growth greater than 50%. The projected growth between 2010 and 2015 includes several larger areas with high growth

potential; however, the population densities in these areas is expected to be 0 – 3 people per acre, which is a relatively low density. From 2015 to 2020 and 2020 to 2025, changes in density greater than 50% occur in much smaller areas of the southernmost extent of basin, furthest from Lake Jesup.

While increases in population are expected over the next 15 years, major increases in population densities in the basin are not expected. The entities in the basin have already taken steps to address TP loading from future growth, as well as efforts to reduce the impacts of existing development through stormwater retrofits and septic tank removals. **Section 4.2.6** summarizes the low impact development (LID) efforts, comprehensive plan amendments, and ordinances that each entity has implemented to reduce or prevent impacts from future growth. **Appendix E** provides additional detail on the LID measures in the basin. Given the extent of LID implementation and current build-out in the basin, the potential effect of future growth was not quantified nor allocated as additional reduction requirements in this BMAP. If the local and statewide efforts to abate the impacts of future growth are insufficient, further reduction requirements to address new nutrient loads could be incorporated in future BMAP allocations.

3.3 Allocations

The need for detailed allocations by entity became clear early in the BMAP process. Stakeholders in the Lake Jesup Basin agreed that a fair approach would be to determine the relative contribution of each entity to the surface runoff and septic tank (if applicable) loadings and use this relative contribution to apportion the required reductions. This percentage was separately calculated for each entity for the surface runoff load and septic tank load. The percentages were then applied to the 16,314 lbs/yr (7.4 metric ton [MT]) surface reduction and 3,307 lbs/yr (1.5 MT) septic tank reduction specified in the TMDL. While the percent reduction in the TMDL was not directly applied, the total load reduction required by the TMDL was allocated to the entities.

During the BMAP process, several areas in the jurisdictions that do not contribute loading ("noncontributing basins") to Lake Jesup were identified. These areas were removed and the loads associated with these locations (approximately 870 lbs/yr) set aside. Therefore, the total required reduction for the BMAP is 18,748 lbs/yr.

There are several major unknowns in the basin that could affect the TMDL calculations and detailed allocations in the BMAP (refer to **Section 2.4**). To allow time for additional monitoring and research studies to address these unknowns, the required reductions were split into three five-year time periods. This BMAP is the first of three phases that will each address one-third of the required reductions. When sufficient information becomes available, allocations and required reductions for the second and third five-year periods will be recalculated. The monitoring strategy outlined in **Section 5.1** provides details of the planned data collection efforts.

3.3.1 Detailed Allocations by Entity

Table 4 shows the starting load and final required reduction for the responsible entities. The TMDL did not require reductions from atmospheric deposition, baseflow, and groundwater. As noted above, the TMDL did include a load reduction for inflows from the St. Johns River; however, that reduction is not addressed in this BMAP. In addition, when determining the detailed allocations, sources of natural background (water, wetlands, and conservation areas with no pasture lands) were not assigned load reductions.

TABLE 4: TP WASTELOAD ALLOCATIONS FOR 15-YEAR IMPLEMENTATION PERIOD

ALLOCATION ENTITY	TOTAL TP STARTING LOAD (LBS/YR)	NONCONTRIBUTING AREAS LOAD (LBS/YR)	TOTAL TP REDUCTION REQUIRED (LBS/YR)*
Agriculture	1,149	8	764
Atmospheric Deposition	6,834	0	0
Baseflow	7,275	0	0
City of Altamonte Springs	116	21	57
City of Casselberry	1,557	1	1,028
City of Lake Mary	1,229	4	793
City of Longwood	1,122	115	616
City of Maitland	906	212	374
City of Orlando	1,570	73	979
City of Oviedo	1,156	0	776
City of Sanford	2,722	22	1,807
City of Winter Park	1,771	72	1,111
City of Winter Springs	2,301	6	1,539
FDOT District 5	646	37	397
Groundwater	1,323	0	0
OOCEA	23	0	16
Orange County	2,746	1	1,707
Seminole County	10,151	239	6,411
St. Johns River Upstream	11,244	0	0
Town of Eatonville	194	60	70
Turnpike Authority	451	0	303
Water/Wetland/Conservation Areas	7,758	164	0
Total	**64,244**	**1,035**	**18,748**

* Reductions subject to change as new information on the noncontributing areas, natural attenuation, and lake assimilation become available.

This first BMAP will address one-third of the total load reductions shown in the table above. **Table 5** shows the required reductions for the first five-year period from 2010 to 2014. Atmospheric deposition, baseflow, groundwater, St. Johns River, and water, wetland, and conservation areas do not have a required reduction, as noted above.

TABLE 5: TP WASTELOAD ALLOCATIONS FOR 2010-2014

ALLOCATION ENTITY	2010-2014 TOTAL REQUIRED REDUCTION (LBS/YR)*
Agriculture	254.7
Altamonte Springs	19.0
Casselberry	342.7
Eatonville	23.4
FDOT District 5	132.3
Lake Mary	264.3
Longwood	205.3
Maitland	124.8
OOCEA	5.2
Orange County	569.0
Orlando	326.3
Oviedo	258.7
Sanford	602.2
Seminole County	2,137.0
Turnpike Authority	101.1
Winter Park	370.5
Winter Springs	513.0
Total	**6,249.5**

* Reductions subject to change as new information on the noncontributing areas, natural attenuation, and lake assimilation become available.

CHAPTER 4: MANAGEMENT ACTIONS

4.1 RELATED PERMIT PROGRAMS

4.1.1 MUNICIPAL STORMWATER PERMITS

Fifteen of the 17 allocation entities qualify as a "municipal separate storm sewer system" (MS4) and, as such, are regulated by the Florida NPDES MS4 Program. The majority of MS4 permittees in this basin are Phase I MS4s, the requirements of which are outlined in Chapters 62-4, 62-620, 62-621 and 62-624, F.A.C. The MS4s in the Lake Jesup Basin are listed in **Table 6**.

TABLE 6: LOCAL GOVERNMENTS IN THE LAKE JESUP BASIN DESIGNATED AS REGULATED MS4S

PERMITTEE	MS4 TYPE	PERMIT #
City of Orlando	Phase I	FLS000014
Orange County City of Maitland City of Winter Park Town of Eatonville FDOT	Phase I	FLS000011
Seminole County City of Altamonte Springs City of Casselberry City of Lake Mary City of Longwood City of Oviedo City of Sanford City of Winter Springs FDOT	Phase I	FLS000038
Turnpike Authority	Phase II	FLR04E049

To avoid the need for re-opening MS4 permits each time a TMDL or BMAP is adopted, the following language is included in Phase I MS4 permits that automatically require the implementation of any stormwater requirements in an adopted BMAP. This "TMDL" clause states: "*In accordance with Section 403.067, F.S., NPDES permits must be consistent with the requirements of adopted Total Maximum Daily Loads (TMDLs). Therefore, when a Basin Management Action Plan (BMAP) and/or implementation plan for a TMDL for a water body into which the permitted MS4 discharges the pollutant of concern is adopted pursuant to Section 403.067(7), F.S., the MS4 operator(s) must comply with the adopted provisions of the BMAP and/or implementation plan that specify activities to be undertaken by the permittee(s) during the permit cycle that are for the purpose of addressing discharges from the MS4 to meet the TMDL allocation."*

Most Phase II MS4s are regulated under a generic permit. Operators of regulated Phase II MS4s must develop a Stormwater Management Program that includes BMPs, with measurable goals, to effectively implement the following six minimum control measures:

1. ***Public Education and Outreach***: Perform educational outreach regarding the harmful impacts of polluted stormwater runoff.
2. ***Public Participation/Involvement***: Comply with state and local public notice requirements and encourage other avenues for citizen involvement.

3. ***Illicit Discharge Detection and Elimination***: Implement a plan to detect and eliminate any non-stormwater discharges to the MS4, and create a system map showing outfall locations. Section 62-624.200(2), F.A.C., defines an illicit discharge as "…any discharge to an MS4 that is not composed entirely of stormwater…," except discharges pursuant to a NPDES permit, or those listed in rule that do not cause a violation of water quality standards. Illicit discharges can include septic/sanitary sewer discharge, car wash wastewater, laundry wastewater, improper disposal of auto and household toxics, and spills from roadway accidents.
4. ***Construction Site Runoff Control***: Implement and enforce an erosion and sediment control program for construction activities.
5. ***Post-construction Runoff Control***: Implement and enforce a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. (Note: This minimum control is generally met through state stormwater permitting requirements under Part IV, Chapter 373, F.S., as a qualifying alternative program.)
6. ***Pollution Prevention/Good Housekeeping***: Implement a program to reduce pollutant runoff from municipal operations and properly and perform staff pollution prevention training.

The Phase II generic permit [Section 62-621.300(7)(a), F.A.C.] also has a self implementing clause that compels a permittee to implement its stormwater pollutant load responsibilities within an adopted BMAP. It states: "*If a TMDL is approved for any water body into which the Phase II MS4 discharges, and the TMDL includes requirements for control of stormwater discharges, the operator must review its stormwater management program for consistency with the TMDL allocation. If the Phase II MS4 is not meeting its TMDL allocation, the operator must modify its stormwater management program to comply with the provisions of the TMDL Implementation Plan applicable to the operator in accordance with the schedule in the Implementation Plan."*

4.1.2 City of Sanford Site 10 Wastewater Permit

Since the initiation of the BMAP process, the City of Sanford has ceased applying biosolids to Site 10. The last application of residuals to the site occurred in May 2008. Sanford now distributes its Class AA biosolids to staff and residents who can use it as fertilizer. Under the Sanford/North wastewater treatment facility (WWTF) permit, future biosolids application on Site 10 will be prohibited. In emergency conditions, when the demand for the Class AA biosolids is not great enough, Sanford has a contract with a private processing facility that will accept the biosolids, which avoids the need to apply any additional residuals to Site 10 (CDM, July 2009).

Sanford has established an inter-local agreement with Volusia County to provide reclaimed water and the city is currently working on a pipeline design to deliver up to 1.5 million gallons per day (MGD) of reclaimed water to the county for irrigation purposes. Sanford also has an agreement with the City of Lake Mary and Seminole County to provide reclaimed water while they are both expanding their distribution systems. Reclaimed water sent to these other areas will result in less application to Site 10. Until those systems are in place and Sanford is able to measure the reduction in volume of reclaimed water applied to Site 10, a quantified TP load reduction to Lake Jesup can only be estimated at this time. From the 2007 memorandum prepared by CDM (refer to **Appendix G**), the TP loading to Site 10 from reclaimed water application resulted in approximately 4,202 lbs/yr. The average flow rate used in the 2007 analysis is consistent with the limits specified in the Volusia County agreement; therefore, there is a potential for this entire load to be removed from Site 10 (CDM, July 2009).

In addition to the inter-local agreements, Sanford has plans to modify the long-term use of Site 10 under the State Road 46 Alternative Water Supply Initiative, which will use the site for a potable alternative water supply treatment facility. Improvements may include expanding and lining the existing holding ponds on Site 10 to increase their capacity from 37 million gallons (MG) to 144 MG. The lining of these ponds may also reduce TP loadings to Lake Jesup through surficial groundwater. Additionally, Sanford has plans to upgrade their Mill Creek site with a pump station and other improvements so that they can store approximately 40 MG of reclaimed water during wet weather conditions (CDM, July 2009).

Sanford has also implemented Actiflo® high-rate clarification into their wastewater process, which has the capability to reduce TP concentrations. However, only pilot studies have been performed to date and the Actiflo is currently in use during periods of heavy flow, when the plant capacity is being stressed. Sanford will be collecting data over time in order to quantify the benefits of this new system and its potential load reduction capabilities as it pertains to Site 10 (CDM, July 2009). Additional details about these changes to the Sanford WWTF and Site 10 can be found in **Appendix G**.

4.2 Management Actions

"Management actions" refers to the suite of activities that the Lake Jesup BMAP allocation entities will be conducting to achieve their required TP reduction. These include structural and nonstructural activities. The projects and timeframes for implementation submitted by the entities to achieve their first five-year BMAP reductions are summarized in the tables in **Appendix D**. These projects were submitted to provide reasonable assurance to FDEP that each entity has a plan on how they will meet their allocation. However, this list of projects is meant to be flexible enough to allow for changes that may occur over time, provided that the required reduction is still met within the specified timeframe. New projects may be substituted for those identified in **Appendix D** during the annual BMAP progress report process.

4.2.1 Management Action Types

The allocation entities in the Lake Jesup Basin provided information on projects and programs that they have in place or will be implemented to meet their BMAP reductions in the first five-year period. These management actions fall into one of four categories: (1) BMPs included in the TMDL; (2) completed and funded projects and programs; (3) planned projects and programs; and (4) participation in regional projects (either the *Interagency Strategy* projects or local cooperative projects) (see **Section 4.2.3**). A summary of the reductions each entity will achieve through these project categories is shown in **Table 7**.

TABLE 7: SUMMARY OF ESTIMATED TP LOAD REDUCTIONS BY MANAGEMENT ACTION CATEGORY

ENTITY	TMDL BMPS	COMPLETED/ FUNDED	PLANNED	INTERAGENCY/ LOCAL COOPERATIVE	TOTAL (LBS/YR)	CREDIT FOR FUTURE BMAPS (LBS/YR)
Agriculture	29.9	-	206	18.8[1]	**254.7**	0
Altamonte Springs	35	-	5.1	-	**40.1**	21.1
Casselberry	0	367.7	95.1	-	**462.8**	120.1
Eatonville	9.6	-	0.3	13.5	**23.4**	0
FDOT	101.9	109.4	126.9	-	**338.2**	205.9
Lake Mary	0	308.8	70.3	-	**379.1**	114.8
Longwood	58.9	24.8	45.5	69.7	**198.9**	-6.4[2]
Maitland	0.7	36.1	85.6	-	**122.4**	-2.4[2]
OOCEA	0	12.8	-	-	**12.8**	7.6
Orange County	31.5	170.1	178.4	189	**569.0**	0
Orlando	34.8	818.2	105.2	-	**958.2**	631.9
Oviedo	386.5	-	416.4	-	**802.9**	544.2
Sanford	504.7	16.5	112.5	-	**633.7**	31.5
Seminole County	1,749.1	859.3	576.5	-	**3,184.9**	1,047.9
Turnpike Authority	0	252.3	12.2	-	**264.5**	163.4
Winter Park	0.4	402.6	119.9	-	**522.9**	152.4
Winter Springs	765.2	230	403.8	-	**1399**	886.0
TOTAL (lbs)	**3,708.2**	**3,608.6**	**2,559.7**	**291.0**	**10,167.5**	**3,918.0**

[1] Reflects reductions that may be achieved by publicly funded projects, if needed. Refer to **Section 4.2.5** for discussion.
[2] Due to some project calculation adjustments done by FDEP, the remainder of the required reductions for this first BMAP will be met as part of the responsibilities in the second iteration of the BMAP.

The total project reductions in **Table 7** are greater than the required reductions for this first BMAP (see **Table 5**). Several entities provided sufficient projects to meet their first five-year required reductions along with additional projects to meet their second, and in some cases third, five-year requirements. **Table 7** and the tables in **Appendix D** show which entities have additional credits towards their obligations in future BMAPs.

4.2.2 ELIGIBILITY

Management actions had to meet several criteria to be considered eligible for credit in the BMAP. All projects and programs were required to address nutrient loads (specifically TP) to receive credit. The BMPs that were included in the TMDL as part of the modeling process to determine needed load reductions were given credit. Through the BMAP process, some of the information on the BMPs in the TMDL was refined to more accurately estimate expected TP reductions. Any completed projects that were missing from the TMDL were also included in the BMAP project list. However, since the effectiveness of these older projects is unknown, additional reductions may be needed in future BMAP iterations to achieve the necessary TMDL reductions. In addition, future management actions were given credit for the portion of the load reduction that was over and above any permit requirements. This criterion was needed since permit conditions are established to maintain the current condition (prevent further impacts from the development) and do not contribute to the improvement of water quality.

Based on these eligibility requirements, the entities submitted structural and nonstructural projects to reduce the nonpoint source loading from stormwater and septic tanks. **Table 8** summarizes the load reduction for each entity by project type (note: the total reductions shown in this table are the same as the total reductions in **Table 7**).

TABLE 8: SUMMARY OF TP LOAD REDUCTIONS BY PROJECT TYPE

ENTITY	STRUCTURAL STORMWATER	PUBLIC EDUCATION	STREET SWEEPING	SEWERING	AGRICULTURAL BMPS	INTERAGENCY/ LOCAL COOPERATIVE	TOTAL (LBS/YR)
Agriculture	N/A	N/A	N/A	N/A	235.9	18.8[1]	**254.7**
Altamonte Springs	35	4.6	0.5	N/A	N/A	-	**40.1**
Casselberry	371.9	85.6	5.3	-	N/A	-	**462.8**
Eatonville	9.6	0	0.3	-	N/A	13.5	**23.4**
FDOT	241.4	6.5	90.3	N/A	N/A	-	**338.2**
Lake Mary	264.3	67.6	2.7	44.5	N/A	-	**379.1**
Longwood	61	44.9	0.6	22.7	N/A	69.7	**198.9**[2]
Maitland	74.2	40.8	7.4	-	N/A	-	**122.4**[2]
OOCEA	12.8	N/A	N/A	N/A	N/A	-	**12.8**
Orange County	191.6	151	37.4	-	N/A	189	**569.0**
Orlando	857.5	86.4	14.3	-	N/A	-	**958.2**
Oviedo	744.9	46.2	11.8	-	N/A	-	**802.9**
Sanford	521.2	108.9	3.6	-	N/A	-	**633.7**
Seminole County	2,613.50	558.3	13.1	-	N/A	-	**3,184.9**
Turnpike Authority	252.3	9	3.2	N/A	N/A	-	**264.5**
Winter Park	403.0	106.3	13.6	-	N/A	-	**522.9**
Winter Springs	1,299.70	92	7.3	-	N/A	-	**1399**
TOTAL (lbs)	**7,953.9**	**1,408.1**	**211.4**	**67.2**	**235.9**	**291.0**	**10,167.5**

[1] Refer to **Section 4.2.5** for additional details on the agriculture commitment to regional project participation.
[2] Due to some project calculation adjustments done by FDEP, the remainder of the required reductions for this first BMAP will be met as part of the responsibilities in the second BMAP.

4.2.3 REGIONAL PROJECTS

While the majority of the projects submitted for this BMAP are jurisdictional projects, the option was also provided to participate in larger scale, regional projects. The regional projects are located in areas of the basin that have high nutrient concentrations; therefore, they can achieve large reductions in a cost effective manner. The regional projects include both local cooperative projects and the projects identified in the *Lake Jesup Interagency Restoration Strategy* (FDEP, FWC, and SJRWMD, 2008).

An example of a local cooperative project is the Solary Canal project, which is being implemented by SJRWMD, Seminole County, Oviedo, and Winter Springs. SJRWMD purchased the land for this project and helped to fund the construction. The local government project partners will be equally responsible for the operation and maintenance of the project and each will receive a portion of the TP reduction credit based on their financial contribution to the total project cost. The project tables for Seminole County, Oviedo, and Winter Springs in **Appendix D** include this project. Other entities also have the opportunity to develop local cooperative projects and Seminole County has proposed several projects and is currently seeking partners.

Another option is for the entities to participate in the regional projects outlined in the *Lake Jesup Interagency Restoration Strategy* (FDEP, FWC, and SJRWMD, 2008). The *Interagency Strategy* was jointly developed by FDEP, SJRWMD, and the Florida Fish and Wildlife Conservation Commission (FWC). The strategy lays out a plan for the restoration of Lake Jesup that will be implemented in two phases. The first phase includes developing the BMAP, reducing external loads to the lake, and reducing nutrients in the lake water column. The second phase of the strategy will be implemented as necessary after the first phase is complete. The steps in the second phase include implementing additional projects to further improve water quality, implementing projects to increase native vegetation and control exotic species, and

implementing projects to establish healthy fish and wildlife habitat and populations. Throughout both phases, water quality monitoring will occur to track progress towards achieving the plan's five main goals:

1. Reduced external nutrient loads (phosphorus and nitrogen).
2. Reduced water column phosphorus and nitrogen concentrations.
3. Increased water clarity through reduction in phytoplankton abundance and turbidity.
4. Increased coverage of native submerged and emergent vegetation.
5. Improvements in fish and wildlife habitats and populations.

This BMAP, which focuses on reducing external sources of phosphorus, is consistent with the *Interagency Strategy* and should help achieve the five goals of the plan.

As part of this first iteration of the BMAP, Eatonville, Longwood, Orange County, and agriculture have committed to meeting part of their required reductions through participation in a regional project, either an *Interagency Strategy* project or a local cooperative project. Additional entities may participate in a regional project in a future BMAP to meet their reductions for 2015-2019 and 2020-2024.

For the five-year period of this first BMAP, the regional projects do not need to be completed by 2014 since cooperative projects are more difficult to coordinate than single-entity projects. Instead, projects that are cooperatively funded by two or more local governments must have the permit issued, funding commitments in place, and the bid document issued for the project by the end of 2014 to receive credit during this BMAP implementation period.

4.2.4 Provisional BMPs

Several of the BMP activities included in the project lists were assigned provisional TP reduction estimates for the purposes of this first iteration of the BMAP. These provisional BMPs are: (1) street sweeping; (2) CDS and Stormceptor units; and (3) public education and outreach efforts. Studies to estimate the efficiencies of these BMPs are currently being conducted across the state, which will provide better information on the expected reductions from these BMPs for use in the next iteration of the BMAP to revise the project reductions. If the new BMP information indicates lower efficiencies than what was estimated for this BMAP, the entities that listed these BMPs in their project tables may need to provide additional projects to make up for the difference in reductions. If the new BMP information indicates higher efficiencies, the entities will receive additional credit if they included these BMPs on their project list.

4.2.4.1 **Street Sweeping**

The method for calculating nutrient reductions from street sweeping used in this BMAP is based on a per roadway mile swept. These calculations were based on data from the U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA) Center for Watershed Protection, University of South Florida, and Orange County's Stormwater Management Division. The efficiencies for different frequencies of sweeping are shown in **Table 9**. Allocation entities provided the total miles swept and the frequency in the Lake Jesup Basin and this information was used to calculate the estimated TP load reduction, as shown in **Appendix D**.

TABLE 9: STREET SWEEPING EFFICIENCY VALUES

SWEEPING FREQUENCY	TP REMOVAL EFFICIENCY
Daily or 2 times/week	7%
Weekly	5%
2 times/month	4%
Monthly	3%
Quarterly	2%
Annually	1%

4.2.4.2 CDS Units and Stormceptor

Provisional credit was also provided for CDS units and Stormceptor. A 5% reduction was assigned to CDS units and a 10% reduction was assigned to Stormceptor. The entities that included one or both of these BMPs in their project tables are shown in **Appendix D**.

4.2.4.3 Public Education and Outreach

Up to a 6% reduction in the starting point load was assigned based on the education and outreach efforts conducted by each entity. The 6% load reduction estimate was determined from the EPA Center for Watershed Protection (CWP) Watershed Treatment Model. Credit was given for the following applicable education activities:

1. Local funding to implement the Florida Yards and Neighborhoods (FYN) program within the city or county.
2. Local land development codes or ordinances that require Florida Friendly landscaping on all new developments; require commercial landscapers to obtain training and certification through the Green Industry BMP program; require irrigation systems per Sections 125.568 and 166.048, F.S. and Section 373.185, F.S.; and which specify fertilizer application rates and types. Local ordinances that control pet waste and require that residents pick up and properly dispose of pet wastes.
3. Implementation of public service announcements (PSAs) on local cable or commercial television and radio stations.
4. Informational pamphlets on pollution prevention, fertilizer application, Florida Friendly Landscaping, water conservation, septic tank maintenance, etc. Presentations on these topics to civic groups, local businesses, students, and the general public.
5. Websites to provide information on reducing nutrient pollution for homeowners and businesses.
6. Inspection program and public call-in number to address illicit discharges.

Credit was assigned to the entities for the above efforts as follows:

- If all six types of activities are conducted by an entity, then the full 6% reduction was assigned.
- If an entity only has FYN, they received a 3% reduction credit.
- If an entity only has the Florida friendly ordinances (irrigation, landscaping, fertilizer, and pet waste management), then they received a 2% reduction.
- If an entity only has the PSAs, websites, brochures, and the inspection program, they received a 1% reduction credit.
- Other combinations of efforts were analyzed on a case-by-case basis for credit.

Appendix D summarizes the public education activities conducted by each entity and the associated load reductions.

4.2.5 Addressing Agricultural Nonpoint Pollution

Nutrient reductions from agricultural land uses will be achieved through the implementation of agricultural BMPs, as discussed below.

4.2.5.1 Agricultural BMPs

BMPs are individual or combined practices determined through research, field-testing, and expert review to be the most effective and practicable means for improving water quality, taking into account economic and technological considerations. Two categories included in FDACS-adopted BMPs are nutrient management and irrigation management. Nutrient management is the amount, timing, placement, and type of fertilizer. University of Florida Institute of Food and Agricultural Sciences (UF-IFAS) recommended fertilizer applications, soil and tissue tests, fertigation (fertilizing through irrigation), split fertilizer applications, foliar applications, controlled-release fertilizer, fertilizer spreader shut-off valves, and variable-rate fertilizer spreaders are among the nutrient management BMPs. Irrigation management is the maintenance, scheduling, and overall efficiency rating of irrigation systems. It typically includes conversion to low-volume systems; soil moisture monitoring; scheduling according to rainfall, temperature, and other climatic conditions; water placement; and plant groupings. In several areas of the state, FDACS-funded Mobile Irrigation Labs identify and demonstrate irrigation efficiency techniques to growers.

4.2.5.2 Agricultural Producers' Responsibilities under the FWRA

Section 403.067(7)(b), F.S., requires that nonpoint pollutant sources (such as agriculture) included in a BMAP demonstrate compliance with pollutant reductions needed to meet a TMDL, either by implementing appropriate BMPs (adopted by FDACS or FDEP, as applicable), or conducting water quality monitoring prescribed by FDEP or the applicable water management district. If these pollutant sources do not either implement BMPs or conduct monitoring, they may be subject to enforcement by FDEP or the applicable water management district.

Pursuant to section 403.067(7)(c), F.S., implementation of FDACS-adopted, FDEP-verified BMPs in accordance with FDACS rule provides a presumption of compliance with state water quality standards. In addition, growers who implement BMPs may be eligible for cost share from the water management district, FDACS, or others. Through the Office of Agricultural Water Policy (OAWP), Division of Forestry, and Division of Aquaculture, FDACS develops, adopts, and assists producers in implementing agricultural BMPs to improve water quality and water conservation. Recent research initiatives conducted by SJRWMD and other state and federal agencies have proven that BMPs can be implemented successfully, and can significantly reduce loads while sustaining production. The targets for enrolling agricultural acres in the basin are shown in **Table 10**.

TABLE 10: TARGETS FOR ENROLLMENT IN AGRICULTURAL BMPS

OAWP BMP PROGRAMS	ENROLLMENT TARGETS*	SUCCESS MEASURE
Citrus	100% of targeted agricultural operations within 5 years of BMAP adoption	Number of targeted operations enrolled, with associated acres on which applicable BMPs will be implemented
Container Nurseries		
Vegetable/ Agronomic Crops		
Sod Farms		
Cow/Calf Operations		
In-Ground Nurseries	100% of targeted agricultural operations within 5 years of manual adoption	
Equine/Horse Farms		

* Enrollment numbers will depend on the ability of field staff to identify and locate producers, and whether producers choose to implement BMPs or monitor their water quality. Also, specific agricultural land uses and number of

agricultural operations may change from year to year. Progress on enrollment, based on best available information, will be included in the annual BMAP report.

Based on information from county agricultural extension agents and FDACS/OAWP field staff, a rough estimate indicates there are between 50 and 60 agricultural operations that appropriately could be targeted for enrollment in the basin. As of June 30, 2009, nine producers within the Lake Jesup Basin counties had submitted notices of intent (NOIs) covering about 208 acres to implement FDACS-adopted BMPs. **Table 11** and **Table 12** show the adjusted estimated agricultural acreage in the watershed by land use, the current NOIs submitted, and the associated acres enrolled in related BMP programs. No producers are conducting water quality monitoring in lieu of implementing BMPs at this time.

It is important to understand that even if all targeted agricultural operations are enrolled, not all the agricultural acres shown in **Table 12** will be included. This is because land use data can contain non-production acres (buildings, parking lots, fallow acres, etc.) that will not be counted on the NOIs submitted to FDACS, and there may be some small farms (e.g., small-plot cow-calf owners not in commercial production) that it is not necessary to enroll. The NOIs will document the estimated total number of acres on which one or more of the selected BMPs are implemented, not the entire parcel acreage.

TABLE 11: SUMMARY OF AGRICULTURAL MANUALS AND PROGRAMS

AREA	ACRES	PERCENT OF WATERSHED
Lake Jesup Basin	87,346.3	100
Agriculture	4,824.2	5.5
AGRICULTURAL AREA	**ACRES**	**PERCENT OF AGRICULTURAL ACREAGE**
Without Adopted OAWP Manuals/Programs	92.9	1.9
With adopted OAWP Manuals/Programs*	4,731.3	98.1
Enrolled in adopted OAWP Manuals/Programs	208.5	4.3

* This figure may contain acres for which a BMP manual has not been adopted because of the aggregation of commodities within land use types.

TABLE 12: AGRICULTURAL ACREAGE AND BMP ENROLLMENTS FOR THE LAKE JESUP BMAP AREA

LAND USE CODE	LAND USE DESCRIPTION	TOTAL ACRES	RELATED FDACS BMP PROGRAMS	COMMENTS	ACREAGE ENROLLED	NUMBER OF NOIS
2120	Unimproved Pasture	17.4	Cow/Calf	Manual adopted (Spring 2009)	N/A	N/A
2130	Woodland Pasture	151.4				
2110	Improved Pasture	2,256.5				
			Future[1]	Vegetable/Agronomic under revision (Fall 2010)	N/A	N/A
2140	Row Crop	196.1	Vegetable/Agronomic	Manual Adopted (Winter 2006)	15.0	1
2150	Field Crops	16.0				
2160	Mixed Crops	0.0				
2210	Citrus	1,340.8	Ridge Citrus[2]	BMP Adopted (Winter 1996)	100.0	2
			Flatwoods Citrus[2]	Manual Adopted (Winter 2005)	0.0	0
2240	Abandoned Tree Crops (citrus)	0.0	N/A	Out of production/abandoned - no enrollment needed	N/A	N/A
2310	Cattle Feeding Operation	0.0	Future	Conservation Plan Rule under development (Spring 2010)	N/A	N/A
2330	Poultry Feeding Operation	2.5			N/A	N/A
2400	Nurseries and Vineyards	384.8	Container Nursery[3]	Manual Adopted (Fall 2007)	See 2430	See 2430
			Future	Specialty Fruit & Nut under development (Fall 2010)	N/A	N/A
2200	Tree Crops	0.0	Future	Comprehensive Nursery under development (Fall 2010)	N/A	N/A
			Future	Specialty Fruit & Nut under development (Fall 2010)	N/A	N/A
2410	Tree Nurseries	0.0	Future	Comprehensive Nursery under development (Fall 2010)	N/A	N/A
			Future	Specialty Fruit & Nut under development (Fall 2010)	N/A	N/A
2430	Ornamentals	90.2	Container Nursery[3]	Manual adopted (Fall2007)	93.5	6
2431	Shade Ferns	0.0	Future	Comprehensive Nursery under development (Fall 2010)	N/A	N/A
2432	Hammock Ferns	0.0				
2450	Floriculture	2.3				
2420	Sod Farm	278.0	Sod	Manual adopted (Fall 2008)	0.0	0
2510	Horse Farm	88.2	Future	Equine manual under development (Spring 2010)	N/A	N/A
2610	Fallow Cropland	0.0	N/A	Acreage not in production as of land use survey	N/A	N/A
2540	*Aquaculture*	*0.0*	*(FDACS Aquaculture Division)*	*Aquaculture Certification Program*	*N/A*	*N/A*
N/A	TOTAL	4,824.2	N/A	N/A	208.5	9

Note: Acreages based in part on SJRWMD 2004 land use level II data.
[1]Acreage included in this land classification that is exclusively in hay production will be covered in a future revision of the Vegetable & Agronomic Crop manual.
[2]To be included in development of comprehensive citrus manual.
[3]Acreage included in this land classification that is in non-containerized nursery production will be covered in a comprehensive nursery manual, under development.

4.2.5.3 Estimated Agricultural Load and Load Reduction Allocation

Table 13 contains the agricultural load estimates for nutrients used in establishing the TMDLs, and the reductions required of agricultural land uses in the Lake Jesup Basin. The acreage used to calculate the starting point agricultural nutrient load is based on 2004 land use information from the SJRWMD. FDACS adjusted this estimate to more accurately reflect the current agricultural land use acreage. The FDACS adjusted acreage had approximately 2,650 less agricultural acreage than the TMDL, which is about 42% less agricultural acreage. In addition, because of data limitations, all agricultural land uses were assigned the same loading rate (event mean concentration) in the TMDL model.

Due to these factors, the estimated total load shown in **Table 13** for agriculture is greater than the actual loading. In addition, the region is expected to have continuing shifts from agricultural to residential land uses. This will further reduce the agricultural load. More precise information will be incorporated into the next iteration of the TMDL, and the estimated agricultural load will be adjusted to reflect the updated acreage figure. In advance of that, during the first phase of BMAP implementation (2010-2014), FDACS will work with FDEP to determine the actual agricultural load and recalculate the remaining reductions needed.

4.2.5.4 Load Reduction Estimates for BMPs

The agricultural load reduction estimates, shown in **Table 13**, are based on commodity-specific methods developed for the Lake Okeechobee watershed. The Lake Okeechobee watershed methods were selected because the nature of the agricultural operations and the distribution of soil hydrologic groups share similarities with those in the Lake Jesup Basin. However, basin-specific methods with emphasis on assumed typical conditions have yet to be developed. An example of this is the field-grown palm acreage being assigned typical conditions associated with standard ornamental operations. These values may assume conditions, such as typical phosphorus fertilization rates, that differ from actual field conditions.

In addition, the agricultural load reduction estimates are based on updated acreage estimates, which total 2,650 acres less than the acreage used in the TMDL. Further ground-truthing of agricultural acreage, along with the potential refinement of a basin- and commodity-specific agricultural loading/reduction model should be considered during the first BMAP cycle.

TABLE 13: ESTIMATED AGRICULTURAL TP LOAD, LOAD REDUCTION ALLOCATION, AND REDUCTIONS

ESTIMATED LOADS	TOTAL	2010-2014 EXISTING BMPS	2015-2019 NEW BMPS	2020-2024 MAINTAIN
Estimated Total Load	1,149.0	N/A	N/A	N/A
Load Reduction Allocation	764.0	254.7	254.7	254.7
Estimated Load Reductions via BMPs	277.9	235.9	42.0	0.0
Remaining Reductions Needed	486.1	18.8	212.7	254.7
Estimated Load Reduction Based on Updated Acreage Adjustments	N/A	N/A	To be determined	To be determined
Remaining Load Reductions Needed	N/A	N/A	To be determined	To be determined

4.2.5.5 FDACS OAWP Role in BMP Implementation and Follow-Up

BMP Implementation

The OAWP assists agricultural producers enrolled in its programs in implementing BMPs. The OAWP employs field staff and contracts with service providers to work with producers to submit NOIs to implement the BMPs appropriate for their operations. Depending on the region of the

state, these providers include the soil and water conservation districts, UF–IFAS, and natural resource development and conservation councils. They also give technical assistance to producers and, as funding allows, help implement cost-share programs that leverage regional, state, and federal funds.

The OAWP will recruit producers within the Lake Jesup Basin to enroll in adopted BMP programs applicable to their operations. OAWP staff and contractors will identify existing growers, to the greatest extent possible, with the help of grower associations, information on county agricultural exemptions, field staff knowledge, and other means. Staff/contractors will assist producers in selecting the appropriate BMPs, with emphasis on nutrient management, irrigation management, sediment/erosion control, stormwater management, and record keeping.

As necessary, growers will be notified that if they choose not to implement BMPs, they are required by statute to conduct water quality monitoring prescribed by FDEP or SJRWMD in order to demonstrate compliance with the allocations in the TMDL.

Table 14 identifies the key nutrient-related BMPs that would most likely be applicable to operations in the Lake Jesup Basin. By definition, BMPs are technically and economically feasible. However, FDACS BMP manuals contain some BMPs that may only be affordable with financial assistance, depending on the economic viability of the operation. The BMP checklists allow producers to indicate whether a BMP is not economically feasible, on a case-by-case basis. As BMP cost share becomes available to the basin, FDACS will work with producers to implement applicable key BMPs that otherwise are not affordable.

TABLE 14: KEY NUTRIENT-RELATED BMPS ADOPTED BY THE FDACS OAWP

KEY NUTRIENT-RELATED BEST MANAGEMENT PRACTICES
Determining Nutrient Needs
Soil and Tissue Testing: Used to base fertilizer applications on plant needs and available nutrients in the soil; helps prevent over-application of fertilizer.
Nutrient Budgeting: Adjustment of fertilizer regime to account for other nutrient sources, such as bio-solids, legumes, manure, and nutrient-laden irrigation water; helps prevent over-application of fertilizer.
Managing Nutrient Application
Precision Application of Nutrients: Use of specialized equipment for precise placement of nutrients on targeted areas at specified rates; reduces total amount used and prevents stray applications.
Equipment Calibration/Maintenance: Ensures proper functioning of equipment; prevents misapplication or over-application of fertilizer materials.
Split Fertilizer Applications: Multiple applications timed with optimal growth stages; allows plants to assimilate nutrients more efficiently; reduces nutrient loss in leaching and runoff.
Fertigation: Application of fertilizer through irrigation water; allows for direct nutrient application to the crop root zone and more efficient assimilation by plants, reducing nutrient loss in leaching and runoff.
Controlled-Release Fertilizer: Use of fertilizer formulations that have a controlled nutrient release curve; reduces nutrient loss to leaching and runoff.
Fertilizer Application Setbacks from Waterbodies (wetlands, watercourses, sinks, springs, etc.): Establishes a zone where no fertilizer will be applied; reduces nutrient loadings to waterbodies.
Managing Irrigation
Irrigation Scheduling: Planning when to irrigate to reduce water and nutrient losses, based on available soil moisture content, evapotranspiration levels, recent rainfall, and time of day.
Monitoring Soil Moisture and Water Table: Use of devices that measure the water table level and the amount of water in the soil; is a key component of proper irrigation scheduling.
Tailwater Recovery: Use of down-gradient catchment ponds to trap irrigation tailwater to be reused on cropland; reduces offsite transport of nutrients and conserves water.
Treatment and Erosion Control
Filter Strips: Vegetated strips of land designed to reduce nutrients and sediments in surface water runoff from fields, pastures, and livestock high-intensity areas before it reaches downstream waterbodies.

KEY NUTRIENT-RELATED BEST MANAGEMENT PRACTICES
Vegetative Buffers: Establishment of riparian and/or wetland buffers to attenuate and assimilate nutrient- or sediment-laden surface flows coming from cropped/grazed areas.
Ditch Maintenance and Retrofits: Use of rip rap, sediment traps, staging structures, and permanent vegetative bank cover to minimize erosion and transport of nutrient-laden sediments.
Livestock Management (Applicable to Cow/Calf and Equine Operations)
Alternative Water Sources: Use of upland livestock watering ponds and/or water troughs; minimizes manure deposition in waterbodies.
Rotational Grazing: Movement of cattle to different grazing areas on a planned basis; prevents concentrated waste accumulations and denuding of pasture areas. May involve fencing.
High-Intensity Areas Location: Siting of cowpens, supplemental feed areas, etc., away from waterbodies to minimize nutrient loadings.
Operations Management
Fertilizer Storage: Proper location/**s**torage of bulk fertilizer products to prevent nutrient loadings.
Fertilizer Mix/Load: Use of appropriate dedicated or temporary mix/load areas located away from waterbodies to prevent nutrient loading.
Employee Training: Training provided to farm workers on how to implement BMPs.
Record Keeping: Proper record keeping provides accountability in the implementation of BMPs, and assists the producer in making nutrient and irrigation management decisions.

OAWP BMPs and staff contact information are located at http://www.floridaagwaterpolicy.com. Printed BMP manuals can be obtained in the local extension office at county agricultural extension centers, or by contacting OAWP field staff.

Follow-Up and Reporting on BMP Enrollment and Implementation

In addition to enrolling targeted operations in the relevant BMP programs, the OAWP will:

- Document the submitted NOIs, which will include a list of the BMPs to be implemented.
- Document the amount of total agricultural acreage covered by the NOIs.
- Assist growers in understanding and implementing BMPs properly.
- Through the Implementation Assurance Program:
  - On a rotating basis by program, mail written surveys to all operations in the Lake Jesup Basin under an active FDACS NOI, to evaluate BMP implementation and update information on ownership, land use, acreage, etc.
  - Perform random site visits on operations in the basin that are under a FDACS NOI, to ensure that the BMPs are being implemented, providing assistance and reasonable opportunities to producers to correct any deficiencies. This will serve as a "spot check" for the surveys, and will not cover all operations because of resource limitations.
- Through regional field staff, follow up on identified areas/operations of particular concern (e.g., large-acreage operations, "hot spots," etc.).
- Participate in annual BMAP reporting on enrollment efforts and results, follow-up activities conducted, new manuals adopted, any new efforts planned, and estimated load reductions.

The FWRA requires that, where water quality problems are demonstrated despite the proper implementation of adopted agricultural BMPs, FDACS must institute a re-evaluation of the practices, in consultation with FDEP, and modify them if necessary. Continuing water quality problems will be detected through the BMAP monitoring component and other FDEP and

SJRWMD activities. If a re-evaluation of the BMPs is needed, FDACS will also include SJRWMD and other partners in the process.

4.2.5.6 FDEP and SJRWMD Roles in BMP Implementation

The FWRA states that nonpoint source dischargers who fail either to implement the appropriate BMPs or conduct water quality monitoring prescribed by FDEP or a water management district may be subject to enforcement action by either of those agencies. In the case of continuous non-cooperation by an agricultural producer in implementing BMPs, FDACS will consult with FDEP and SJRWMD to determine whether it is necessary for one of those agencies to intervene.

FDEP and SJRWMD will work cooperatively with OAWP to determine the most appropriate action to take (site inspection, prescribed water quality monitoring, enforcement), based on the circumstances. FDEP and SJRWMD will provide an annual summary of the non-compliance reports they receive and any related actions they take.

4.2.5.7 Beyond BMPs

Under the FWRA, when FDEP adopts a BMAP that includes agriculture, it is the agricultural producer's responsibility to implement water quality BMPs adopted by FDACS and verified as being effective by FDEP. The Lake Jesup BMAP target for BMP implementation is to enroll all producers in the watershed in the relevant FDACS BMP programs. As shown in **Table 13**, implementation of agricultural BMPs on all operations (based on adjusted agricultural acreage figures) is estimated to achieve 248 lbs/yr of TP of the 771 lbs/yr of TP reduction required of agricultural sources.

As discussed previously, the agricultural loading estimate does not reflect the significant reduction in agricultural acreage since the period of record for the TMDL, so the load reduction needed may be significantly lower than calculated. However, if acreage adjustments and BMP implementation do not fully account for the current agricultural load reduction allocation, it will be necessary to develop and implement cost-assisted field- and/or regional-level treatment options that remove nutrients from farm discharges. As needed, FDACS will work with local, regional, state, and federal partners to explore opportunities and funding sources to develop and implement effective treatment projects. As appropriate to achieve agricultural load reductions, these might include *Interagency Strategy* projects or other cooperative initiatives in the basin.

4.2.6 Actions to Address Loading From Future Growth

The future growth analysis described above identified areas of population growth. To achieve pollution reductions in these high growth areas, the state and EPA want developers to look to LID and other green infrastructure practices to reduce the hard surfaces that prevent water from infiltrating the ground where it can be treated naturally. Stakeholders in the basin have a variety of programs in place to manage the water quality impacts of future growth. Each stakeholder operates under a specific set of guidelines, policies, and requirements that regulate development within their jurisdiction, as shown in **Table 15**.

TABLE 15: LAKE JESUP BASIN STAKEHOLDER DEVELOPMENT REGULATIONS

STAKEHOLDER	DEVELOPMENT REGULATIONS
SJRWMD	Environmental Resource Permit (ERP) Regulations
Altamonte Springs	Comprehensive Plan
	Code of Ordinances
	Land Development Code
Casselberry	Code of Ordinances
	Comprehensive Plan
Eatonville	Comprehensive Plan
	Land Development Code
Lake Mary	Comprehensive Plan
	Code of Ordinances
Longwood	Community Development Documents
Maitland	Comprehensive Plan
	Code
Orange County	Comprehensive Plan
	Code of Ordinances
Orlando	Growth Management Plan
	Code
Oviedo	Comprehensive Plan
	Land Development Code
Sanford	Comprehensive Plan
	City Code
	Land Development Regulations
Seminole County	Comprehensive Plan
	Land Development Code
Winter Park	Comprehensive Plan
	Land Development Code
Winter Springs	Comprehensive Plan
	Code of Ordinances

4.2.6.1 **Low Impact Development**

Conventional stormwater systems have typically been designed to collect, convey and discharge runoff away from development as efficiently as possible. The purpose of stormwater management was first and foremost to prevent flooding. The concept of LID in stormwater management was introduced in the late 1990s (U.S. EPA 2000, http://www.epa.gov/owow/nps/lid/lidlit.html), and is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs. The LID approach to land development meets flood prevention needs while also minimizing water quality impacts associated with growth.

The goal of LID is to replicate the pre-development water balance of surface runoff, infiltration and evapotranspiration on a site-specific basis, thereby minimizing or eliminating pollutant loads into surface waters. Stormwater storage, infiltration, and ground water recharge, as well as the volume and frequency of discharges are maintained through the use of integrated and distributed small-scale stormwater retention and detention areas, reduction of impervious surfaces, and the lengthening of flow paths and runoff time (Coffman, 2000). The basic principle is to manage runoff at the source using decentralized techniques at the scale of individual lots.

The incorporation of LID techniques into future development is an innovative management action that the stakeholders are undertaking to maintain or improve water quality within the Lake

Jesup Basin. There are numerous creative LID techniques to treat, use, store, retain, detain and recharge stormwater runoff and new methods are evolving. **Appendix E** provides examples of how stakeholders in the Lake Jesup Basin are implementing LID principles and activities.

4.2.6.2 Other Development-Related Management Actions

Stakeholders in the basin are implementing other activities to address the impact of future growth. One example is that Orange County planners are working on including LID strategies in the update of the Urban Design Element of the Comprehensive Plan. They are also developing an infill master plan that may include LID building practices for re-development.

There are many opportunities that local governments in the basin can undertake to build on the current implementation of LID. Regulatory initiatives can be proposed to require increasing the amounts of on-site runoff retention, or to provide additional water quality treatment to remove suspended sediments. Orange County is considering expanding LID policies adopted as part of the Wekiva Parkway Protection Act to cover the entire county. Orange County Comprehensive Plan Policy 4.5.2 of the Future Land Use Element encompasses the full spectrum of LID concepts and strategies, providing a concise example that other jurisdictions can use as a model.

Legislatively, local governments can pursue changes in the SJRWMD, FDOT, and Florida Building Code rules to promote LID practices and provide support from the State level. Local governments can initiate or expand incentive programs for builders and developers. Permitting preferences, streamlined permitting, or reductions in permit fees may be given where LID practices are used over traditional techniques in complying with standards. Perhaps the greatest impact that local governments have had with regard to LID is through education and outreach. This activity could be expanded to include specific training for local building officials, planners, engineers and reviewers on LID. Such training will serve to overcome the reluctance on the part of staff to review and approve innovative practices. Similar outreach should be provided to developers, builders, and landscape architects.

Through continued implementation of LID principles listed in **Appendix E**, land acquisition, and continued regulatory support, the water quality effects of future growth will be minimized in the Lake Jesup basin. Because most development occurs by private entities, public-private cooperation is vital if the effects of new development are to be mitigated. The foundation for this type of cooperation exists in the basin. Relationships between SJRWMD, local governments, and the development community have been built through implementation of the projects noted in the appendix. This foundation will be important to the ongoing success of LID and similar efforts in the Lake Jesup Basin.

4.3 Section 319 Funding Nine Elements

Although many different components may be included in a watershed plan, EPA has identified a minimum of nine elements that are critical for achieving improvements in water quality. EPA requires that these nine elements be addressed for watershed plans funded using incremental Section 319 funds and strongly recommends that they be included in all other watershed plans that are intended to remediate water quality impairments. This BMAP includes the recommended elements, as shown in **Table 16**, which benefits the entities applying for Section 319 funding for the projects in the BMAP. Additional information on these elements can be found in the "Draft Handbook for Developing Watershed Plans to Restore and Protect Our Waters," located online at: http://www.epa.gov/owow/nps/watershed_handbook/.

TABLE 16: EPA ELEMENTS OF A WATERSHED PLAN

EPA ELEMENT	EPA ELEMENT	SECTION IN BMAP WHERE ADDRESSED
1	Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan.	Sections 1.3, 3.2, and 3.3
2	An estimate of the load reductions expected from management measures.	Sections 3.3 and 4.2 and Appendix D
3	A description of the nonpoint source management measures that will need to be implemented to achieve load reductions, and a description of the critical areas in which those measures will be needed to implement this plan.	Section 4.2 and Appendix D
4	Estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon to implement this plan.	Section 1.2.3 and Appendix D
5	An information and education component used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.	Sections 1.2.1 and 4.2, Appendix C, and Appendix D
6	Schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.	Appendix D
7	A description of interim measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.	Sections 1.2.3 and 5.1 and Appendix D
8	A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.	Sections 1.3 and 5.1 and Appendix D
9	A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under item 8 immediately above.	Section 5.1

CHAPTER 5: MONITORING AND EVALUATION

Successful BMAP implementation requires commitment and follow-up. In the Commitment to Plan Implementation (**Chapter 6**), Basin Working Group members have expressed their intention to carry out the plan, monitor its effect, and continue to coordinate within and across jurisdictions to achieve water quality targets. The information gathered as part of this monitoring plan will be used to recalculate the TMDL and BMAP allocations in the next five-year cycle.

5.1 MONITORING STRATEGY

The Lake Jesup BMAP was developed with the best information available regarding in-lake processes, water quality conditions, nutrient sources, and project effectiveness. This monitoring strategy is designed to enhance the understanding of basin loads, track project implementation, and identify long-term water quality trends. This information will measure progress toward achieving the TMDL and provide a foundation for continued improvement in cost-effective project implementation. Sampling stations, parameters, frequency, and other elements of this strategy may be modified as appropriate to match changing environmental conditions and funding resources. However, any modifications made shall not affect the ability of the monitoring network to fulfill the objectives noted below, including quantification of trends in TP that will be used to evaluate progress toward meeting the TMDL.

5.1.1 OBJECTIVES

Focused objectives are critical for a monitoring strategy to provide the information needed to evaluate implementation success. The primary and secondary objectives of the monitoring strategy for both Lake Jesup and its tributaries are described below. Primary objectives are necessary to evaluate success of the BMAP and refine the TMDL model in the next iteration. Secondary objectives contribute to this evaluation, can help interpret data collected, and provide refinements for potential future refinements of the TMDL and/or BMAP.

Primary Objectives

1. Track trends in total phosphorus load in Lake Jesup and its tributaries through the ambient monitoring network.
2. Determine inputs to Lake Jesup.
3. Track trends in inflow and outflow nutrient loads from each jurisdiction for model refinement, attenuation calculations, and determination of reductions from BMAP projects.
4. Collect necessary information on nutrient loads to support future refinement of the TMDL (refer to **Section 5.2** for research studies).

Secondary Objectives

1. Identify areas within the watershed that exhibit unusually high loadings of total phosphorus (“hot spots”) to better focus management efforts.
2. Monitor trends in total nitrogen in Lake Jesup and its tributaries to determine to what extent reductions in total phosphorus is helping to control nitrogen fixation in the lake (see **Section 2.4** for a discussion of the relationship between TP and nitrogen-fixation).
3. Track ecological and limnological responses to BMAP implementation.
4. Verify the BMP effectiveness values used in the Lake Jesup BMAP (see **Section 2.4**).

5.1.2 Water Quality Indicators and Resources Responses

To achieve the objectives above, the monitoring strategy focuses on two types of indicators to track water quality trends: core and supplemental (**Table 17**). The core indicators are directly related to the parameters causing impairment in the lake and its tributaries. Supplemental indicators are monitored primarily to support the interpretation of core water quality parameters. At a minimum, the core parameters will be tracked to determine progress towards meeting the TMDL (see **Table 19**). In addition, resource responses to BMAP implementation will also be tracked (**Table 18**). Changes in water chemistry are expected to occur within a relatively short timeframe, depending on the actual rate of project implementation and rainfall conditions. A significant amount of time may be needed for the changes in water chemistry to be observed in the resource responses. However, resource responses represent improvements in the overall ecological health of Lake Jesup.

TABLE 17: CORE AND SUPPLEMENTAL WATER QUALITY PARAMETERS FOR AMBIENT MONITORING

CORE PARAMETERS	LAKE JESUP - ANTICIPATED TREND	TRIBUTARIES - ANTICIPATED TREND
Chlorophyll-a (corrected)	Decrease in concentration	Decrease in concentration
Total Phosphorus (as P)	Decrease in concentration	Decrease in concentration
Orthophosphate as P	Decrease in concentration	Decrease in concentration
Ammonium as N (NH4)	No trend anticipated	No trend anticipated
Nitrate/nitrite as N	No trend anticipated	No trend anticipated
Total Kjeldahl nitrogen (TKN)	Possible decrease in concentration*	Possible decrease in concentration*
Biological oxygen demand (BOD)	Decrease in concentration	Decrease in concentration
SUPPLEMENTAL PARAMETERS	**LAKE JESUP**	**TRIBUTARIES**
Specific conductance	Monitored to support interpretation of core indicators	Monitored to support interpretation of core indicators
Dissolved Oxygen (DO)	Monitored to support interpretation of core indicators	Monitored to support interpretation of core indicators
pH	Monitored to support interpretation of core indicators	Monitored to support interpretation of core indicators
Temperature	Monitored to support interpretation of core indicators	Monitored to support interpretation of core indicators
Total Suspended Solids (TSS)	Monitored to support interpretation of core indicators	Monitored to support interpretation of core indicators

Note: Anticipated trends are only for the first 5-year BMAP implementation period.
* The focus in this BMAP is on reducing external TP loads to the lake. However, some of the projects in the BMAP to reduce TP may also result in a reduction in TN.

TABLE 18: ANTICIPATED RESOURCE RESPONSES FROM BMAP IMPLEMENTATION

RESOURCE RESPONSES	LAKE JESUP	TRIBUTARIES
Reduction in the trophic state index (TSI)	X	
Increase in stream condition index (SCI) score	X	X
Increase in Shannon-Weaver diversity index	X	X
Increase in key fish populations	X	

5.1.3 Monitoring Network

The monitoring network for this plan builds on existing efforts in basin by:

- Orange County
- Seminole County
- Altamonte Springs
- Casselberry
- Lake Mary
- Longwood
- Maitland
- Orlando
- Oviedo
- Sanford
- Winter Park
- SJRWMD
- FDEP

Table 19 lists the stations that are included in the BMAP monitoring network. The water quality monitoring will be conducted on a monthly basis to assess the conditions in the watershed and within Lake Jesup to determine changes in water quality from the actions implemented as part of the BMAP. The flow stations throughout the basin will take measurements every 15 or 60 minutes and this information will be used to calibrate the model. The storm event stations are described in further detail in **Section 5.1.3.2**. The stations in the monitoring network are also shown in **Figure 7** through **Figure 13**.

In addition to the BMAP monitoring network, the entities in the basin are also conducting sampling that will provide supplemental data to meet the monitoring strategy objectives. This additional monitoring is described in **Appendix F**. The research studies, as described in **Section 5.2**, will also provide information that will be utilized in the next iteration of the TMDL and BMAP.

5.1.3.1 FDOT Role in the Monitoring Network

Due to the fact that FDOT District Five's jurisdiction extends across multiple MS4 boundaries, FDOT District Five currently relies on the lead permittees (Orange County and Seminole County) for compliance with the water quality monitoring component of the respective Phase I MS4 permit. Additionally, stormwater runoff from FDOT District Five's right-of-way discharges to waterbodies monitored by the existing monitoring programs in place by Orange County and Seminole County. FDOT District Five has a joint-participation agreement with Seminole County to provide financial support for Seminole County's Watershed Atlas and five quarterly NPDES monitoring sites. FDOT District Five and Seminole County are negotiating the current agreement for FDOT to provide additional funds to assist with the County's monitoring program. FDOT District Five is also currently negotiating a similar agreement with Orange County to provide financial support for Orange County's water quality monitoring program. FDOT District Five will not be developing an independent monitoring program for the Lake Jesup BMAP and will continue to rely on Orange and Seminole County's monitoring program in support of the first iteration of the Lake Jesup BMAP. In the next iteration of the Lake Jesup BMAP, FDOT District Five will coordinate with Orange and Seminole County to evaluate proposed changes, if any, to the joint-participation agreements based on changes to the monitoring programs of each County.

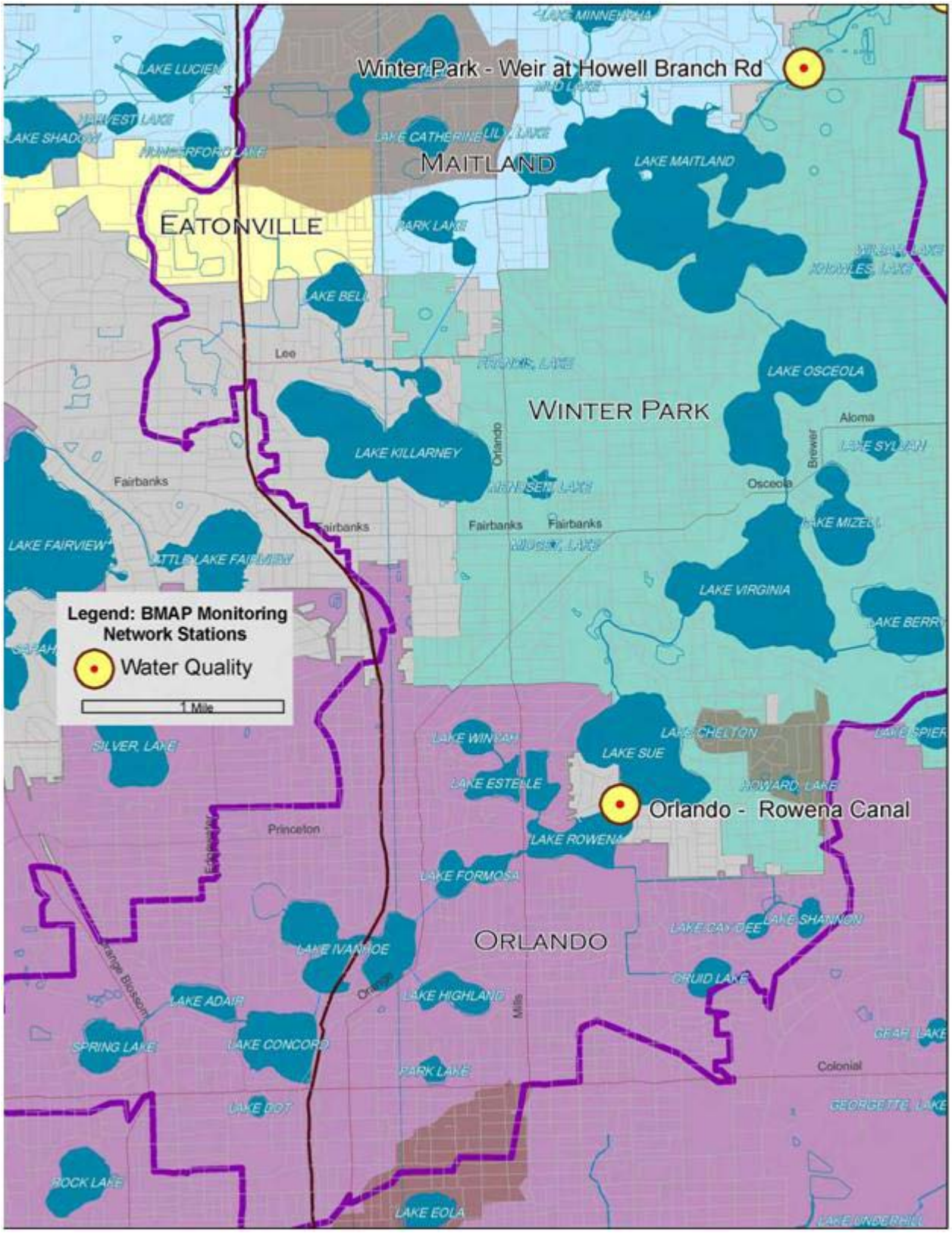


FIGURE 7: MONITORING STATIONS IN ORLANDO AND WINTER PARK

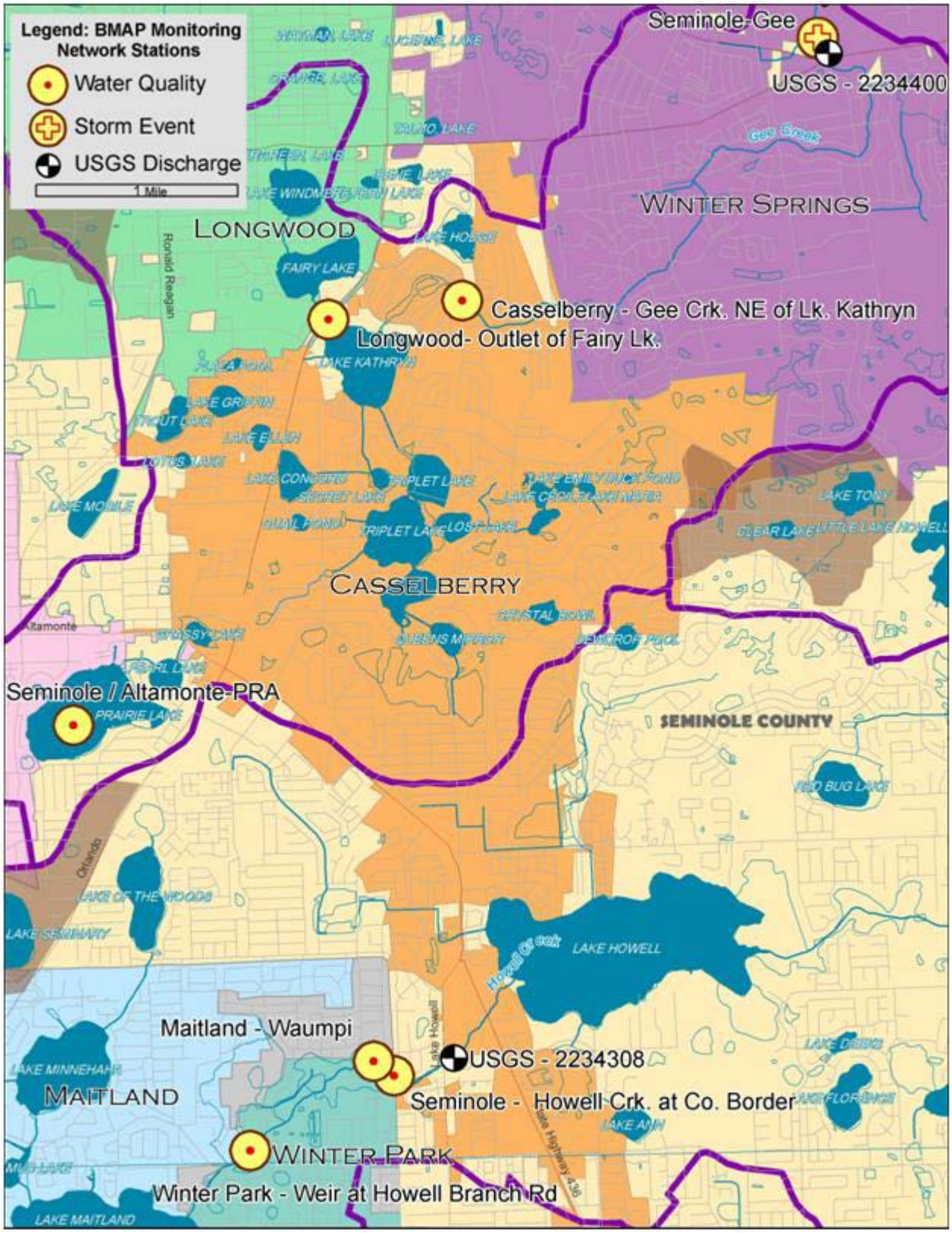


FIGURE 8: MONITORING STATIONS IN MAITLAND, CASSELBERRY, LONGWOOD, AND WINTER SPRINGS

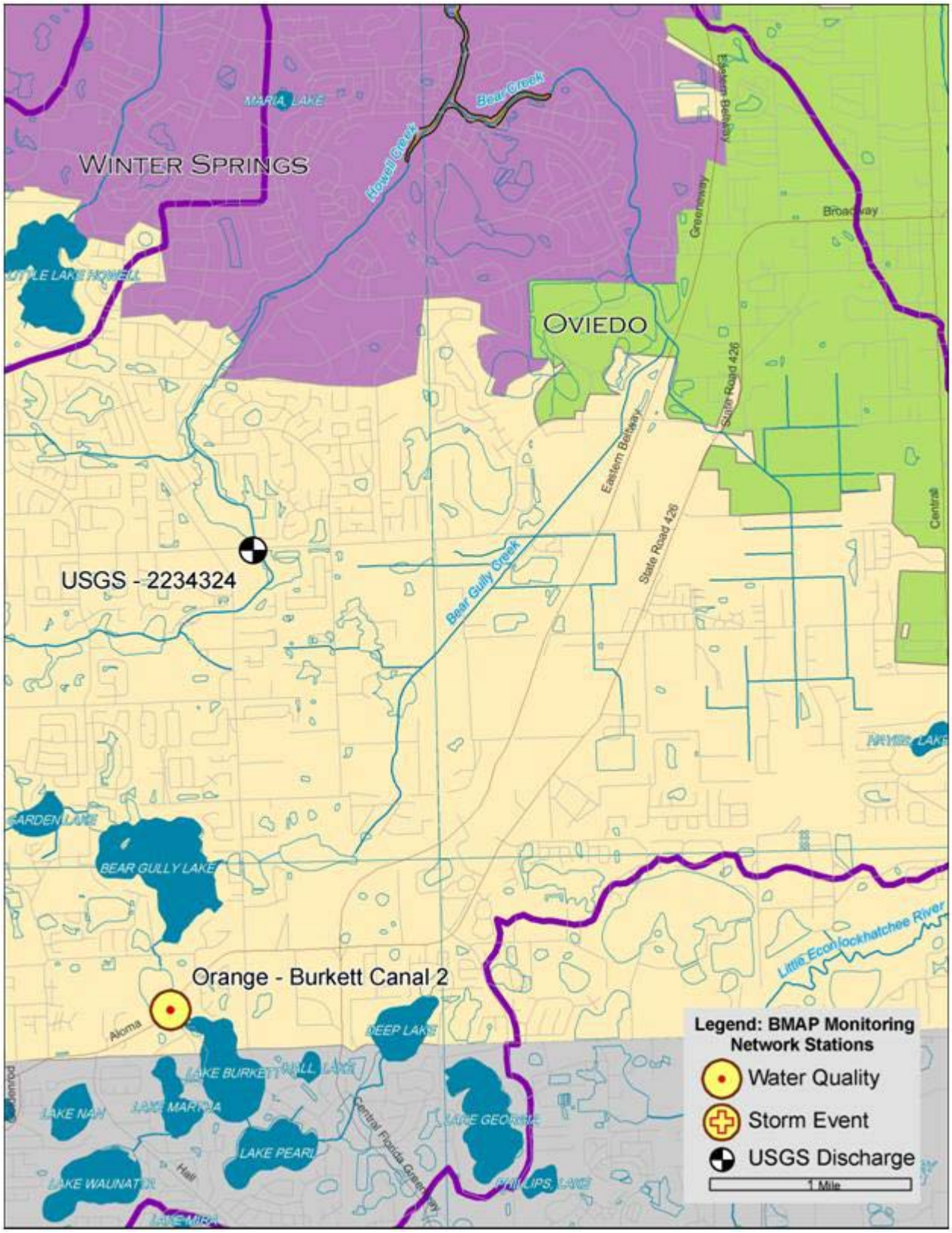


FIGURE 9: MONITORING STATIONS IN ORANGE COUNTY

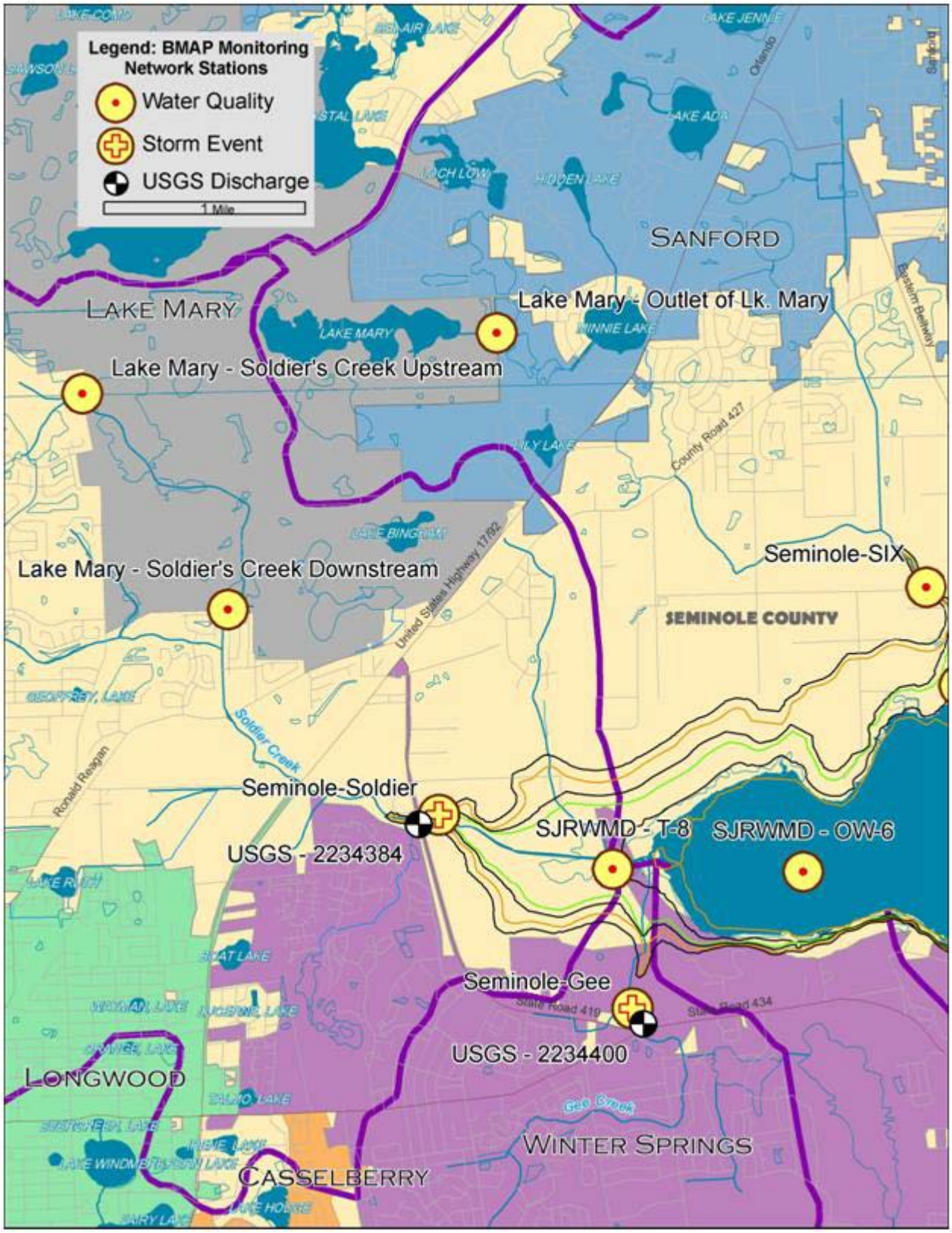


FIGURE 10: MONITORING STATIONS IN WINTER SPRINGS, SEMINOLE COUNTY, AND LAKE MARY

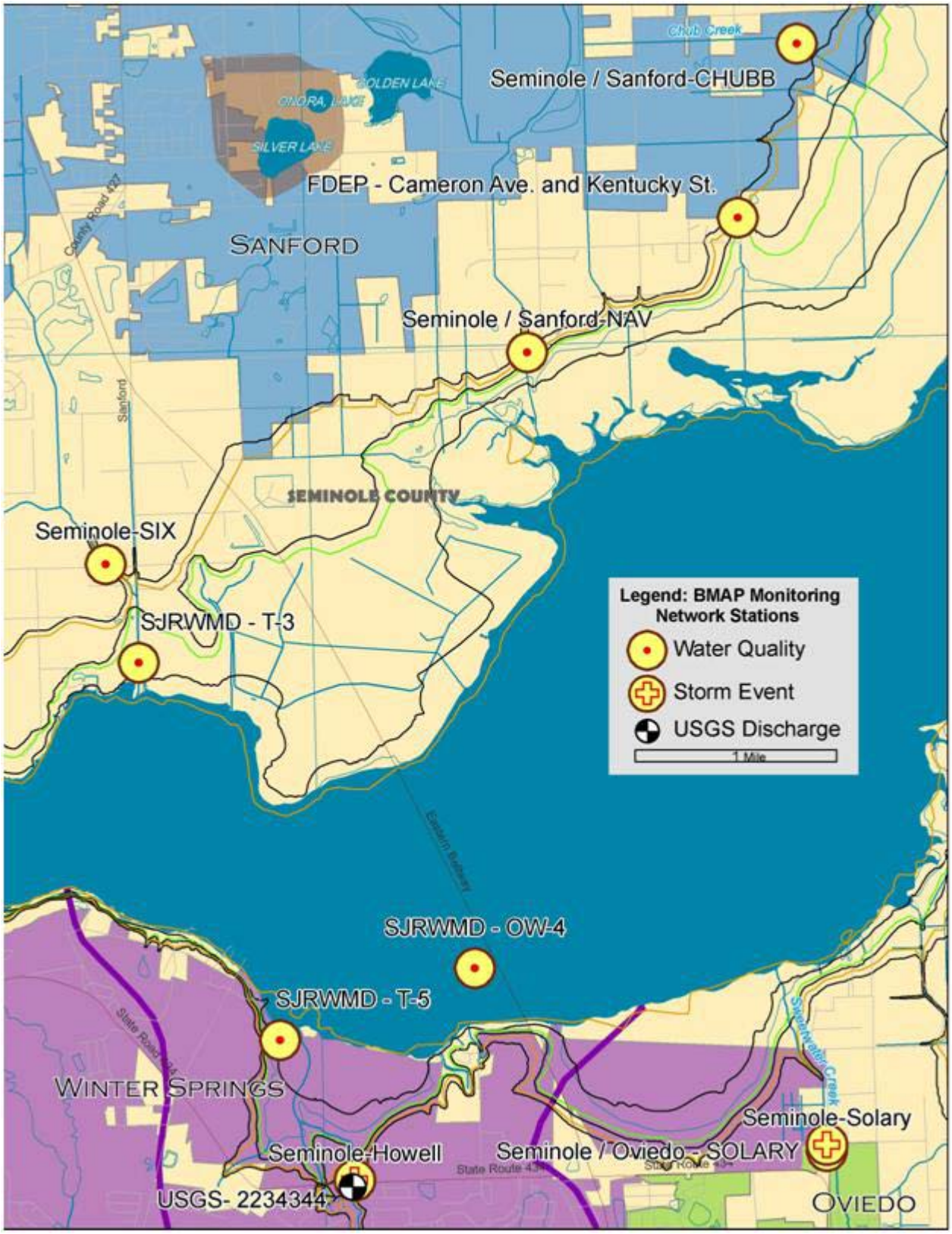


FIGURE 11: MONITORING STATIONS IN SEMINOLE COUNTY, SANFORD, AND LAKE JESUP

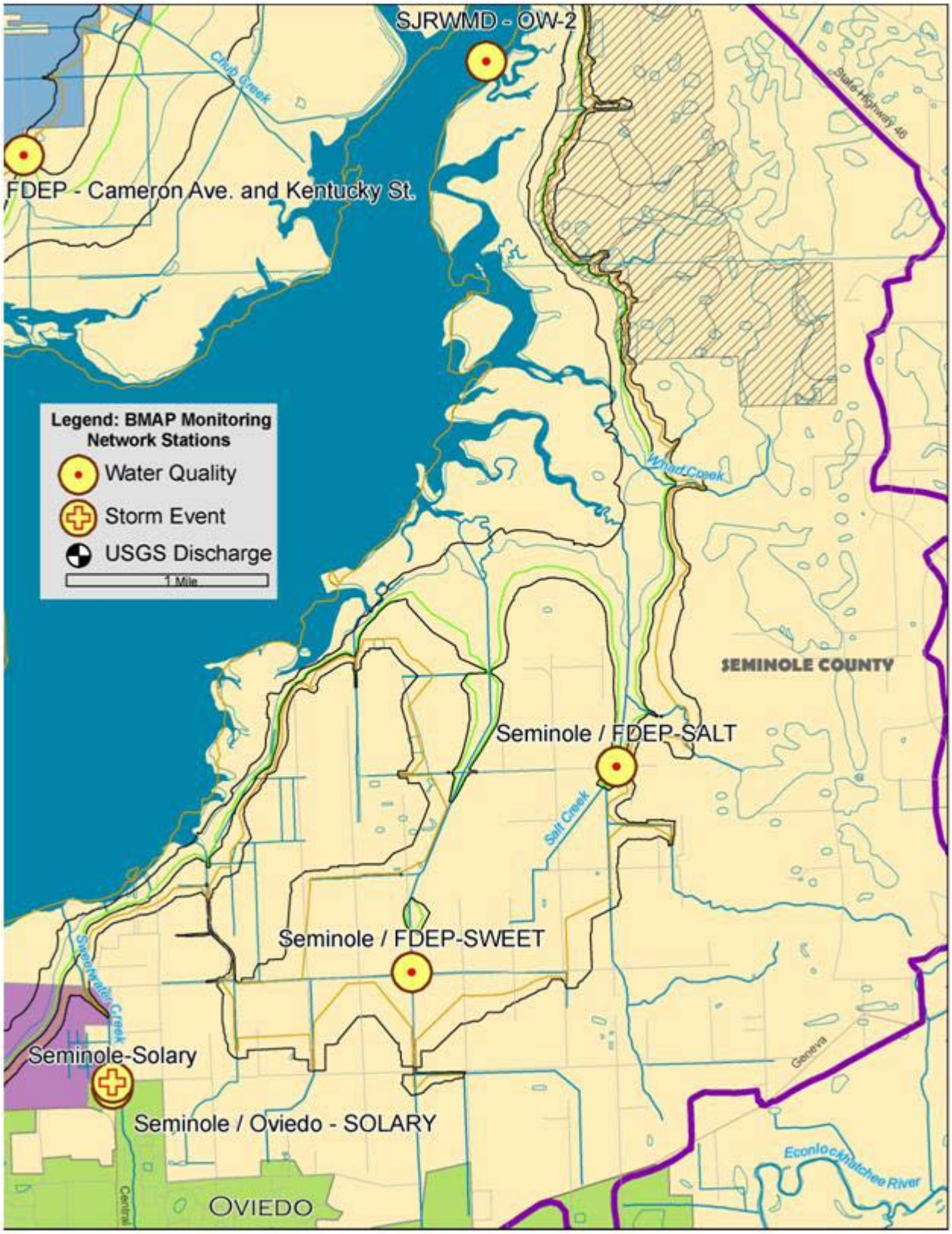


FIGURE 12: MONITORING STATIONS IN SEMINOLE COUNTY AND LAKE JESUP

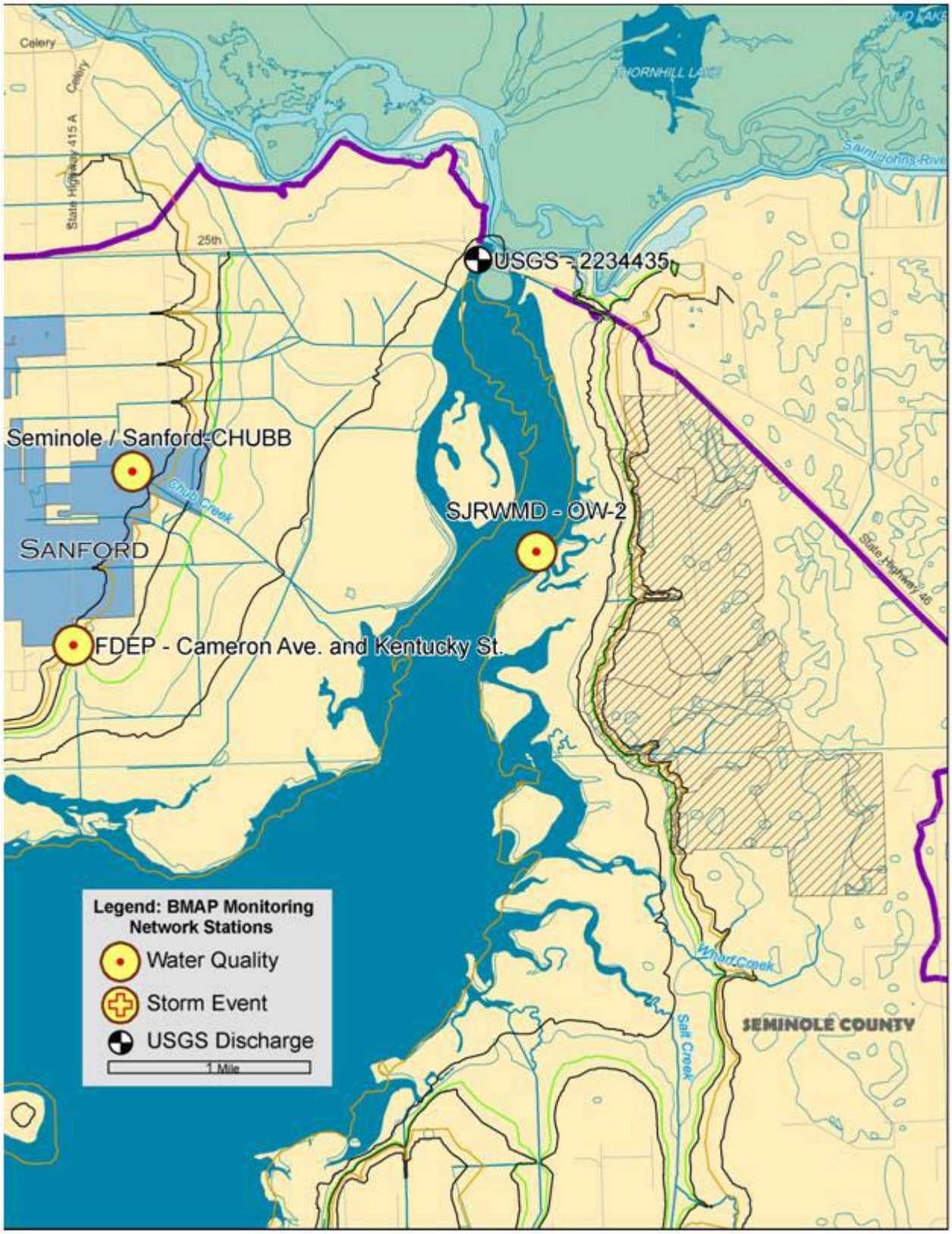


FIGURE 13: MONITORING STATIONS IN LAKE JESUP

TABLE 19: BMAP MONITORING NETWORK

ENTITY	STATION ID	STATION DESCRIPTION	STATION TYPE	SAMPLING FREQUENCY	YEAR SITE ESTABLISHED	SAMPLING PARAMETERS
Casselberry	New station	Gee Creek northeast of Lake Kathryn	Water Quality	Monthly	New	Core and supplemental parameters
FDEP	New Station	Cameron Avenue and Kentucky Street	Water Quality	Monthly	New	Core and supplemental parameters
Lake Mary	Longwood Lake Mary Rd. downstream of culvert	Soldier's Creek Upstream	Water Quality	Monthly	2005	Core and supplemental parameters
Lake Mary	Behind Austin Street upstream of culvert	Soldier's Creek Downstream	Water Quality	Monthly	2005	Core and supplemental parameters
Lake Mary	New station	Outlet of Big Lake Mary	Water Quality	Monthly	New	Core and supplemental parameters
Longwood	New station	Fairy Lake	Water Quality	Monthly	New	Core and supplemental parameters
Maitland	Waumpi	Lake Waumpi	Water Quality	Monthly	2008	Core and supplemental parameters, secchi depth, water depth, coliform, alkalinity, total dissolved solids (TDS), volatile TSS
Orange County	Burkett Canal 2	Lake Burkett Discharge Upstream of Aloma	Water Quality	Monthly	2007	Core and supplemental parameters, flow, discharge, bacteria
Orlando	Rowena Canal	In the canal that connects Lake Rowena to Lake Sue	Water Quality	Monthly	2008	Core and supplemental parameters, volatile TSS, TDS, alkalinity
Seminole County*	HCCB	Howell Creek at County Border	Water Quality	Monthly	2007	Core and supplemental parameters, flow, water depth, coliform
Seminole County/Sanford	NAV	Naval Canal at Pineway	Water Quality	Quarterly/Fill in for monthly	2000	Core and supplemental parameters, secchi depth, water depth, coliform, alkalinity, TDS, volatile TSS, color
Seminole County/Oviedo	SOLARY	Solary Canal	Water Quality	Quarterly/Fill in for monthly	2004	Core and supplemental parameters, secchi depth, water depth, coliform, alkalinity, TDS, volatile TSS, color
Seminole County/Sanford	CHUBB	Chub Creek at E Lake Mary Blvd	Water Quality	Quarterly/Fill in for monthly	2007	Core and supplemental parameters, water depth, flow, coliform, alkalinity, TDS, color, volatile TSS, metals
Seminole County/ Altamonte Springs	PRA	Prairie Lake	Water Quality	Quarterly/Fill in for monthly	1999	Core and supplemental parameters, secchi depth, water depth, coliform, alkalinity, TDS, volatile TSS, color
Seminole County/FDEP	SALT	Salt Creek at Packard Ave.	Water Quality	Quarterly/ Fill in for monthly	2003	Core and supplemental parameters, secchi depth, water depth, coliform, alkalinity, TDS, volatile TSS, color, metals

Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Established	Sampling Parameters
Seminole County/FDEP	SWEET	Sweetwater Creek at Howard Ave.	Water Quality	Quarterly/ Fill in for monthly	2004	Core and supplemental parameters, water depth, flow, coliform, alkalinity, TDS, color, volatile TSS, metals
SJRWMD	T-3	Six Mile Creek at Sanford Ave Canal NE of LJ	Water Quality	Monthly	1995	Core and supplemental parameters, metals
SJRWMD	T-5	Howell Creek Delta on SW end of LJ	Water Quality	Monthly	1995	Core and supplemental parameters, metals
SJRWMD	T-8	Gee and Soldier Creek Delta west of LJ	Water Quality	Monthly	1995	Core and supplemental parameters, metals
SJRWMD	OW-2	LJ off Grassy Point	Water Quality	Monthly	1995	Core and supplemental parameters, metals, light attenuation, plankton
SJRWMD	OW-4	LJ W of bridge betwn Whites Lndg & Bird Island	Water Quality	Monthly	1995	Core and supplemental parameters, metals, light attenuation, plankton
SJRWMD	OW-6	LJ off center of Far W Arm	Water Quality	Monthly	1995	Core and supplemental parameters, metals, light attenuation, plankton
Winter Park	Weir at Howell Branch Rd	10' Upstream of Weir at Howell Branch Road	Water Quality	Monthly	1995	Core parameters
Seminole County	Howell	Howell Creek at W SR 434	Storm	Storm	2000	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
Seminole County	Solary	Solary Canal at Deleon Street	Storm	Storm	2001	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
Seminole County	Gee	Gee Creek at SR 434	Storm	Storm	2000	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
Seminole County	Soldier	Soldiers Creek at SR 419	Storm	Storm	2000	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
Seminole County	Six	Six Mile Creek at Myrtle Street	Storm	Storm	2000	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
USGS	2234308	Howell Creek Near Altamonte Springs FL	Flow	60min	1996	Gage height, discharge
USGS	2234324	Howell Creek near Slavia FL	Flow	60min	1972	Gage height, discharge
USGS	2234344	Howell Creek at State HWY 434 near Oviedo FL	Flow	60min	1973	Gage height, discharge
USGS	2234384	Soldier Creek near Longwood FL	Flow	60min	1972	Gage height, discharge
USGS	2234400	Gee Creek near Longwood FL	Flow	60min	1972	Gage height, discharge
USGS	2234435	Lake Jesup outlet near Sanford FL	Flow	15min	1941	Gage height, velocity, discharge

*Note: Casselberry will help fund some of the sampling at the Lake Howell site (see Appendix F).

5.1.3.2 Storm Event Sampling

The event-based sampling will occur after storm events to provide information on what pollutant loads are entering the tributaries due to high runoff conditions. This information will be important to help calibrate the model for the next iteration of the TMDL and BMAP. The majority of the storm event data will be collected by Seminole County. They have operated and maintained permanent storm event monitoring stations on the five major tributaries to Lake Jesup, which include Six Mile Creek, Soldiers Creek, Howell Creek, Gee Creek, and Solary (Sweetwater) Canal. Each station is located at or near the downstream end of the subbasin, as close to the confluence with the lake as is structurally possible. All of the storm event sites have been in operation since 2000, with the exception of the Gee Creek site which came online in 2001. Seminole County will continue to monitor these stations as part of the BMAP network (see **Table 19**).

5.1.3.3 Performance-Based Monitoring

Measuring the effectiveness of specific BMPs in reducing target pollutant loads is a secondary objective of the monitoring strategy. Specific stations have not been identified at this time. As part of the BMAP implementation and follow-up process, BWG members will identify opportunities for BMP-specific monitoring on a project-by-project basis. This will involve individual entities monitoring the impacts of one of the BMPs included in their management actions identified in the BMAP. Although this is not feasible for every BMAP project, a few carefully selected monitoring efforts would provide important data on the effectiveness of individual BMPs. Performance-based monitoring will occur on an as-needed basis as resources allow, as determined by the project sponsor. The data collected through this type of targeted monitoring will be used during BMAP evaluations to analyze the effectiveness of specific BMPs and adjust the implementation strategy, as appropriate. Performance-based monitoring will apply the same set of core parameters identified in **Table 17** and the appropriate supplemental parameters. In addition, the Florida Stormwater Association (FSA) has ongoing studies on the effectiveness of stormwater BMPs. Available information from these studies will be considered during the next BMAP iteration to help determine project credit.

5.1.3.4 Site 10 Monitoring

The City of Sanford has agreed to modify their existing monitoring on Site 10 to provide the information needed for the TMDL modeling in the next iteration. The Site 10 monitoring plan has been incorporated into the Sanford WWTF permit. The monitoring plan was added as a permit requirement to aid in enforceability because Site 10 was not included in the current TMDL model. However, future iterations of the TMDL will include the loading from this site based on the results of this monitoring. It is important to note that the sampling locations described below are not included in the BMAP monitoring network maps in **Section 5.1.3.2**. The Site 10 monitoring plan consists of three components: (1) groundwater; (2) storm event; and (3) in-lake sampling.

The City of Sanford currently has 13 groundwater monitoring stations. As part of the updated monitoring plan, Sanford will add two new stations on the western portion of the site and will add TP as a sampling parameter to the groundwater wells. In addition, FDEP has agreed to allow Sanford to remove several existing wells in the citrus groves where there is a large cluster of wells, which will help offset the cost associated with the new wells. **Figure 14** shows the locations of the groundwater wells on Site 10 (CDM, 2009).

Sanford is also adding a storm event sampler upstream of Pond B-2 (see **Figure 15**). This location was selected because it is the only area that has continuous streamflow; therefore, a sampler in this area could also provide data for base flow. In addition, this location is in an area that can be accessed by staff to collect the samples. The city will also consider moving the storm event sampler after one to two years of sampling near Pond B-2 to capture events in other areas of the site, if needed (CDM, 2009).

For the in-lake sampling, Sanford will rely on existing monitoring conducted by SJRWMD and Lakewatch. The two closest sampling locations near Site 10 are: (1) station 44055, which has been routinely monitored by the SJRWMD since 1995; and (2) Jesup North-Seminole, which is a Lakewatch station and has been routinely sampled since 2001 (see **Figure 16**). Both of these stations include nutrients in the sampled parameters. Sanford will coordinate with SJRWMD and Lakewatch to ensure these stations are continued to be sampled and to obtain the water quality data (CDM, 2009).

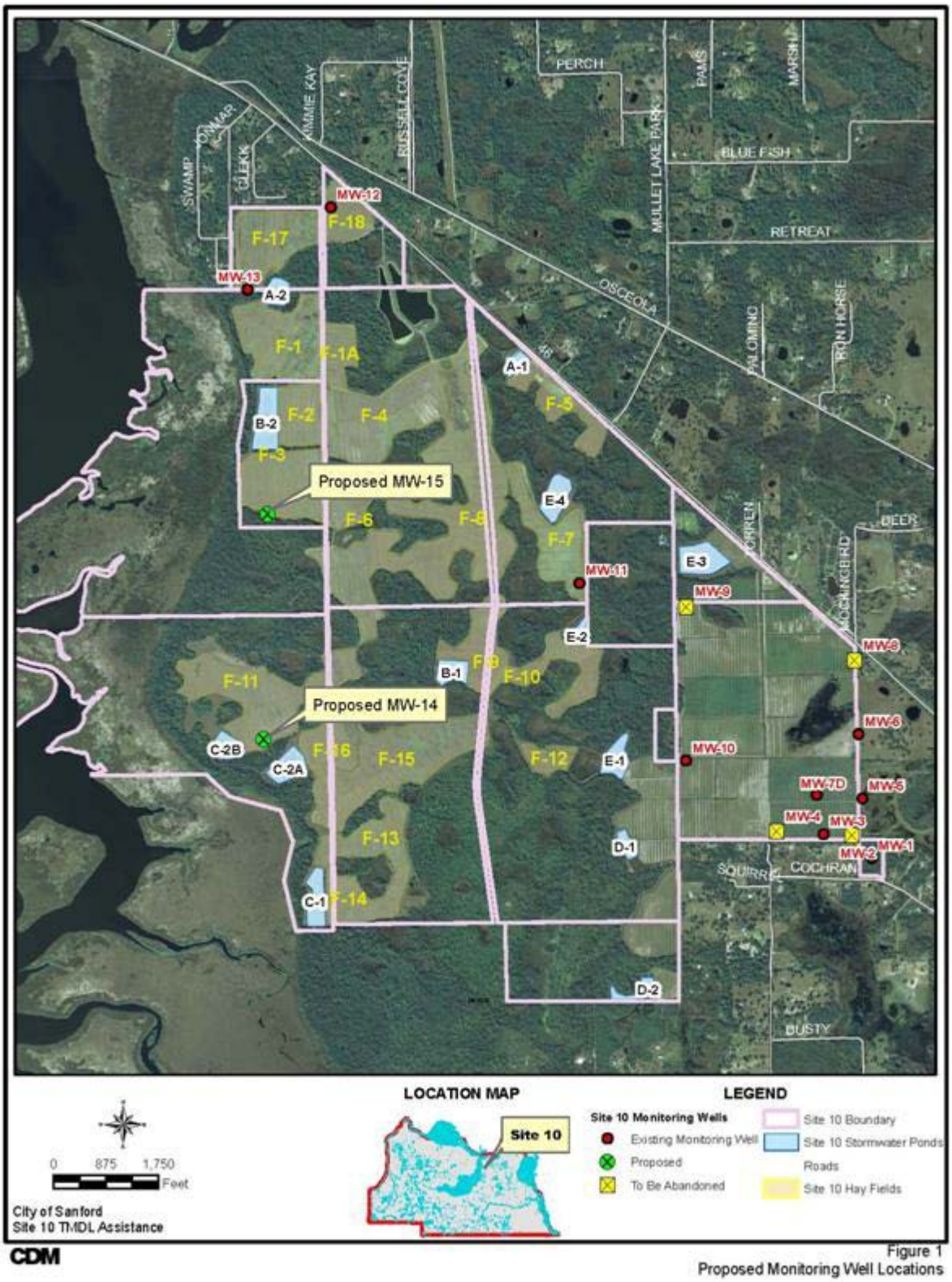


FIGURE 14: LOCATIONS OF SITE 10 GROUNDWATER MONITORING WELLS

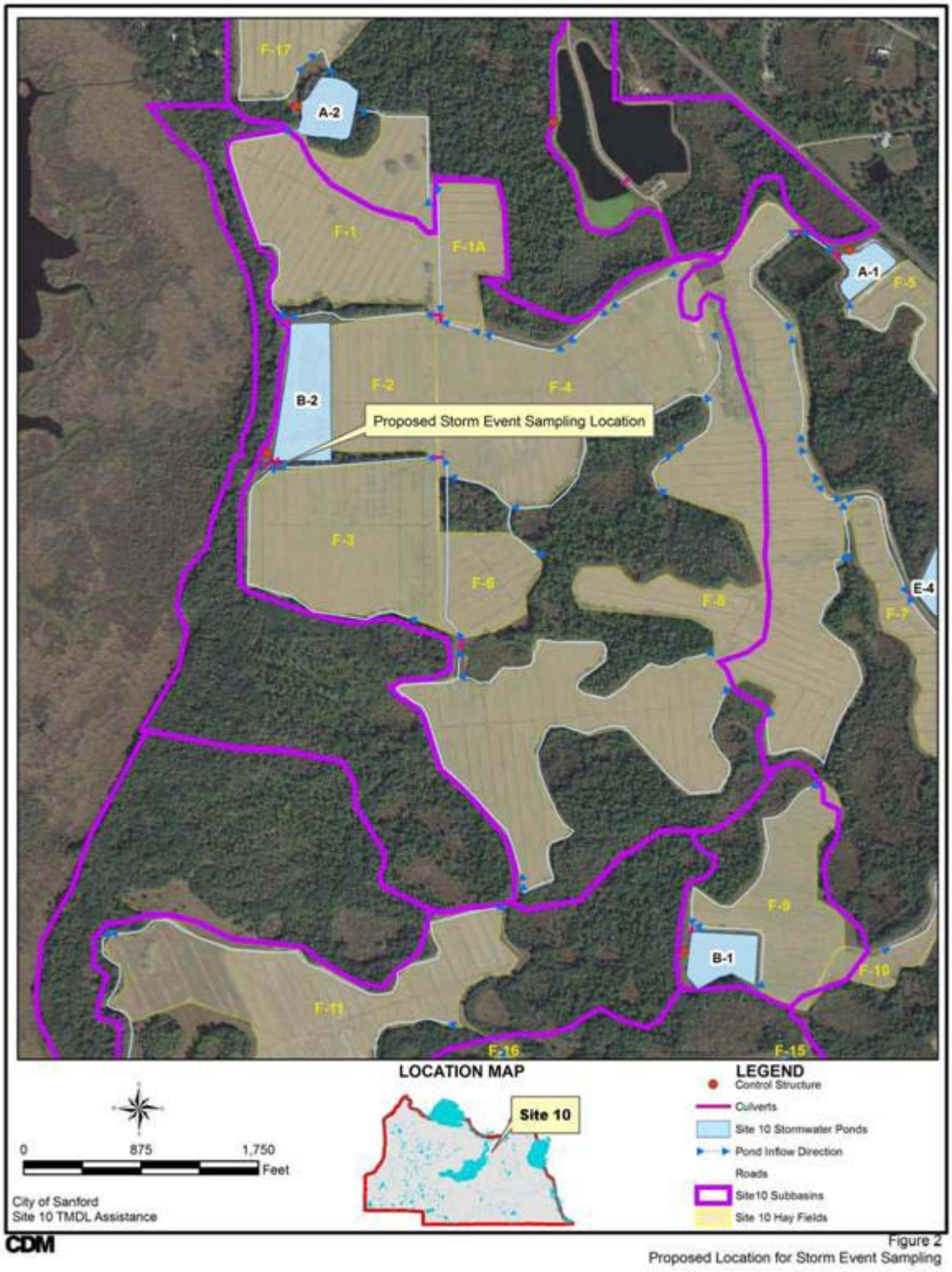


FIGURE 15: LOCATION OF THE SITE 10 STORM EVENT SAMPLING SITE

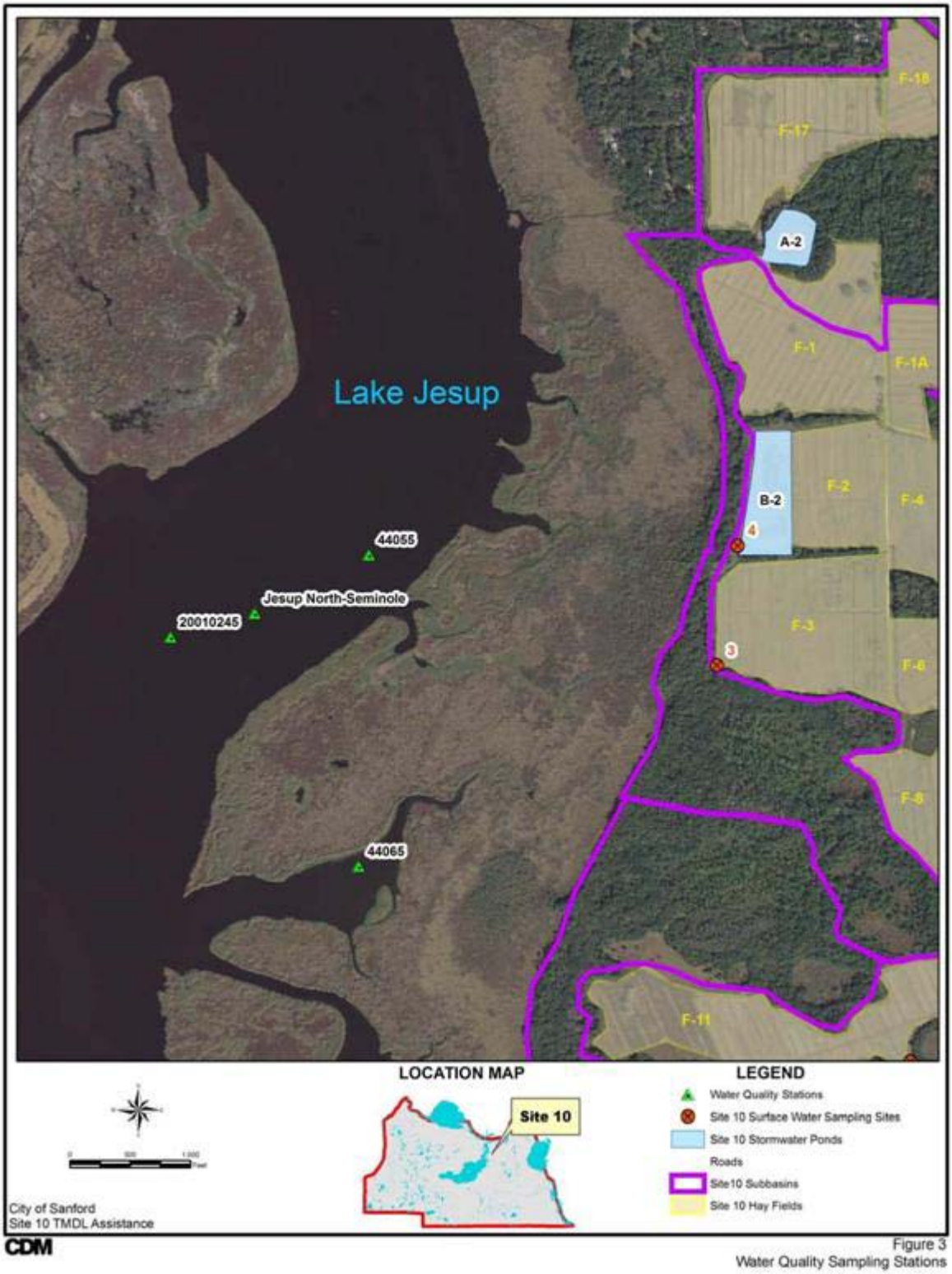


FIGURE 16: LOCATIONS OF IN-LAKE SAMPLING NEAR SITE 10

5.1.4 Data Management and Assessment

The Florida STORET database serves as the primary repository of ambient water quality data for the state of Florida. FDEP pulls water quality data used for impaired water evaluations and TMDL development directly from the STORET database. Ambient water quality data collected as part of the BMAP will be uploaded into STORET for long-term storage and availability. SJRWMD, FDEP, and local stakeholders currently upload water quality data into STORET. All BMAP data providers have agreed to upload ambient water quality data to STORET at least once every six months, upon completion of the appropriate quality assurance/quality control (QA/QC) checks. Local stakeholders will also use their existing water atlas platforms to store and disseminate data. Seminole County, Altamonte Springs, Casselberry, Lake Mary, Longwood, Oviedo, Sanford, Winter Springs, and SJRWMD support the Seminole County Water Atlas (http://www.seminole.wateratlas.usf.edu/). Orange County, Apopka, Belle Isle, Maitland, Orlando, Winter Garden, Winter Park, and the Valencia Water Control District support the Orange County Water Atlas (http://www.orange.wateratlas.usf.edu/; note that not all these jurisdictions are within the Jesup watershed).

Ambient flow conditions will also be monitored as part of this BMAP. Although instantaneous flow data can be uploaded, the STORET database is not equipped to handle high-frequency flow data. Flow data collected by USGS is stored in the Real-Time Water Database, accessible on the web (http://waterdata.usgs.gov/nwis/rt).

Data on biological parameters (e.g. SCI, algae speciation) will be collected at the stations noted in **Appendix F**. As with high-frequency flow data, the STORET database is not equipped to store biological data. Stakeholders agree to provide this data to other BMAP partners upon request and when appropriate for inclusion in BMAP data analyses and adaptive management evaluations.

Storm event data and possibly performance-based data for individual projects will be collected as part of this BMAP. Because these types of data are not representative of ambient water quality conditions, it is inappropriate to store this data in STORET. Storm event and performance-based data will be maintained by the entity that collected the samples. Stakeholders agree to provide this data to other BMAP partners upon request and when appropriate for inclusion in BMAP data analyses and adaptive management evaluations.

The water quality data will be analyzed after four years of BMAP implementation to determine trends in water quality in the lake and to assess attenuation in the basin. A wide variety of statistical methods are available for 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; however, the BWG will use commonly accepted methods of data analysis that are consistent with the TMDL model.

5.1.5 Quality Assurance/Quality Control

Through cooperation on TMDL-related data collection, the SJRWMD, FDEP, and stakeholders have used similar standard operating procedures (SOPs) for field sampling and lab analyses. This will continue into the future to ensure that data can be used not only for tracking BMAP progress but also for future TMDL evaluations and other purposes. The collection of water quality data will be conducted in a manner consistent with FDEP's SOPs for QA/QC. The most current version of these procedures can be downloaded from www.dep.state.fl.us/labs/qa/sops.htm. All stakeholders contributing data in support of the

BMAP agree to follow these SOPs. For BMAP-related data analyses, entities should use National Environmental Laboratory Accreditation Conference (NELAC) certified labs or other labs that meet the certification and other requirements outlined in the SOPs.

SJRWMD staff and contractors collect, process, and preserve samples according to the SJRWMD's Standard Operating Procedures for the Collection of Surface Water Quality Samples and Field Data–Feb. 13, 2004. Where SJRWMD and FDEP SOP's do not correspond to one another, SJRWMD staff and contractors defer to FDEP's SOPs.

5.1.6 Monitoring Network Sufficiency Evaluation

The data collected as part of this monitoring plan are a critical component for re-evaluating the TMDL in five years. For the next iteration of the TMDL, a new model, the Hydrologic Simulation Program – FORTRAN (HSPF) model originally developed by EPA, will be used. The HSPF model in the next iteration will build upon previous modeling done by SJRWMD in this basin. Compared to the existing model, the SJRWMD HSPF model has a more detailed watershed loading calculation process, which allows the model to be calibrated using data from each sampling event. The HSPF model also addresses the in-stream assimilation of nutrients and, therefore, attenuation in the watershed and receiving water. In addition, the HSPF model will include both the watershed loading and in-lake process components in one model.

While the HSPF model has the ability to provide more detailed basin information than the current TMDL model, the results are dependent on the quantity and quality of the water quality data. At least four years of bimonthly or monthly data will be collected for the parameters listed in **Table 17** at each of the BMAP stations. The monitoring sites included in the BMAP monitoring network were selected to provide loading information for individual jurisdictions or subbasins (based on the preferences of the stakeholders) to determine load attenuation throughout the basin. Based on these considerations, the BMAP monitoring network is sufficient to meet the minimum data requirements for the model for the next iteration of the TMDL.

5.2 Research Priorities

Several entities in the basin have completed research projects or are currently implementing studies that will provide information to address the current unknowns in the basin (refer to **Section 2.4**). The projects, sponsors, research objectives, and information gaps addressed are shown in **Table 20**. The status and results of each study will be discussed at the annual BMAP progress report meetings. In addition, these discussions will identify how the study results will be used in an adaptive management context for future iterations of the BMAP. The applicable data from these studies will also be used by FDEP in future re-evaluation of the TMDL.

Table 20: Research Projects in the Lake Jesup Basin

Information Gap Addressed	Research Objective	Project Description	Project Sponsor(s)	Location	Timeline	Key Deliverables
Nitrogen-fixation	Quantify nitrogen-fixation	In-situ nitrogen-fixation study.	Seminole County	Lake Jesup	Completed 2006	Actual nitrogen-fixation rates studied during the peak annual season (i.e. worst case scenario).

Information Gap Addressed	Research Objective	Project Description	Project Sponsor(s)	Location	Timeline	Key Deliverables
Nitrogen-fixation	Quantification of nitrogen-fixation load and rates.	One year nitrogen-fixation sampling using several different methods for determining rates and species contributing; included diurnal, daily and seasonal testing.	SJRWMD	Lake Jesup	Final Report 09/30/08	Nitrogen-fixation rates in Lake Jesup and their relationship to environmental factors.
Sediment flux	Quantify flux.	*In situ* sediment flux study.	Seminole County	Lake Jesup	Completed 2006	Actual sediment flux values based on an *in situ* study.
Sediment flux	Assessment of the cycling and compartmentalization of nitrogen and phosphorus in saturated soils, sediments and the water column in Lake Jesup.	One year study to measure and assess the nature of both the downward and potential upward sediment (including organic material) flux within the system on different time scales (from weekly quarterly sampling, to daily sampling) and link transport dynamics with external forces and effects.	SJRWMD	Lake Jesup	Final Report Expected 05/01/10	Cycling and compartmentalization of nitrogen and phosphorus in saturated soils, sediments and the water column.
Groundwater loads	Integrated surface-groundwater modeling Middle St. Johns River Basin.	Phase 1: collect additional baseflow and aquifer water quality data required to complete supportable model results. Phase 2: modeling.	SJRWMD and Seminole County	Lake Jesup primarily, rest of Middle Basin eventually	Phase 1 estimate 10/01/09 Phase 2 TBD	Quantification of groundwater inputs to water bodies along with nutrient concentrations.
Groundwater loads	Determine the actual quality and quantity of surficial groundwater in the lake.	Conduct a seepage study on a large number of sample points throughout the lake to determine surficial groundwater quality and quantity/flow into and out of Lake Jesup.	Seminole County	Lake Jesup	Anticipated by 12/10	Actual surficial groundwater data (quality and quantity) for use in the water quality models; more accurate information.
Watershed loads	Delineate sub-basins where highest nutrients (especially TP) are originating, based on grab samples, in the Howell Creek tributary.	Add three storm event samplers to the Howell Creek sub-basin to better define pollutant loading sources.	Seminole County and SJRWMD	Lake Jesup Basin	12/09	Calculate actual storm event loading along the creek where it enters Seminole County, downstream of Lake Howell, and on Bear Creek just upstream of its confluence with Howell Creek.

Information Gap Addressed	Research Objective	Project Description	Project Sponsor(s)	Location	Timeline	Key Deliverables
Watershed loads	Develop a hydrologic and nutrient budget for Lake Howell.	Develop a detailed hydrologic and nutrient budget using measured data.	Seminole County	Lake Howell	10/09	A detailed hydrologic and nutrient budget for Lake Howell.
Watershed loads	Develop a hydrologic and nutrient budget for Bear Gully Lake.	Develop a detailed hydrologic and nutrient budget using measured data.	Seminole County	Bear Gully Lake	10/09	A detailed hydrologic and nutrient budget for Bear Gully Lake.
Watershed loads	Determine actual pollutant load being discharged from the City of Orlando into remaining Lake Jesup basin.	Determine pollutant loading using continuous elevation monitoring in conjunction with existing stage-discharge curve. Monthly water quality samples being collected.	City of Orlando	Lake Rowena	Ongoing	Actual nutrient load determination for City of Orlando.
Watershed loads	Determine loading from the Lake Charm basin to the Lake Jesup basin.	Determine agricultural loads and residential septic tank loads within basin.	City of Oviedo	Lake Charm	2010-2011	Master Study of Oviedo major stormwater conveyance systems and associated loading, and priority improvements.
Watershed Loads	Determine pollutant load being discharged from Orange County through Lake Burkett.	Determine pollutant load being discharged from Orange County through Lake Burkett from flow/discharge/ water quality data.	Orange County	Lake Burkett	2013	Actual nutrient load determination for Orange County.
Watershed Loads	Add storm event samplers to the Sweetwater Creek and Salt Creek area.	Add storm event samplers to the Sweetwater Creek and Salt Creek area to obtain load estimates for the ungauged portion of the basin.	To be determined	Sweetwater Creek and Salt Creek	To be determined	Storm event sampling will be added to this area if funding becomes available.
Non-contributing areas	Determine if Lake Killarney discharges into the Lake Jesup system via Howell Creek.	Determine if Lake Killarney discharges into the Lake Jesup system via Howell Creek via flow measurements and observations over the next 5 years.	Orange County	Lake Killarney	2014	Determination if Lake Killarney contributes loading to the Lake Jesup Basin.
Non-contributing areas	Determine if Lake Georgia discharges into the Bear Gulley sub-basin of Lake Jesup.	Conduct study to determine if Lake Georgia flows into Lake Jesup system or Econ River.	Orange County	Lake Georgia	2011	Determine if Lake Georgia contributes load to Jesup.

Information Gap Addressed	Research Objective	Project Description	Project Sponsor(s)	Location	Timeline	Key Deliverables
BMP efficiency	Determine feasibility of regional treatment projects suggested as first priorities in the *Lake Jesup Interagency Restoration Strategy.*	Four currently funded: in-lake water column treatment, floating islands as a tributary treatment, alum as an external load reduction, and use of existing wetlands to treat high concentration, low occurrence tributary loads (marsh diversion).	SJRWMD	Lake Jesup	9/30/2010	Feasibility of using alternative treatment processes as regional treatment projects for significant reduction of external loading.
BMP efficiency	Determine actual pollutant load removal for Navy Canal and Cameron Ditch regional stormwater facilities (RSFs); if not achieving anticipated efficiency, what can be done to improve and maximize the pollutant load removal rates.	Determine the actual pollutant load removal rates of two RSF that discharge directly into Lake Jesup.	Seminole County and FDEP	Lake Jesup	12/10	Actual pollutant load removal rates and ways to improve the rates, if necessary.
Septic tanks	Determine exact locations of tanks that meet the Orange County setback of 150 feet.	Determine exact locations of tanks that meet the Orange County setback of 150 feet versus the State Rule of 75 feet from surface waters.	Orange County	Orange County in Lake Jesup Basin	2013	Count of septic tanks in Orange County portion of basin that are setback 150 feet.
Reuse nutrient contributions	Quantify reuse water runoff.	Continue to build spatial model of reuse water using available data; generate empirical data about end use water quality.	SJRWMD	Entire Middle Basin	Initial estimates 03/2010	Empirical and modeling data for runoff of reuse water into Lake Jesup.
Model refinement	QUAL2K model.	Development of a more complex water quality model that includes kinetic modules such as sediment flux, groundwater quality, etc.	Seminole County	Lake Jesup	Completed 2006; updated model 10/10	A more detailed water quality model with improved existing conditions and predictive capabilities. Update utilizing additional data and information from Lake Apopka and Seminole County.

5.3 Adaptive Management Measures

Adaptive management involves setting up a mechanism for making course corrections in the BMAP when circumstances change or feedback indicates a more effective strategy is needed. Adaptive management measures include:

- Procedures to determine whether additional cooperative strategies are needed.
- Criteria/process for determining whether and when plan components need to be revised due to changes in costs, environmental impacts, social effects, watershed conditions, or other factors.
- Descriptions of what the role of the BWG will be subsequent to BMAP completion.

Tracking implementation, monitoring water quality and pollutant loads, and periodic BWG meetings to share information and expertise are key components of adaptive management. The information the BWG receives from implementation tracking and water quality monitoring will help the group decide what changes to the BMAP are needed to ensure that the TMDLs for the basin are achieved.

The BWG will meet annually to review project status and water quality conditions in Lake Jesup. At this time, available information will be used to evaluate projects and monitoring efforts. Modifications from the original BMAP may occur at that time, if conditions warrant. For example, if a more feasible and/or effective alternative to a particular project listed in the original BMAP is found and proposed by a stakeholder as a substitute, such modifications to the project list may be made at these annual meetings. FDEP will also distribute an annual implementation report (refer to example in **Table 21**) to stakeholders for their review and input. This information and a periodic water quality trend analysis will form the basis of the annual review meetings.

5.3.1 Annual Assessment of Management Actions

FDEP and stakeholders will organize the monitoring data and project implementation status and present this information to the BWG in an annual report. The BWG has agreed to meet at least once every 12 months after the adoption of the BMAP in order to follow up on plan implementation, share new information, and continue to coordinate on TMDL-related issues. The types of activities that may occur at the annual meetings are described below.

Implementation Data and Reporting

- Collect project implementation and/or discharge information from MS4 permit reporting, agricultural NOI reporting, and other sources and compare to the BMAP schedule.
- Review summaries of estimated load reductions based on the data received and comparisons to the TMDL and individual allocations.
- Discuss the data collection process, including any concerns and possible improvements to the process.
- Review of the monitoring plan and research plan implementation as detailed in **Section 5.1** and **Section 5.2**.

Sharing New Information

- Reports on results from water quality monitoring and trend information.
- Reports related to the status of the biological health of the lake.
- Information on new technologies for reducing nutrients.

- Reports of progress on quantifying load reductions from urban stormwater and other nonpoint sources, including information on quantifying nonstructural BMPs and the effects of public education.

Coordination of TMDL-Related Issues

- Updates from FDEP and SJRWMD on the basin cycle and activities related to impairments, TMDLs, PLRGs, and BMAPs.
- Reports from other basins where tools or other information may be informative to the Lake Jesup TMDLs.

It is not required that all of these topics be covered during the annual BWG meetings. These topics are provided as examples of the types of information that should be considered for the agenda to assist with BMAP implementation and coordination among the agencies and stakeholders.

The activities planned as part of this BMAP are shown in **Figure 17** and will be discussed during the annual progress report meetings.

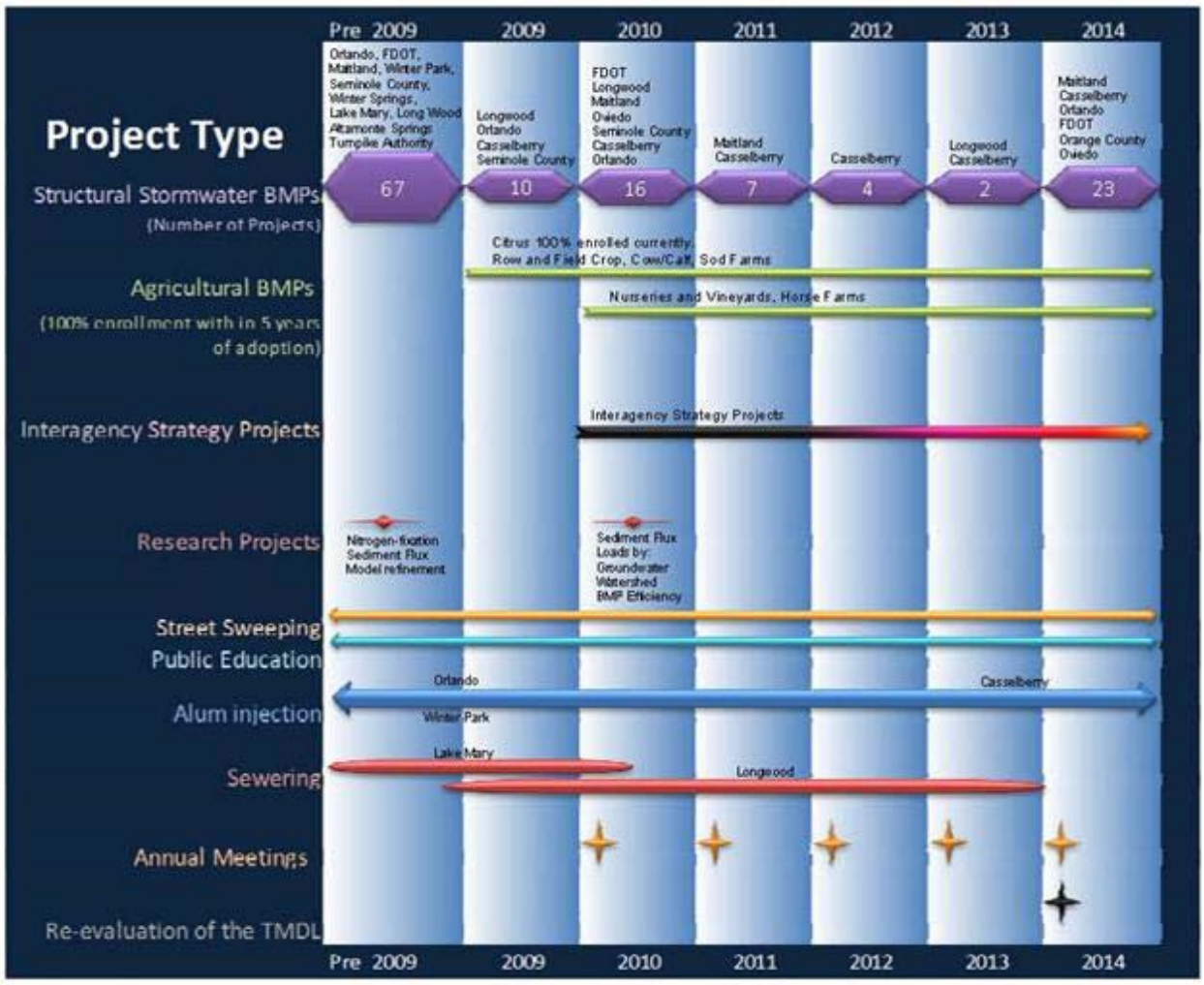


FIGURE 17: BMAP ACTIVITIES IMPLEMENTATION TIMELINE

5.3.2 Future Revision of the TMDL and BMAP

As discussed in **Section 2.4**, there are several key uncertainties that were identified during the BMAP process that should be considered in future revisions of the TMDL and BMAP allocations. The information from the research studies and monitoring strategy will provide valuable information to better the understanding of these current issues. The appropriate data will be provided to FDEP for consideration in the re-evaluation of the TMDL, which will occur according to the watershed assessment cycle. Once the TMDL is revised, the BMAP will be revisited and the detailed allocations recalculated. While **Table 4** shows the allocations for each entity for the entire 15-year implementation period based on the current TMDL, these allocations will likely be adjusted in the future.

TABLE 21: DRAFT BMAP ANNUAL REPORTING FORMAT

2010 Lake Jesup Basin Management Action Plan

___YEAR__ ANNUAL IMPLEMENTATION REPORT

REPORTING ENTITY: _____ **DATE**: _____

Note: Relevant MS4 activities, whether contained in the BMAP or not, may be included in this report.

IMPLEMENTATION STATUS – BMAP MANAGEMENT STRATEGIES

[1] BMAP PROJECT #	AFFECTED AREA	[2] BRIEF DESCRIPTION	[3] PROJECTED START/END	[4] PROJECT/ACTIVITY STATUS	[5]TP REMOVAL ESTIMATE (TOTAL)	[5]TP REMOVAL ESTIMATE (INTERIM)	[6] PROJECT MONITORING RESULTS	[7] COMMENTS

NEW MANAGEMENT STRATEGIES

[1] BMAP PROJECT #	AFFECTED AREA	[2] BRIEF DESCRIPTION	[3] PROJECTED START/END	[4] PROJECT/ACTIVITY STATUS	[5]TP REMOVAL ESTIMATE (TOTAL)	[5]TP REMOVAL ESTIMATE (INTERIM)	[6] PROJECT MONITORING RESULTS	[7] COMMENTS

Directions for BMAP Annual Reporting Format (Draft):

[1] **BMAP Projects**: This includes projects and other management strategies. Use the project number assigned in the BMAP Projects/Activities Table (e.g., A-1). Please include all management strategies for which you have lead responsibility in the BMAP, regardless of their status. **New Management Strategies**: Include new projects/activities that are not included in the BMAP in the New Management Strategies table. Create a project number for new management strategies by using the prefix, then -N# (e.g., A-N1).

[2] Include a brief description of the management action being reported (e.g., street sweeping removing gross debris on all streets with "L curbs" - 5 miles performed each month).

[3] If applicable, include the start and end dates for the management action. If not applicable, put “N/A” or, if it is a continuous activity, put “Continuous” and indicate how often the activity takes place (e.g., for street sweeping).

[4] Give a clear summary of the status of the management action, in a way that makes sense for the item listed. For instance, for educational activities, list pertinent publications, events, etc., including name and/or topic for each. Include specific or general timeframes (e.g., 2 public workshops on lawn fertilizer in September 2010). Also, describe any significant changes to the management action that have taken place

[5] Provide total and interim (to date) TP removal estimates, if available. Include removal estimate units (e.g., lbs/yr). Note whether the estimates are different from those contained in the BMAP for the specific management action.

[6] As Applicable: If monitoring is required as part of a management action (e.g., in a cost-share situation), or is conducted voluntarily (e.g., as part of an effort to collect BMAP effectiveness information) include the monitoring results to date, as practicable.

[7]Include comments on any implementation obstacles, including weather, funding, technical difficulties, etc. Identify needs for assistance from the BWG as a whole, or from individual entities represented on the BWG. Include any other comments you consider important.

CHAPTER 6: COMMITMENT TO PLAN IMPLEMENTATION

Section 403.067(7), F.S., lays out the mechanisms for BMAP implementation *(*see **Appendix B***)*. While the BMAP is linked by statute to permitting and other enforcement processes that target individual entities, successful implementation requires that local stakeholders willingly and consistently work together to achieve adopted TMDLs. This collaboration fosters the sharing of ideas, information, and resources. The members of the Lake Jesup BWG have demonstrated their willingness to confer with and support each other in their efforts.

The BWG members provided endorsement of the BMAP at their January 14, 2010 meeting on behalf of the entities they represent since they have been actively involved in the BMAP process. In addition to this endorsement, FDEP has asked for letters of commitment or resolutions of support for the BMAP from the entities to ensure that as staff and board members change over time, the entity has a way to show support for the BMAP and the efforts included. This process will occur concurrently with BMAP adoption. Written statements of commitment that have been provided are included below and additional statements will be added to this chapter of the BMAP as they are received.

Altamonte Springs
225 Newburyport Avenue
Altamonte Springs, Florida 32701-3697

March 25, 2010

The Honorable Michael W. Sole
Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 49
Tallahassee, FL 32399

RE: Letter of Commitment to Support Plan Implementation

Dear Secretary Sole,

Please accept this letter as the City of Altamonte Springs' written support of the Lake Jesup Basin Management Action Plan (BMAP). As an active member of the Lake Jesup Basin Working Group (BWG), our representative voted to endorse the BMAP on January 14, 2010. By endorsing this plan, the City agrees to the following actions:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load related pollutant load reductions and water quality improvements;
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured;
- Track the implementation of management actions for which we are responsible to assure that the BMAP is carried out, pursuant to the process agreed upon by the BWG;
- Identify and advise the Florida Department of Environmental Protection and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding and legal obstacles;
- Assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG, as appropriate;

March 25, 2010

The Honorable Michael W. Sole
Secretary
Florida Department of Environmental Protection

RE: Letter of Commitment to Support Plan Implementation

Page two

- Continue to communicate and coordinate actions and funding across community organizations, agencies and programs with regard to BMAP implementation.

Sincerely,

William R. Baer
Director, Public Works and Utilities
City of Altamonte Springs
225 Newburyport Avenue
Altamonte Springs, FL 32701
WRBaer@altamonte.org
407-571-8340

Altamonte Springs
225 Newbury Avenue
Altamonte Springs, Florida 32701-3697

March 25, 2010
The Honorable Michael W. Sole
Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Station 49
Tallahassee, FL 32399

RE: Letter of Commitment to Support Plan Implementation

Dear Secretary Sole,

Please accept this letter as the City of Altamonte Springs' written support of the Lake Jesup Basin Management Action Plan (BMAP). As an active member of the Lake Jesup Basin Working Group (BWG), our representative voted to endorse the BMAP on January 14, 2010. By endorsing this plan, the City agrees to the following actions:

- Support of the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load related pollutant load reductions and water quality improvements;
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured;
- Track the implementation of management actions for which we are responsible to assure that the BMAP is carried out, pursuant to the process agreed upon by the BWG;
- Identify and advise the Florida Department of Environmental Protection and the BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding and legal obstacles;
- Assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG, as appropriate;
- Continue to communicate and coordinate actions and funding across community organizations, agencies and programs with regard to BMAP implementation.

Sincerely,
William R. Baer
Director, Public Works and Utilities
City of Altamonte Springs
225 Newburyport Avenue
Altamonte Springs, FL 32701
WRBaer@altamonte.org
407-571-8340

RESOLUTION 10-2127

"A RESOLUTION OF THE CITY OF CASSELBERRY, FLORIDA, PROVIDING SUPPORT OF THE LAKE JESUP BASIN MANAGEMENT ACTION PLAN PROPOSED BY FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION; PROVIDING FOR CONFLICTS, SEVERABILITY, AND EFFECTIVE DATE."

WHEREAS, the City of Casselberry contributes pollutant loads to the Lake Jesup watershed via stormwater runoff and is therefore a stakeholder in its watershed planning; and

WHEREAS, in 2006, the City of Casselberry began participating in multi-jurisdictional efforts to create the Lake Jesup Basin Management Action Plan (BMAP); and

WHEREAS, the proposed BMAP will address needed pollutant load reductions related to the Total Maximum Daily Load (TMDL) previously established for Lake Jesup; and

WHEREAS, the BMAP acknowledges technical uncertainties, provides flexibility, and includes a plan to gather additional data and further refine load allocations during its next iteration; and

WHEREAS, City staff have reviewed the proposed BMAP and find it to be reasonable and consistent with the City's adopted Stormwater, Lakes Management, and Water Quality Master Plan.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF CASSELBERRY, FLORIDA, AS FOLLOWS:

SECTION I. The City Commission of the City of Casselberry hereby approves the Lake Jesup Basin Management Action Plan Statement of Commitment to Support Plan Implementation (attached as "Exhibit A"), and authorizes the Mayor to execute said document on behalf of the City.

SECTION II. Conflicts. All Resolutions or parts of Resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

SECTION III. Severability. If any Section or portion of a Section of this Resolution proves to be invalid, unlawful, or unconstitutional, it shall not be held to invalidate or impair the validity, force, or effect of any other Section or part of this Resolution.

SECTION IV. Effective Date. This Resolution shall become effective immediately upon its passage and adoption.

PASSED and **ADOPTED** this 8th day of March, AD 2010.

ATTEST:

Donna G. Gardner
City Clerk

Charlene Glancy
Mayor/Commissioner

Exhibit 'A'

LAKE JESUP BASIN MANAGEMENT ACTION PLAN
2010

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, their organizations will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.
- Subject to available funding mechanisms and available, reasonable funding levels, support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- To the extent of available funds and pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise the Florida Department of Environmental Protection (FDEP) and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

Organization: City of Casselberry

Authorized Name/Title: Charlene Glancy
Charlene Glancy
Mayor/Commissioner

Resolution 10-2127

"A RESOLUTION OF THE CITY OF CASSELBERRY, FLORIDA, PROVIDING SUPPORT OF THE LAKE JESUP BASIN MANAGEMENT ACTION PLAN PROPOSED BY FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION; PROVIDING FOR CONFLICTS, SEVERABILITY, AND EFFECTIVE DATE."

WHEREAS, the City of Casselberry contributed pollutant loads to the Lake Jesup watershed via stormwater runoff and is therefore a stakeholder in its watershed planning; and

WHEREAS, in 2006, the City of Casselberry began participating in multi-jurisdictional efforts to create the Lake Jesup Basin Management Action Plan (BMAP); and

WHEREAS, the proposed BMAP will address needed pollutant load reductions related to the Total Maximum Daily Load (TMDL) previously established for Lake Jesup; and

WHEREAS, the BMAP acknowledges technical uncertainties, provides flexibility, and includes a plan to gather additional data and further refine load allocations during its next iteration; and

WHEREAS, City staff reviewed the proposal BMAP and find it to be reasonable and consistent with the City's adopted Stormwater, Lakes Management, and Water Quality Master Plan.

NOW THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF THE CITY OF CASSELBARRY, FLORIDA, AS FOLLOWS:

SECTION I. The city Commission of the City of Casselberry hereby approved the Lake Jesup Basin Management Action Plan Statement of Commitment to Support Plan Implementation (attached as "Exhibit A"), and authorizes the Mayor to execute said document on behalf of the City.

SECTION II. Conflicts. All resolutions or parts of Resolutions in conflict with any of the provisions of this Resolution are hereby repealed.

SECTION III. Severability. If any Section or portion of a Section of this Resolution proves to be invalid, unlawful, or unconstitutional, it shall not be held to validate or impair the validity, force, or effect of any other Section or part of this Resolution.

SECTION IV. Effective Date. This Resolution shall become effective immediately upon its passage and adoption.

PASSED and ADOPTED this 8th day of March, AD 2010

ATTEST:

Donna G. Gardner	Charlene Glancy
City Clerk	Mayor/Commissioner

Exhibit 'A'

LAKE JESUP BASIN MANAGEMENT ACTION PLAN 2010

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, their organizations will:

- Support of the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily (TMDL)-related pollutant load reductions and water quality improvements;
- Subject to available funding mechanisms and available, reasonable funding levels, support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured;
- To the extent of available funds and pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise the Florida Department of Environmental Protection and the BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding and legal obstacles;
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies and programs with regard to BMAP implementation.

Organization: City of Casselberry

Authorized Name/Title:
Charlene Glancy
Mayor/Commissioner

John C. Litton
City Manager
jlitton@lakemaryfl.com

City of Lake Mary

Incorporated in 1973

LAKE JESUP BASIN MANAGEMENT ACTION PLAN 2010

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, their organizations will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise the Florida Department of Environmental Protection (FDEP) and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

APPROVED BY
CITY COMMISSION
2/18/10

John C. Litton, City Manager
City Lake Mary

www.lakemaryfl.com • Phone: (407) 585-1419 • Fax: (407) 585-1498
CITY HALL, 100 N. Country Club Road, P.O. Box 958445, Lake Mary, FL 32795-8445

City of Lake Mary

LAKE JESUP BASIN MANAGEMENT ACTION PLAN 2010

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, their organizations will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.

- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.

- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.

- Identify and advise the Florida Department of Environmental Protection (FDEP) and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.

- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.

- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

Approved by City Commission 2/18/10

John C. Litton, City Manager
City of Lake Mary

RESOLUTION NUMBER 2010-06

A RESOLUTION OF THE CITY COMMISSION OF WINTER SPRINGS, FLORIDA, AGREEING TO IMPLEMENTATION OF A LAKE JESUP BASIN MANAGEMENT ACTION PLAN; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, Lake Jesup has been verified by the Florida Department of Environmental Protection (FDEP) as impaired for nutrients and unionized ammonia.

WHEREAS, FDEP formally adopted a Total Maximum Daily Load (TMDL) report for Lake Jesup in 2006 which identified the nutrient loading sources and required reductions to meet water quality standards for total phosphorous (TP) and total nitrogen (TN) within the Lake Jesup Basin.

WHEREAS, The Lake Jesup Basin Stakeholders, including the City of Winter Springs, have prepared a Basin Management Action Plan, or BMAP, to reduce the amount of nutrients that caused the verified impairment of Lake Jesup.

WHEREAS, Under the BMAP, entities within the Lake Jesup Basin are required by the Florida Department of Environmental Protection to reduce phosphorous discharges to Lake Jesup from surface waters and/or septic systems by a combined total of approximately 15,000 pounds over the next 15 years.

WHEREAS, The Lake Jesup BMAP contains strategies to implement the Lake Jesup nutrient TMDL through reduction and prevention of pollutant discharges through various means, and the project types contained in the BMAP reflects the array of sources and stakeholder relationships that exist in this complex watershed.

WHEREAS, the Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG), including the City of Winter Springs.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COMMISSION OF WINTER SPRINGS, FLORIDA, AS FOLLOWS:

SECTION I – The City Commission of the City of Winter Springs hereby agrees that the City of Winter Springs will:

a. Agree to the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.

b. Agree to pursue the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.

c. Pursuant to the process agreed upon by the Basin Working Group, track the implementation of management actions for which the City is responsible to assure that the BMAP is carried out.

d. Identify and advise the Florida Department of Environmental Protection (FDEP) and Basin Working Group of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.

e. As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the Basin Working Group.

f. Continue to communicate and coordinate actions across community organizations, agencies, and programs with regard to BMAP implementation.

SECTION II – The City Clerk of the City of Winter Springs is hereby directed to send copies of this Resolution to FDEP and all other persons as directed by the Mayor and City Commission.

SECTION III - This Resolution shall take effect immediately upon adoption by the City Commission.

Passed and adopted this 8th day of February, 2010.

CITY OF WINTER SPRINGS, FLORIDA

John F. Bush

JOHN F. BUSH, MAYOR

ATTEST:

ANDREA LORENZO-LUACES, CITY CLERK

City of Winter Springs, Florida
Resolution Number 2010-06
Page 3 of 3

RESOLUTION NUMBER 2010-06

A RESOLUTION OF THE CITY COMMISSION OF WINTER SPRINGS, FLORIDA, AGREEING TO IMPLEMENTATION OF A LAKE JESUP BASIN MANAGEMENT ACTION PLAN; AND PROVIDING FOR AN EFFECTIVE DATE

WHEREAS, Lake Jesup has been verified by the Florida Department of Environmental Protection (FDEP) as impaired for nutrients and unionized ammonia.

WHEREAS, FDEP formally adopted a Total Maximum Daily Load (TMDL) report for Lake Jesup in 2006 which identified the nutrient loading sources and required reductions to meet water quality standards for total phosphorus (TP) and total nitrogen (TN) within the Lake Jesup Basin.

WHEREAS, The Lake Jesup Basin Stakeholders, including the City of Winter Springs, have prepared a Basin Management Action Plan, or BMAP, to reduce the amount of nutrients that caused the verified impairment of Lake Jesup.

WHEREAS, Under the BMAP, entities within the Lake Jesup Basin are required by the Florida Department of Environmental Protection to reduce phosphorus discharges to Lake Jesup from surface waters and/or septic systems by a combined total of approximately 15,000 pounds over the next 15 years.

WHEREAS, The Lake Jesup BMAP contains strategies to implement the Lake Jesup nutrient TMDL through reduction and prevention of pollutant discharges through various means, and the project types contained in the BMAP reflects the array of sources and stakeholder relationships that exist in this complex watershed.

WHEREAS, the Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG), including the City of Winter Springs.

NOW, THEREFORE BE IT RESOLVED BY THE CITY COMMISSION OF WINTER SPRINGS, FLORIDA, AS FOLLOWS:

SECTION I – The City Commission of the City of Winter Springs hereby agrees that the City of Winter Springs will:

a. Agree to the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.

b. Agree to pursue the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.

c. Pursuant to the process agreed upon by the Basin Working Group, track the implementation of management actions for which the City is responsible to assure that the BMAP is carried out.

d. Identify and advise the Florida Department of Environmental Protection (FDEP) and Basin Working Group of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.

e. As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the Basin Working Group.

f. Continue to communicate and coordinate actions across community organizations, agencies, and programs with regard to BMAP implementation.

SECTION II – The City Clerk of the City of Winter Springs is hereby directed to send copies of this Resolution to FDEP and all other persons as directed by the Mayor and City Commission.

SECTION III – This Resolution shall take effect immediately upon adoption by the City Commission.

Passed and adopted this 8th day of February, 2010.

CITY OF WINTER SPRINGS, FLORIDA
John F. Bush, Mayor

ATTEST:
Andrea Lorenzo-Luaces, City Clerk

APPROVED
BY ORANGE COUNTY BOARD
OF COUNTY COMMISSIONERS
FEB 23 2010 JB/NP

RESOLUTION

of the

ORANGE COUNTY BOARD OF COUNTY COMMISSIONERS

regarding

THE LAKE JESUP BASIN MANAGEMENT ACTION PLAN

Resolution No. 2010- M-15

WHEREAS, in an effort to improve water quality, Section 303(d) of the federal Clean Water Act requires the adoption of total maximum daily loads ("TMDLs") of pollutants that may be discharged into impaired surface water bodies in the United States; and

WHEREAS, to implement TMDLs for Florida's impaired water bodies, the Florida Department of Environmental Protection ("FDEP"), along with stakeholders within the watersheds of impaired waters, develops Basin Management Action Plans ("BMAPs"), which are to specify the activities, schedule, and funding sources that pollutant dischargers will undertake to achieve the TMDLs adopted by FDEP for each water body and thereby restore the water body; and

WHEREAS, FDEP has been working closely with Orange County and other stakeholders within the Lake Jesup watershed to develop the Lake Jesup BMAP; and

WHEREAS, on February 23, 2010, the Orange County Board of County Commissioners (the "Board") was briefed by Orange County staff on the current draft of the Lake Jesup BMAP and recognizes that, although there may be some minor revisions to the BMAP before it is adopted by order of the FDEP Secretary, the revisions are not expected to significantly change any fiscal or policy impacts to Orange County.

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

Section 1. The Board supports the continued development and finalization of the use of the Lake Jesup BMAP with the participation of representatives of Orange County.

Section 2. The Board supports the implementation of the Lake Jesup BMAP and intends to seek the necessary approvals and funding to implement the management actions for Orange County identified in the Lake Jesup BMAP.

Section 3. The Board supports Orange County's participation in the coordinated tracking of BMAP implementation, continued coordination with the FDEP and other stakeholders, and revising the BMAP as necessary to ensure the management actions are effective in meeting the TMDLs.

Section 4. The Board endorses a coordinated and comprehensive watershed management approach to address and achieve FDEP-adopted TMDLs for the Lake Jesup watershed.

Section 5. The Board authorizes the Mayor or his designee to represent the Board in reviewing and approving the BMAP preliminary to its adoption by FDEP, provided that such approval will not significantly change any fiscal or policy impacts to Orange County beyond those presented in the February 23, 2010 BMAP briefing of the Board by Orange County staff. In the event the Mayor, his designee, or Orange County staff determine that revisions to the Lake Jesup BMAP, preliminary to its adoption by FDEP, significantly change any fiscal or policy impacts to Orange County, they shall bring the matter to the Board and request further direction before approving the plan.

Section 6. This Resolution shall take effect immediately upon the date of its adoption.

FEB 23 2010

ADOPTED this _____ day of February, 2010.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners

By: _____
Richard T. Crotty
Orange County Mayor

ATTEST: Martha O. Haynie, County Comptroller
As Clerk of the Board of County Commissioners

By: _____
Deputy Clerk

CESD-D-01

RESOLUTION

of the

ORANGE COUNTY BOARD OF COUNTY COMMISSIONERS

regarding

THE LAKE JESUP BASIN
MANAGEMENT ACTION PLAN

Resolution No. 2010-M-15

WHEREAS, in an effort to improve water quality, Section 303(d) of the federal Clean Water Act requires the adoption of total maximum daily loads ("TMDLs") of pollutants that may be discharged into impaired surface water bodies in the United States; and

WHEREAS, to implement TMDLs for Florida's impaired water bodies, the Florida Department of Environmental Protection ("FDEP"), along with stakeholders within the watersheds of impaired waters, develops Basin Management Action Plans ("BMAPs"), which are to specify the activities, schedule, and funding sources that pollutant discharges will undertake to achieve the TMDLs adopted by FDEP for each water body and thereby restore the water body; and

WHEREAS, FDEP has been working closely with Orange County and other stakeholders within the Lake Jesup watershed to develop the Lake Jesup BMAP; and

WHEREAS, on February 23, 2010, the Orange County Board of County Commissioners (the "Board") was briefed by Orange County staff on the current draft of the Lake Jesup BMAP and recognizes that, although there may be some minor revisions to the BMAP before it is adopted by order of the FDEP Secretary, the revisions are not expected to significantly change any fiscal or policy impacts to Orange County.

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF ORANGE COUNTY:

Section 1. The Board supports the continued development and finalization of the use of the Lake Jesup BMAP with the participation of representatives of Orange County.

Section 2. The Board supports the implementation of the Lake Jesup BMAP and intends to seek the necessary approvals and funding to implement the management actions for Orange County identified in the Lake Jesup BMAP.

Section 3. The Board supports Orange County's participation in the coordinated tracking of BMAP implementation, continued coordination with the FDEP and other stakeholders, and revising the BMAP as necessary to ensure the management actions are effective in meeting the TMDLs.

Section 4. The Board endorses a coordinated and comprehensive watershed management approach to address and achieve FDEP-adopted TMDLs for the Lake Jesup watershed.

Section 5. The Board authorizes the Mayor or his designee to represent the Board in reviewing and approving the BMAP preliminary to its adoption by FDEP, provided that such approval will not significantly change any fiscal or policy impacts to Orange County beyond those presented in the February 23, 2010 BMAP briefing of the Board by Orange County staff. In the event the Mayor, his designee, or Orange County staff determine that revisions to the Lake Jesup BMAP, preliminary to its adoption by FDEP, significantly change any fiscal or policy impacts to Orange County, they shall bring the matter to the Board and request further direction before approving the plan.

Section 6. This Resolution shall take effect immediately upon the date of its adoption.

ADOPTED this 23rd day of February, 2010.

ORANGE COUNTY, FLORIDA
By: Board of County Commissioners
By: Richard T. Crotty
Orange County Mayor

ATTEST: Martha O. Haynie, County Comptroller
As Clerk of the Board of County Commissioners

St. Johns River
Water Management District
Kirby B. Green III, Executive Director • David W. Fisk, Assistant Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500
On the Internet at www.sjrwmd.com.

February 16, 2010

The Honorable Mr. Michael Sole, Secretary
The Department of Environmental Protection
3900 Commonwealth Boulevard, M.S. 49
Tallahassee, FL 32399

Re: Draft Lake Jesup Basin Management Action Plan (BMAP)
Statement of Commitment to Support Plan Implementation

Dear Secretary Sole:

FDEP has obtained endorsement of the draft BMAP for the Lake Jesup Basin. Lake Jesup, one of the largest lakes in Central Florida, is impaired by high levels of total nitrogen and total phosphorus (FDEP, Verified Impaired Waters). The focus of the Lake Jesup BMAP requires reductions from external TP sources. The total required reductions are allocated to the responsible entities in the basin.

St. Johns River Water Management District, as a member of the Lake Jesup Basin Working Group, supports the Lake Jesup Basin Management Action Plan, as indicated in the attached Statement of Commitment to Support Plan Implementation.

Sincerely,

Kirby B. Green III
Executive Director

Attachment

KBG/rlm

c. Casey Fitzgerald
Maurice Sterling

LAKE JESUP BASIN MANAGEMENT ACTION PLAN
2010

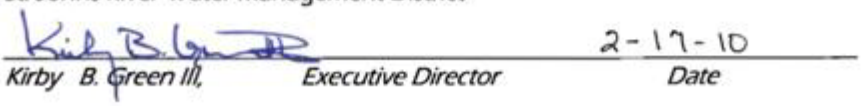
STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, St. Johns River Water Management District will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.
- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.
- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.
- Identify and advise the Florida Department of Environmental Protection (FDEP) and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.
- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.
- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

St. Johns River Water Management District



2-17-10

Kirby B. Green III, Executive Director *Date*

St. Johns River Water Management District

February 16, 2010

The Honorable Mr. Michael Sole, Secretary
The Department of Environmental Protection
3900 Commonwealth Boulevard, M.S. 49
Tallahassee, FL 32399

Re: Draft Lake Jesup Basin Management Action Plan (BMAP)
Statement of Commitment to Support Plan Implementation

Dear Secretary Sole:

FDEP has obtained endorsement of the draft BMAP for the Lake Jesup Basin. Lake Jesup, one of the largest lakes in Central Florida, is impaired by high levels of total nitrogen and total phosphorus (FDEP, Verified Impaired Waters). The focus of the Lake Jesup BMAP requires reductions from external TP sources. The total required reductions are allocated to the responsible entities in the basin.

St. Johns River Water Management District, as a member of the Lake Jesup Basin Working Group, supports the Lake Jesup Basin Management Action Plan, as indicated in the attached Statement of Commitment to Support Plan Implementation.

Sincerely,

Kirby B. Green III
Executive Director

Attachment

KBG/rlm

c. Casey Fitzgerald
Maurice Sterling

LAKE JESUP BASIN MANAGEMENT ACTION PLAN 2010

STATEMENT OF COMMITMENT TO SUPPORT PLAN IMPLEMENTATION

The Lake Jesup Basin Management Action Plan (BMAP) was endorsed on January 14, 2010, by authorized representatives of the agencies and organizations listed as members of the Lake Jesup Basin Working Group (BWG).

The signatories of the BMAP agree that, as applicable, St. Johns River Water Management District will:

- Support the use of an equitable and cost-effective coordinated comprehensive watershed management approach to address and achieve total maximum daily load (TMDL)-related pollutant load reductions and water quality improvements.

- Support the necessary approvals and funding needed to implement the consensus management actions identified in the BMAP, and assist implementation of those actions as required approvals and funding are secured.

- Pursuant to the process agreed upon by the BWG, track the implementation of management actions for which they are responsible to assure that the BMAP is carried out.

- Identify and advise the Florida Department of Environmental Protection (FDEP) and BWG of any issues or concerns that could be obstacles to carrying out management actions identified in the BMAP, including technical, funding, and legal obstacles.

- As appropriate, assist with water quality monitoring according to the BMAP monitoring strategy approved by the BWG.

- Continue to communicate and coordinate actions and funding across community organizations, agencies, and programs with regard to BMAP implementation.

St. Johns River Water Management District

Kirby B. Green III, Executive Director 2-17-10

Appendix A: TMDL Basin Rotation Schedule

TMDLs are developed, allocated, and implemented through a watershed management approach (managing water resources within their natural boundaries) that addresses the state's 52 major hydrologic basins in five groups, on a rotating schedule. **Table A-1** shows the hydrologic basins within each of the five groups, with the DEP District office of jurisdiction. **Table A-2** illustrates the repeating five-year basin rotation schedule.

Table A-1: Major Hydrologic Basins by Group and DEP District Office

DEP District	***Group 1 Basins***	***Group 2 Basins***	***Group 3 Basins***	***Group 4 Basins***	***Group 5 Basins***
NW	Ochlockonee-St. Marks	Apalachicola-Chipola	Choctawhatchee-St. Andrews Bay	Pensacola Bay	Perdido Bay
NE	Suwannee	Lower St. Johns	Not applicable	Nassau-St. Marys	Upper East Coast
Central	Ocklawaha	Middle St. Johns	Upper St. Johns	Kissimmee	Indian River Lagoon
SW	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay-Peace-Myakka	Withlacoochee	Springs Coast
S	Everglades West Coast	Charlotte Harbor	Caloosahatchee	Fisheating Creek	Florida Keys
SE	Lake Okeechobee	St. Lucie-Loxahatchee	Lake Worth Lagoon-Palm Beach Coast	Southeast Coast Biscayne Bay	Everglades

Each group will undergo a cycle of five phases on a rotating schedule:

Phase 1: Preliminary evaluation of water quality
Phase 2: Strategic monitoring and assessment to verify water quality impairments
Phase 3: Development and adoption of TMDLs for waters verified as impaired
Phase 4: Development of basin management action plan (BMAP) to achieve the TMDL
Phase 5: Implementation of the BMAP and monitoring of results

The Middle St. Johns is a Group 2 basin. As such, the Cycle 1 list of verified impaired waters was developed in 2004, and the Cycle 2 update was in 2009. Subsequent TMDL and BMAP development is occurring on a schedule driven by the 1998 303(d) list (see http://www.dep.state.fl.us/water/tmdl/ for more information) and FDEP staff resource availability. FDEP will re-evaluate impaired waters every five years to determine whether improvements are being achieved, and to refine loading estimates and TMDL allocations using new data. If any changes in a TMDL are required, the applicable TMDL rule may be revised. Changes to a TMDL would prompt revisions to the applicable BMAP, which will be revisited at least every five years and modified as necessary, regardless of whether the TMDL is modified.

Appendix B: SUMMARY OF STATUTORY PROVISIONS GUIDING BMAP DEVELOPMENT AND IMPLEMENTATION

SECTIONS 403.067(6) AND (7), FLORIDA STATUTES - *Summary of Excerpts*

ALLOCATIONS

- The TMDL shall include reasonable and equitable allocations of the TMDL between or among point and nonpoint sources that will alone, or in conjunction with other management and restoration activities, provide for the attainment of pollutant reductions established pursuant to paragraph (a) to achieve applicable water quality standards.
- The allocations may establish the maximum amount of the pollutant that may be discharged or released in combination with other discharges or releases.
- Allocations may also be made to individual basins and sources or as a whole to all basins and sources or categories of sources of inflow to the water body or water body segments.
- An initial allocation of allowable pollutant loads may be developed as part of the TMDL; in such cases detailed allocations to specific point sources and categories of nonpoint sources shall be established in the basin management action plan.
- The initial and detailed allocations shall be designed to attain pollutant reductions established pursuant to paragraph (a) and shall be based on consideration of:
    1. Existing treatment levels and management practices;
    2. Best management practices established and implemented pursuant to paragraph (7)(c);
    3. Enforceable treatment levels established pursuant to state or local law or permit;
    4. Differing impacts pollutant sources may have on water quality;
    5. The availability of treatment technologies, management practices, or other pollutant reduction measures;
    6. Environmental, economic, and technological feasibility of achieving the allocation;
    7. The cost benefit associated with achieving the allocation;
    8. Reasonable timeframes for implementation;
    9. Potential applicability of any moderating provisions such as variances, exemptions, and mixing zones; and
    10. The extent to which non-attainment of water quality standards is caused by pollution sources outside of Florida, discharges that have ceased, or alterations to water bodies prior to the date of this act.

GENERAL IMPLEMENTATION

- **DEP is the lead agency** in coordinating TMDL implementation, through existing water quality protection programs.
- **Application of a TMDL by a water management** district does not require WMD adoption of the TMDL.
- **TMDL implementation may include**, but is not limited to:
    - Permitting and other existing regulatory programs
    - Non-regulatory and incentive-based programs
    - Other water quality management and restoration activities, such as Surface Water Improvement and Management (SWIM) plans or **basin management action plans**
    - Pollutant trading or other equitable economically based agreements
    - Public works
    - Land acquisition

BASIN MANAGEMENT ACTION PLAN DEVELOPMENT

- DEP may develop a basin management action plan that addresses some or all of the watersheds and basins tributary to a TMDL waterbody.
- A basin management action plan **shall**:
  - Integrate appropriate management strategies available to the state through existing water quality protection programs.
  - Equitably allocate pollutant reductions to individual basins, all basins, each identified point source, or category of nonpoint sources, as appropriate.
  - Identify the mechanisms by which potential future increases in pollutant loading will be addressed.
  - Specify that for nonpoint sources for which BMPs have been adopted, the initial requirement shall be BMPs developed pursuant to paragraph (c).
  - Establish an implementation schedule.
  - Establish a basis for evaluating plan effectiveness.
  - Identify feasible funding strategies.
  - Identify milestones for implementation and water quality improvement, and an associated water quality monitoring component to evaluate reasonable progress over time.
  - Be adopted in whole or in part by DEP Secretarial Order, subject to chapter 120.
- A basin management action plan **may**:
  - Give load reduction credits to dischargers that have implemented load reduction strategies (including BMPs) prior to the development of the BMAP. (*Note: this assumes the related reductions were not factored into the applicable TMDL*.)
  - Include regional treatment systems or other public works as management strategies.
  - Provide for phased implementation to promote timely, cost-effective actions.
- An assessment of progress in achieving milestones shall be conducted every 5 years and the basin management action plan revised, as appropriate, in cooperation with basin stakeholders, and adopted by secretarial order.
- DEP shall assure that key stakeholders are invited to participate in the basin management action plan development process, holding at least one noticed public meeting in the basin to receive comments, and otherwise encouraging public participation to the greatest practicable extent.
- A basin management action plan shall not supplant or alter any water quality assessment, TMDL calculation, or initial allocation.

BASIN MANAGEMENT ACTION PLAN IMPLEMENTATION

- NPDES Permits
  - Management strategies related to a discharger subject to NPDES permitting shall be included in subsequent applicable NPDES permits or permit modifications when the permit expires (is renewed), the discharge is modified (revised), or the permit is reopened pursuant to an adopted BMAP.
  - Absent a detailed allocation, TMDLs shall be implemented through NPDES permit conditions that include a compliance schedule. The permit shall allow for issuance of an order adopting the BMAP within five years. (***Note**: Intended to apply to individual wastewater permits – not MS4s*)
  - Once the BMAP is adopted, the permit shall be reopened, as necessary, and permit conditions consistent with the BMAP shall be established.
  - Upon request by a NPDES permittee, DEP may establish individual allocations prior to the adoption of a BMAP, as part of a permit issuance, renewal, or modification (revision).
  - To the maximum extent practicable, MS4s shall implement a TMDL or BMAP through the use of BMPs or other management measures.
  - A BMAP does not take the place of NPDES permits or permit requirements.
  - Management strategies to be implemented by a DEP permittee shall be completed

according to the BMAP schedule, which may extend beyond the 5-year term of an NPDES permit.
    - Management strategies are not subject to challenge under chapter 120 when they are incorporated in identical form into a NPDES permit or permit modification (revision).
- Management strategies assigned to nonagricultural, non-NPDES permittees (state, regional, or local) shall be implemented as part of the applicable permitting programs.
- Nonpoint source dischargers (e.g., agriculture) included in a BMAP shall demonstrate compliance with the applicable TMDLs by either implementing appropriate BMPs established under paragraph 7(c), or conducting water quality monitoring prescribed by **DEP or a WMD**. (***Note**: this is not applicable to MS4s, as they are considered point sources under the federal Clean Water Act and TMDL Program*.)
    - Failure to implement BMPs or prescribed water quality monitoring may be subject to **DEP or WMD** enforcement action.
- Responsible parties who are implementing applicable BMAP strategies shall not be required to implement additional pollutant load reduction strategies, and shall be deemed in compliance with this section. However, this does not limit DEP's authority to amend a BMAP.

BEST MANAGEMENT PRACTICES

- DEP, in cooperation with WMDs and other interested parties, may develop interim measures, BMPs, or other measures for non-agricultural nonpoint sources to achieve their load reduction allocations.
    - These measures may be adopted by **DEP or WMD** rule. If adopted, they shall be implemented by those responsible for non-agricultural nonpoint source pollution.
- DACS may develop and adopt by rule interim measure, BMPs, or other measures necessary for agricultural pollutant sources to achieve their load reduction allocations.
    - These measures may be implemented by those responsible for agricultural pollutant sources. **DEP, the WMDs, and DACS** shall assist with implementation.
    - In developing and adopting these measures, DACS shall consult with DEP, DOH, the WMDs, representatives of affected farming groups, and environmental group representatives.
    - The rules shall provide for a notice of intent to implement the practices and a system to ensure implementation, including recordkeeping.
- Verification of Effectiveness and Presumption of Compliance -
    - DEP shall, at representative sites, verify the effectiveness of BMPs and other measures adopted by rule in achieving load reduction allocations.
    - DEP shall use best professional judgment in making the initial verification of effectiveness, and shall notify **DACS and the appropriate WMD** of the initial verification prior to the adoption of a rule proposed pursuant to this paragraph.
    - Implementation of rule-adopted BMPs or other measures initially verified by DEP to be effective, or verified to be effective by monitoring at representative sites, provides a presumption of compliance with state water quality standards for those pollutants addressed by the practices.
- Reevaluation –
    - Where water quality problems are demonstrated despite implementation, operation, and maintenance of rule-adopted BMPs and other measures, **DEP, a WMD, or DACS**, in consultation with DEP, shall reevaluate the measures. If the practices require modification, the revised rule shall specify a reasonable time period for implementation.

Appendix C: STAKEHOLDER INVOLVEMENT IN BMAP DEVELOPMENT

LAKE JESUP BASIN WORKING GROUP

The Lake Jesup Basin Working Group (BWG) is made up of responsible stakeholders in the watershed. The BWG was formed in July 2007 and has advised FDEP on major issues related to the BMAP and detailed allocations. The BWG played a critical role in the development of the BMAP to implement the Lake Jesup TMDL.

The BWG's mission statement is as follows: *"The mission of the Lake Jesup Basin Working Group is to make recommendations to the Florida Department of Environmental Protection to work toward restoring impaired waterbodies through development of an effective, equitable, and cost-efficient Basin Management Action Plan to implement the Total Maximum Daily Loads."*

During BMAP development, the BWG met in Sanford on the following dates:

- July 24, 2008;
- July 30, 2009;
- September 17, 2009; and
- November 19, 2009.

In addition to the input from the BWG, the stakeholders involved in the technical meetings provided valuable information during the BMAP process. The technical stakeholders began meeting prior to TMDL adoption to provide input on the land uses, event mean concentrations (EMCs) used in the TMDL modeling, best management practice (BMP) efficiency values, and other aspects of model development and restoration targets. BMAP-related technical meetings began in 2006 and continued through BMAP development to provide stakeholder input with data collection and compilation, identification of scientific uncertainties and needs for additional research, as well as input on existing monitoring sites and information for the monitoring plan.

PROCESS FOR PLAN RECOMMENDATION DEVELOPMENT

BASIN WORKING GROUP MEETING PROCESS

The BWG was asked to endorse the BMAP, to reflect the local commitment to implement load reductions towards achievement of the TMDLs prior to the Secretarial adoption of the BMAP as a rule. FDEP will also ask for letters of commitment or resolutions of support for the BMAP from the individual entities represented on the BWG. These letters and resolutions will provide an additional level of support for the BMAP efforts as staff and local elected officials change over time. The process to submit letters and resolutions of support will occur during and after BMAP adoption. The written statements of commitment will be added to the BMAP as they are received (when received prior to adoption) or in the BMAP annual reports (when received after adoption).

CONSENSUS

The technical stakeholder meetings were operated on an informal basis where the purpose of the discussions was to provide technical input. As such, there were no official members of designated group of technical representatives. The BWG, however, had designated representatives for the major stakeholder organizations and made specific recommendations to FDEP on BMAP issues. A consensus-based a voting procedure was used to make these recommendations to FDEP. Votes were held only in circumstances when a quorum of at least 50% of the voting members (or their designated alternates) was present at a publicly noticed

meeting. Consensus was achieved when all participants could support, agree to, or accept the recommendation.

PUBLIC PARTICIPATION IN BASIN WORKING GROUP MEETINGS

All BWG and technical meetings were open to the public and noticed in the Florida Administrative Weekly. Public comment was invited during the BWG meetings and the technical meetings were open to anyone interested in participating in the technical discussions. In addition, public meetings were held on the verified lists, the adoption of the TMDLs, and the BMAP document.

PUBLIC MEETINGS

Public meetings on the proposed verified list and the Lake Jesup TMDL were held before each was adopted. In addition, a public workshop on the BMAP was held on February 8, 2010.

PLAN RECOMMENDATION APPROVAL AND ADOPTION

The Basin Working Group approved the final recommended BMAP at its January 14, 2010 meeting. The final BMAP is to be adopted by FDEP secretarial order.

Appendix D: PROJECTS TO ACHIEVE THE TMDL

The projects and timeframes for implementation submitted by the entities to achieve their BMAP allocations are summarized in the tables below. The tables provide information on the nutrient reduction attributed to each individual project, shown in pounds per year (lbs/yr). These projects were submitted to provide reasonable assurance to FDEP that each entity has a plan on how they will meet their allocation; however, this list of projects is meant to be flexible enough to allow for changes that may occur over time, provided that the reduction is still met within the specified timeframe.

CITY OF ALTAMONTE SPRINGS

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	TP REDUCTION (LBS/YR)	STATUS
Altamonte Springs	A-1	Existing BMPs	BMPs in place at the time of the TMDL	35.0	Completed
Altamonte Springs	A-2	Street Sweeping	Street sweeping of 4.4 miles, two times per month	0.5	Ongoing
Altamonte Springs	A-3	Education Efforts	FYN, PSAs, pamphlets, presentations, website, illicit discharge program	4.6	Ongoing
			Total Projects Reduction	**40.1**	
			Total Required Reduction 2010-2014	**19.0**	
			Credit for Future BMAPs	**21.1**	

CITY OF CASSELBERRY

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	TREATMENT ACRES	PROJECT TYPE	STATUS
Casselberry	C-1	Lake Concord Stormwater Park/Anniversary Park - Plumosa Baffle Box	Redevelopment and retrofit of City-owned property into an educational stormwater park; 2nd generation baffle box	10/2007	09/2009	0.5	$43,250	8.5	Stormwater Retrofit	Started
Casselberry	C-2	Lake Concord Stormwater Park/Anniversary Park - Exfiltration Trench	Redevelopment and retrofit of City-owned property into an educational stormwater park; an exfiltration trench	10/2007	09/2009	0.4	$143,200	1.7	Exfiltration	Started
Casselberry	C-3	Lake Concord Stormwater Park/Anniversary Park - Dry Detention	Redevelopment and retrofit of City-owned property into an educational stormwater park; dry detention	10/2007	09/2009	0.0	$75,000	1.0	Dry detention pond	Started
Casselberry	C-4	Lake Concord Stormwater Park/Anniversary Park - Swale, Wetland Revegetation, & Boardwalk	Redevelopment and retrofit of City-owned property into an educational stormwater park; swale, lakeshore revegetation, educational boardwalk	10/2007	09/2009	0.1	$742,000	1.7	Swales	Started
Casselberry	C-5	Lake Concord Stormwater Park/Anniversary Park	Redevelopment and retrofit of City-owned property into an educational stormwater park; baffle box, pervious pavement, bioretention/ parking lot	10/2007	09/2009	0.1	$226,500	1.2	Stormwater Retrofit	Started
Casselberry	C-6	Anchor Road Reconstruction	Reconstruction of Anchor Road with drainage improvements including upgraded detention/retention ponds	10/2007	10/2009	2.9	$2,000,000	60.7	Wet detention pond	Started

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Treatment Acres	Project Type	Status
Casselberry	C-7	North Lake Triplet Shoreline Revegetation	Remove existing nuisance vegetation from the north and west shores of North Lake Triplet and replace with beneficial species; install reverse berm and swale	12/2007	09/2014	0.8	$80,000	16.2	Swales	Planned & Funded
Casselberry	C-8	Secret Lake Shoreline Revegetation	Remove existing nuisance vegetation from the east and southwest shores of Secret Lake and replace with beneficial species; install 2 reverse berms and swales	01/2008	05/2008	0.2	N/A	3.7	Swales	Completed
Casselberry	C-9	Fountain/Aeration and Revegetation for Grassy Lake	Installation of aeration for high BOD loading to this waterbody; includes shoreline revegetation for aesthetics and nutrient removal with swale construction as practicable	03/2009	07/2009	0.0	$150,000	1.7	Aeration System	Planned & Funded
Casselberry	C-10	672 & 676 San Pablo Avenue 2nd generation Baffle Boxes	Replace existing storm manholes with two 2nd generation baffle boxes for removal of pollutants	03/2009	04/2010	1.3	$300,000	28.0	Stormwater Retrofit	Planned & Funded
Casselberry	C-11	Madrid Drive at Desoto Drive 2nd generation Baffle Box	Replace existing storm manholes with 2nd generation Baffle Boxes for removal of pollutants	03/2009	04/2010	0.4	$150,000	5.0	Stormwater Retrofit	Planned & Funded
Casselberry	C-12	Sonora Drive at Desoto Drive 2nd generation Baffle box	Replace existing storm manholes with 2nd generation baffle boxes for removal of pollutants	03/2009	04/2010	2.4	$170,000	42.7	Stormwater Retrofit	Planned & Funded
Casselberry	C-13	Live Oaks Center 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutant	03/2010	04/2011	1.9	$100,000	11.6	Stormwater Retrofit	Planned & Funded

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Treatment Acres	Project Type	Status
Casselberry	C-14	360 South Lake Triplet Drive 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2011	04/2012	1.7	$140,000	27.8	Stormwater Retrofit	Planned & Funded
Casselberry	C-15	Lake Hodge Park 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2011	04/2012	3.3	$170,000	53.2	Stormwater Retrofit	Planned & Funded
Casselberry	C-16	161 South Lake Triplet Drive 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2011	04/2012	5.5	$170,000	89.9	Stormwater Retrofit	Planned & Funded
Casselberry	C-17	530 South Lake Triplet Drive 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2011	04/2012	1.3	$140,000	20.7	Stormwater Retrofit	Planned & Funded
Casselberry	C-18	Carriage Hill Unit 4 2nd generation baffle boxes at the 3 outfalls north of Violet Dell, Tulip Trail and Lowndes Square Queens Mirror	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2012	04/2013	3.3	$400,000	72.5	Stormwater Retrofit	Planned & Funded
Casselberry	C-19	808 Osceola Trail 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2013	04/2014	1.2	$140,000	25.2	Stormwater Retrofit	Planned & Funded
Casselberry	C-20	Park Drive Drainage/Wetland Improvements	Construction of stormwater retention area on Lots 10A & 11 on north side of Park Drive	03/2013	04/2014	4.2	$36,000	46.4	Wet retention pond	Planned & Funded

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Treatment Acres	Project Type	Status
Casselberry	C-21	Alum Injection System for Carriage Hill Detention Pond	Construction of a feed system for the addition of alum to the influent to the new wet detention pond for removal of pollutants, especially phosphorus, from stormwater system influent to Queens Mirror and the Triplet Lake chain	03/2013	04/2014	16.5	$120,000	98.3	Alum	Planned & Funded
Casselberry	C-22	Middle Lake Triplet Shoreline Revegetation	Remove existing nuisance vegetation from the north shore of Middle Lake Triplet and replace with beneficial species; install reverse berm and swale	12/2013	06/2014	0.3	$33,000	3.4	Swales	Planned & Funded
Casselberry	C-23	Secret Way at canal 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2014	12/2014	0.7	$170,000	16.4	Stormwater Retrofit	Planned & Funded
Casselberry	C-24	51 North Lake Triplet Drive 2nd generation Baffle Box	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2014	12/2014	1.2	$140,000	27.4	Stormwater Retrofit	Planned & Funded
Casselberry	C-25	South Lake Triplet Swales	Replace existing storm manholes with baffle boxes for removal of pollutants	03/2014	12/2014	1.0	$80,000	6.3	Swales	Envisioned but Not Funded
Casselberry	C-26	South Lake Triplet 2nd generation Baffle Box	Replace existing storm manholes with Baffle Boxes for removal of pollutants (sediment and detritus) (4.l)	03/2014	12/2014	0.8	$140,000	18.3	Stormwater Retrofit (baffle box)	Envisioned but Not Funded
Casselberry	C-27	Street Sweeping	Monthly street sweeping of 72.5 miles	N/A	N/A	5.3	N/A	N/A	Street Sweeping	Ongoing

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Treatment Acres	Project Type	Status
Casselberry	C-28	Education Efforts	FYN, landscape and irrigation ordinances, PSAS, pamphlets/presentations, website, illicit discharge program	N/A	N/A	85.6	N/A	N/A	Education	Ongoing
Casselberry	C-29	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	319.9	N/A	N/A	N/A	Completed
Total Projects Reduction						**462.8**				
Total Required Reduction 2010-2014						**342.7**				
Credit for Future BMAPs						**120.1**				

Town of Eatonville

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Type	Status
Eatonville	E-1	Street Sweeping	Monthly street sweeping of 3.7 miles	N/A	N/A	0.3	Street sweeping	Ongoing
Eatonville	E-2	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	9.6	N/A	Completed
Eatonville	E-3	Regional Project	Participate in a regional project	2009	2014	13.5	Regional Project	Planned
Total Projects Reduction						**23.4**		
Total Required Reduction 2010-2014						**23.4**		
Credit for Future BMAPs						**0.0**		

FLORIDA DEPARTMENT OF TRANSPORTATION

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DESCRIPTION	START DATE	END DATE	TP REDUCTION (LBS/YR)	TREATMENT ACRES	PROJECT TYPE	STATUS
FDOT	FDOT -1	FM: 240167-1 SR434	Widen from 2 to 6 lanes from McCulloch Road to Mitchell Hammock; drainage improvements and treatment of existing impervious	2002	2007	3.6	83.47	Wet Detention	Completed
FDOT	FDOT -2	FM: 240196-1 SR17-92 Basin A&B	Proposed widening of SR 15/600 (US 17/92) from Shepard Road to Lake Mary Blvd; drainage improvements and treatment of existing impervious	Pending	2014	21.0	57.21	Wet Detention	Design
FDOT	FDOT -3	FM: 240196-1 SR17-92 Basin C&D	Proposed widening of SR 15/600 (US 17/92) from Shepard Road to Lake Mary Blvd; drainage improvements and treatment of existing impervious	Pending	2014	3.7	47.97	Dry Retention	Design
FDOT	FDOT -4	FM: 240163-1 SR 46	SR 46 Bridge Replacement over Lake Jesup; drainage improvements and treatment of existing impervious	2008	2010	5.4	50.50	Wet Detention	Construction
FDOT	FDOT -5	Street Sweeping	Monthly street sweeping of 1,232.6 miles	N/A	N/A	90.3	N/A	Street Sweeping	Ongoing
FDOT	FDOT -6	Education Efforts	Public Education efforts	N/A	N/A	6.5	N/A	Education	Ongoing
FDOT	FDOT -7	Existing BMPs	Varies	N/A	N/A	207.7	N/A	N/A	Completed
Total Projects Reduction						**338.2**			
Total Required Reduction 2010-2014						**132.3**			
Credit for Future BMAPs						**205.9**			

City of Lake Mary

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Footprint (Acres)	Project Type	Status
Lake Mary	LM-1	Lake Mary Woods	Eliminate 18 septic tanks 75 feet from surface water, some of them were failing	5/2005	4/2006	44.5	$3,700,000	$2,056	6,260	Extend sewer line	Completed
Lake Mary	LM-2	Street Sweeping	Quarterly street sweeping of 52.3 miles	N/A	N/A	2.7	N/A	N/A	N/A	Street Sweeping	Ongoing
Lake Mary	LM-3	Education Efforts	FYN, ordinances, PSAs, pamphlets, presentations, website, illicit discharge program	N/A	N/A	67.6	N/A	N/A	N/A	Education	Ongoing
Lake Mary	LM-4	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	264.3	N/A	N/A	N/A	N/A	Completed
Total Projects Reduction						**379.1**					
Total Required Reduction 2010-2014						**264.3**					
Credit for Future BMAPs						**114.8**					

City of Longwood

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Project Type	Status
Longwood	L-1	South Grant Street Drainage Project	Drainage improvements on South Grant Street	2008	2009	0.7	$300,000	Stormwater Retrofit	Planned & Funded
Longwood	L-2	North Grant Street Drainage Project	Drainage improvements on North Grant Street	2009	2010	1.4	$300,000	Stormwater Retrofit	Planned & Funded
Longwood	L-3	Sewering projects to remove septic tanks	Sewering projects to remove tanks within 75 ft of surface waters (remove 20 septic tanks)	2009	2013	22.7	N/A	Wastewater plant improvements	Planned & Funded
Longwood	L-4	Street Sweeping	Quarterly street sweeping of 11.1 miles	N/A	N/A	0.6	N/A	Street sweeping	Ongoing
Longwood	L-5	Education Efforts	FYN, pamphlets, presentations, website, illicit discharge program	N/A	N/A	44.9	N/A	Education	Ongoing
Longwood	L-6	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	58.9	N/A	N/A	Completed
Longwood	L-7	Regional Project	Participate in a regional project	2009	2014	69.7	N/A	N/A	Planned
Total Projects Reduction						**198.9**			
Total Required Reduction 2010-2014						**205.3**			
Credit for Future BMAPs						**-6.4***			

* Note: Due to some project calculation adjustments done by FDEP, the remainder of the required reductions for this first BMAP will be met as part of the responsibilities in the second BMAP.

CITY OF MAITLAND

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	ANNUAL O&M COST	TREATMENT ACRES	PROJECT TYPE	STATUS
Maitland	M-1	Sybelia Parkway Regional Pond	Construct wet pond	2005	2007	33.7	$4,400,000	$3,000	125.2	Wet detention pond	Completed
Maitland	M-2	Lake Gem/Park Lake COOP BMP	Construct second generation baffle box	2010	2011	0.3	$30,000	$3,000	3.4	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-3	Lake Gem/Park Lake COOP BMP	Construct second generation baffle box	2010	2011	3.1	$30,000	$3,000	20.0	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-4	Lake Gem/Park Lake COOP BMP	Construct second generation baffle box	2010	2011	0.2	$60,000	$6,000	3.1	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-5	Lake Gem/Park Lake COOP BMP	Construct second generation baffle box	2010	2011	18.9	$60,000	$6,000	178.9	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-6	Lake Gem/Park Lake COOP BMP	Construct second generation baffle box	2010	2011	9.1	$60,000	$6,000	58.1	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-7	Lake Maitland Basin - Ridgewood Area Quality Neighborhood Program City Street Improvement Plan	Construct infiltration trenches	2009	2010	0.5	$60,000	$2,500	3.9	Infiltration trench	Planned & Funded
Maitland	M-8	Lake Maitland Basin - Ridgewood Area Quality Neighborhood Program City Street Improvement Plan	Construct infiltration trenches	2009	2010	1.7	$170,000	$8,500	15.0	Infiltration trench	Planned & Funded
Maitland	M-9	Lake Maitland Basin - Ridgewood Area Quality Neighborhood Program City Street Improvement Plan	Construct infiltration trenches	2009	2010	0.6	$100,000	$5,000	9.2	Infiltration trench	Planned & Funded
Maitland	M-10	North Lake Maitland Leaf Trap Project	Install curb inlet leaf trap	2009	2010	0.1	$3,000	$6,000	16.8	Inlet	Planned & Funded

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Treatment Acres	Project Type	Status
Maitland	M-11	Lake Maitland Basin - Ridgewood Area Quality Neighborhood Program City Street Improvement Plan	Construct infiltration trenches	2009	2010	0.9	$100,000	$8,500	14.8	Infiltration trench	Planned & Funded
Maitland	M-12	Dommerich Lot Baffle Box	Construct second generation baffle box	2010	2011	1.1	$60,000	$5,000	24.7	Stormwater Retrofit	Envisioned, but Not Funded
Maitland	M-13	Chipewa Trail Baffle Box	Construct second generation baffle box	2007	2007	1.1	$60,000	$5,000	25.3	Stormwater Retrofit	Completed
Maitland	M-14	Horatio Avenue Infiltration Trench	Construct infiltration trenches	2012	2014	0.9	$150,000	$5,000	5.0	Infiltration trench	Envisioned, but Not Funded
Maitland	M-15	Minnehaha Park Stormwater Improvements Dry Stormwater Pond	Construct wet pond	2007	2008	1.3	$65,000	$2,000	9.9	Dry detention pond	Completed
Maitland	M-16	Street Sweeping	Street sweeping once every 2 weeks of 71 miles	2005	Ongoing	7.4	N/A	$100,000	2898	Street Sweeping	Ongoing
Maitland	M-17	Education Efforts	Landscaping ordinance, PSAs, presentations/ pamphlets, website, illicit discharge program	N/A	N/A	40.8	N/A	N/A	N/A	Education	Ongoing
Maitland	M-18	Existing BMPs	BMPs in place at the time of the TMDL	N/A	N/A	0.7	N/A	N/A	N/A	N/A	Completed
Total Projects Reduction						**122.4**					
Total Required Reduction 2010-2014						**124.8**					
Credit for Future BMAPs						**-2.4***					

* Note: Due to some project calculation adjustments done by FDEP, the remainder of the required reductions for this first BMAP will be met as part of the responsibilities in the second BMAP.

ORLANDO ORANGE COUNTY EXPRESSWAY AUTHORITY

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	TP REDUCTION (LBS/YR)	PROJECT TYPE	STATUS
OOCEA	OOCEA-1	Existing BMPs	BMPs that were in place at the time of the TMDL	12.8	N/A	Completed
Total Projects Reduction				**12.8**		
Total Required Reduction 2010-2014				**5.2**		
Credit for Future BMAPs				**7.6**		

ORANGE COUNTY

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT TYPE	STATUS
Orange County	OC-1	Hall Road Improvements	OC CIP Hall Road Improvements	Pending	2014	0.1	Stormwater Retrofit	Planned
Orange County	OC-2	OC CIP Lake Wauntta	OC CIP Lake Wauntta	Pending	2014	3.5	Stormwater Retrofit	Planned
Orange County	OC-3	Lake Sue Inlet Baskets	Lake Sue inlet baskets	N/A	N/A	0.7	Inlet Baskets	Completed
Orange County	OC-4	Street Sweeping	Street sweeping weekly of 78 miles and monthly of 360 miles	N/A	N/A	27.4	Street Sweeping	Ongoing
Orange County	OC-5	Education Efforts	FYN, ordinances, PSAs, pamphlets, presentations, website, illicit discharge program	N/A	N/A	151	Education	Ongoing
Orange County	OC-6	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	197.3	N/A	Completed
Orange County	OC-7	Regional Project	Participate in a regional project	2009	2014	189.0	Regional Project	Planned
Total Projects Reduction						**569.0**		
Total Required Reduction 2010-2014						**569.0**		
Credit for Future BMAPs						**0.0**		

CITY OF ORLANDO

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	ANNUAL O&M COST	TREATMENT ACRES	PROJECT TYPE	STATUS
Orlando	ORL-1	Lake Dot Water Quality Restoration	Installation of Alum Treatment System, where aluminum sulfate (alum) is injected into stormline on a flow-proportioned basis	1988	07/1990	70.4	$569,207	N/A	276	Alum	Completed
Orlando	ORL-2	Hazel Street Outfall Improvements	Installation of CDS Unit at Lake Winyah from 96" pipe	07/2000	07/2003	8.3	$410,992	N/A	505	Stormwater Retrofit	Completed
Orlando	ORL-3	Lake Rowena Screening Facility & Alum Stormwater Treatment	Installation of underground, flow-actuated rotating bar screen on 108" outfall pipe to capture debris with additional treatment via alum system	1994	1996	55.0	$596,512	N/A	470	Screening and Alum	Completed
Orlando	ORL-4	Lake Highland CDS Unit	Installation of CDS Unit at Lake Highland	1998	1999	1.0	$60,000	N/A	45	Stormwater Retrofit	Completed
Orlando	ORL-5	Mills Avenue Retrofit	Construction of Storm Flo Litter Collection Screen on Mills Ave., adjacent to Lake Rowena to treat runoff from 36" and 24" stormlines	01/2009	04/2009	8.4	$250,000	N/A	89	Stormwater Retrofit	Planned & Funded
Orlando	ORL-6	Overbrook Stormwater Improvements	Construct 2nd generation baffle box upstream of Lake Adair; Implement pollution prevention methods, including gravel bottom and check dams to settle out pollutants	10/2007	07/2008	1.8	$400,000	N/A	236	Stormwater Retrofit	Planned & Funded
Orlando	ORL-7	Guernsey Park - Expansion of Wet Detention Pond	Expansion of wet detention pond to treat 61% of sub-basin drainage	N/A	N/A	0.1	$425,000	N/A	80	Wet detention pond	Envisioned, but Not Funded
Orlando	ORL-8	Ivanhoe Plaza Park Exfiltration	Installation of exfiltration galleries to treat 100% of sub-basin drainage	N/A	N/A	1.3	$1,100,000	N/A	49	100% on-site retention	Envisioned, but Not Funded

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Treatment Acres	Project Type	Status
Orlando	ORL-9	Don Dudley Park 2nd Generation Baffle Boxes	Construct two 2nd Generation Baffle Boxes upstream of Lake Concord and reroute flow to treat 30" and 24" outfalls from nearly 100% of two sub-basins	N/A	N/A	0.8	$250,000	N/A	66	Stormwater Retrofit	Envisioned, but Not Funded
Orlando	ORL-10	Winyah (Westchester Ave/Wilkinson St) 2nd Generation Baffle Box	Construct 2nd Generation Baffle Box upstream of Lake Winyah to treat 71% of sub-basin	N/A	N/A	1.6	$72,000	N/A	30	Stormwater Retrofit	Envisioned, but Not Funded
Orlando	ORL-11	Westmoreland 2nd Generation Baffle Box	Construct 2nd Generation Baffle Box upstream of Lake Adair	N/A	2006	0.1	$35,000	N/A	5.3	Stormwater Retrofit	Completed
Orlando	ORL-12	Stormwater Filtration Systems / Inlet Baskets	Installation of 6 inlet baskets around perimeter of Lake Adair	N/A	2007	0.0	$5,400	N/A	25	Inlet Basket	Completed
Orlando	ORL-13	Stormwater Filtration Systems / Inlet Baskets	Installation of 11 inlet baskets in Spring Lake basin	N/A	2007	0.0	$9,900	N/A	25	Inlet Basket	Completed
Orlando	ORL-14	Stormwater Filtration Systems / Inlet Baskets	Installation of 13 inlet baskets in Lake Formosa basin	N/A	2007	0.1	$11,700	N/A	14	Inlet Basket	Completed
Orlando	ORL-15	Stormwater Filtration Systems / Inlet Baskets	Installation of 29 inlet baskets in Lake Highland basin	N/A	2007	3.5	$26,100	N/A	223	Inlet Basket	Completed
Orlando	ORL-16	Stormwater Filtration Systems / Inlet Baskets	Installation of 2 inlet baskets in Lake Rowena basin	N/A	2007	0.5	$1,800	N/A	39	Inlet Basket	Completed
Orlando	ORL-17	Stormwater Filtration Systems / Inlet Baskets	Installation of 49 inlet baskets in Lake Ivanhoe basin	N/A	2008	0.6	$44,100	N/A	242	Inlet Basket	Completed
Orlando	ORL-18	Stormwater Filtration Systems / Inlet Baskets	Installation of 4 inlet baskets in Lake Druid basin	N/A	2007	0.4	$1,800	N/A	39	Inlet Basket	Completed
Orlando	ORL-19	Street Sweeping	2 times per week of 6.4 miles, weekly of 9.3 miles, and 2 times per month of 113 miles	N/A	N/A	14.3	N/A	$1,800,000	N/A	Street Sweeping	Completed

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Treatment Acres	Project Type	Status
Orlando	ORL-20	Reading Dr (24" line) - 2nd Generation Baffle Box at Lake Adair	Construct 2nd Generation Baffle Box upstream of Lake Adair to treat approximately 13% of subbasin	N/A	N/A	0.5	N/A	N/A	26	Stormwater Retrofit	Envisioned, but Not Funded
Orlando	ORL-21	Spring Lake -2nd Generation Baffle Box at Rio Grande	Construct 2nd Generation Baffle Box upstream of Spring Lake to treat 100% of subbasin	N/A	N/A	0.6	$128,000	N/A	39	Stormwater Retrofit	Envisioned, but Not Funded
Orlando	ORL-22	Spring Lake- 2nd Generation Baffle Box at Springdale Rd	Construct 2nd Generation Baffle Box upstream of Spring Lake to treat 100% of subbasin	N/A	N/A	0.1	N/A	N/A	21	Stormwater Retrofit	Completed
Orlando	ORL-23	DOT Pond Maintenance, west of Spring Lake	Removal of muck/sediment and expansion of wet detention pond to treat 95% and 5% of two sub-basins, respectively.	N/A	N/A	6.1	N/A	N/A	141	Wet detention pond	Envisioned, but Not Funded
Orlando	ORL-24	Weber Dr - 2nd Generation Baffle Box at Lake Druid	Construct 2nd Generation Baffle Box upstream of Lake Druid to treat approximately 7% of subbasin	N/A	2006	0.3	N/A	N/A	6	Stormwater Retrofit	Completed
Orlando	ORL-25	Educational Component	FYN, ordinances (landscape, irrigation, pet waste), PSAs, pamphlets, presentations, website, illicit discharge program	N/A	N/A	94.2	N/A	N/A	N/A	Education	Ongoing
Orlando	ORL-26	Hughey Avenue Retrofit	Divert stormwater from Lake Concord basin to Lake Dot Alum Treatment before discharging into chain of lakes	10/2010	12/2010	3.8	$500,00	N/A	90.8	Stormwater Retrofit and Alum	Planned & Funded
Orlando	ORL-27	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	684.4	N/A	N/A	N/A	N/A	Completed
Total Projects Reduction						**958.2**					
Total Required Reduction 2010-2014						**326.3**					
Credit for Future BMAPs						**631.9**					

CITY OF OVIEDO

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	TREATMENT ACRES	PROJECT TYPE	STATUS
Oviedo	OV-1	Aulin Regional Stormwater Pond	Aulin Regional Stormwater Pond	2009	2014	13.5	N/A	N/A	Wet detention pond	Envisioned, but Not Funded
Oviedo	OV-2	Lightwood Knox Canal Project	Lightwood Knox Canal Project	2009	2014	84.5	N/A	N/A	Dry detention pond, Swales	Envisioned, but Not Funded
Oviedo	OV-3	Sweetwater Creek Project	Sweetwater Creek Project	2009	2014	30.4	N/A	N/A	Dry detention pond, wet detention pond	Envisioned, but Not Funded
Oviedo	OV-4	Solary Canal Stormwater Treatment Area	Regional Stormwater Treatment Facility consisting of an 8.0-acre wet pond and 4.8-acre wetland	1/2010	9/2010	230.0	$1,700,000	1,471	Wet detention pond, Wetland treatment	Planned & Funded
Oviedo	OV-5	Street Sweeping	Monthly street sweeping of 160.8 miles	N/A	N/A	11.8	N/A	N/A	Street Sweeping	Ongoing
Oviedo	OV-6	Education Efforts	FYN, illicit discharge program	N/A	N/A	46.2	N/A	N/A	Education	Ongoing
Oviedo	OV-7	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	386.5	N/A	N/A	N/A	Completed
					Total Projects Reduction	**802.9**				
					Total Required Reduction 2010-2014	**258.7**				
					Credit for Future BMAPs	**544.2**				

CITY OF SANFORD

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	STATUS
Sanford	S-1	Street Sweeping	Weekly street sweeping of 25.3 miles	N/A	N/A	3.6	Ongoing
Sanford	S-2	Public Education	Public Education	N/A	N/A	108.9	Ongoing
Sanford	S-3	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	521.2	Complete
					Total Projects Reduction	**633.7**	
					Total Required Reduction 2010-2014	**602.2**	
					Credit for Future BMAPs	**31.5**	

SEMINOLE COUNTY

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	FOOTPRINT (ACRES)	TREATMENT ACRES	PROJECT TYPE	STATUS
Seminole County	SC-1	Cassel Creek RSF	RSF to treat water in the sub basin upstream	1/2010	9/2010	156.8	$ 1,700,000	10	830	Wet detention pond	Planned & Funded
Seminole County	SC-2	Lake Ann Outfall	Baffle box and pipe replacement	4/2001	10/2001	10.8	$148,000	0.1	322	Stormwater Retrofit	Completed
Seminole County	SC-3	Red Bug Lake Road RSF	RSF to treat water in the sub basin upstream	6/2009	3/2010	93.0	$ 1,400,000	9	1050	Wet detention pond	Planned & Funded
Seminole County	SC-4	Navy Canal RSF	RSF to treat water in the sub basin upstream	3/1/2005	10/14/2006	285.0	$ 2,112,336	7	889	Wet detention pond	Completed
Seminole County	SC-5	Cameron Ditch RSF	RSF to treat water in the sub basin upstream	4/17/2006	10/14/2006	71.9	$ 3,735,374	32	376	Wet detention pond, Wetland treatment	Completed
Seminole County	SC-6	Lake Howell Road Pond Retrofit	Retrofit of an old FDOT pond now under county jurisdiction that drains Howell Branch Road	5/2007	11/1/2007	7.1	N/A	4.0	23	Wet detention pond	Completed
Seminole County	SC-7	Solary Canal Stormwater Treatment Area	RST facility consisting of an 8.0-acre wet pond and 4.8-acre wetland	1/2010	9/2010	230.0	$1,700,000	12.7	1471	Wet detention pond, Wetland treatment	Planned & Funded
Seminole County	SC-8	Anchor Road Reconstruction	Reconstruction of Anchor Road with drainage improvements including upgraded detention/retention ponds	10/2007	10/2009	5.1	$2,000,000	13	60.7	Wet detention pond	Started
Seminole County	SC-9	Street Sweeping	Street sweeping monthly of 66.8 miles and quarterly of 160.2 miles	N/A	N/A	13.1	N/A	N/A	N/A	Street sweeping	Ongoing

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Footprint (Acres)	Treatment Acres	Project Type	Status
Seminole County	SC-10	Education Efforts	FYN, ordinances, PSAs, pamphlets, presentations, website, illicit discharge program	N/A	N/A	558.3	N/A	N/A	N/A	Education	Ongoing
Seminole County	SC-11	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	1,753.8	N/A	N/A	N/A	N/A	Completed
Total Projects Reduction						**3,184.9**					
Total Required Reduction 2010-2014						**2,137.0**					
Credit for Future BMAPs						**1,047.9**					

Turnpike Authority

Entity	Project Number	Project Name	Project Detail	TP Reduction (lbs/yr)	Status
Turnpike Authority	T-1	Existing BMPs	BMPs that were in place at the time of the TMDL	252.3	Completed
Turnpike Authority	T-2	Monthly street sweeping of 48 miles	Monthly street sweeping	3.2	Ongoing
Turnpike Authority	T-3	Education Efforts	Presentations, illicit discharge program	9	Ongoing
Total Projects Reduction				**264.5**	
Total Required Reduction 2010-2014				**101.1**	
Credit for Future BMAPs				**163.4**	

CITY OF WINTER PARK

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	ANNUAL O&M COST	TREATMENT ACRES	PROJECT TYPE	STATUS
Winter Park	WP-1	Lake Island Interconnect	First Flush bypass to Wet Retention Ponds	06/2002	09/2003	4.7	$408,009	N/A	74.5	Wet detention pond	Completed
Winter Park	WP-2	Via Lugano Exfiltration	Off Line Exfiltration	10/1996	11/1997	1.3	$200,000	N/A	25.3	Dry detention pond	Completed
Winter Park	WP-3	N. Park Ave. Exfiltration	Off Line Exfiltration	06/2004	10/2004	6.6	$250,000	N/A	21.44	Dry detention pond	Completed
Winter Park	WP-4	Fairway 3 Exfiltration	Off Line Exfiltration	11/2006	10/2007	5.5	$1,000,000	N/A	57.39	Dry detention pond	Completed
Winter Park	WP-5	McKean Road CDS	CDS Unit on 24" outfall	05/2004	06/2005	0.0	N/A	N/A	5.58	Stormwater Retrofit	Completed
Winter Park	WP-6	Pinetree Rd Outfall CDS	CDS unit on 42" outfall	05/2004	06/2005	0.6	N/A	N/A	64.78	Stormwater Retrofit	Completed
Winter Park	WP-7	1190 Park Ave CDS	CDS unit on 30" outfall	08/1998	11/1999	0.2	N/A	N/A	22.82	Stormwater Retrofit	Completed
Winter Park	WP-8	Moss/ Venetian Dry Capture 1st Generation Baffle box	Baffle screen on 15" outfall	02/2000	03/2007	0.1	N/A	N/A	3.02	Stormwater Retrofit	Completed
Winter Park	WP-9	Green Cove Road 2 CDS Units	2 CDS units on two 24" outfalls	05/2004	06/2006	0.1	N/A	N/A	11.35	Stormwater Retrofit	Completed
Winter Park	WP-10	Courtland Alum Injection treatment	Alum injection at Lake Mizell outfall	N/A	N/A	21.2	N/A	N/A	88.08	Alum	Completed
Winter Park	WP-11	Partnership/ wet detention/ Windsong	Developer's agreement to treat Palmer ditch basin run off within site MSSW	N/A	N/A	5.8	N/A	N/A	84.55	Wet detention pond	Completed
Winter Park	WP-12	Lincoln Ave Alum Injection treatment	Alum injection at Lake Osceola outfall	N/A	N/A	37.7	N/A	N/A	17.59	Alum	Completed
Winter Park	WP-13	Alexander Place Alum Injection treatment with baffle box	Alum injection at Lake Osceola outfall	N/A	N/A	22.6	N/A	N/A	24.61	Alum	Completed
Winter Park	WP-14	Morse /Alum Injection treatment	Alum injection at Lake Osceola outfall	N/A	N/A	6.9	N/A	N/A	57.13	Alum	Completed

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Treatment Acres	Project Type	Status
Winter Park	WP-15	Trismen and Lakewood Drive Exfiltration	Off Line Exfiltration	N/A	N/A	0.4	N/A	N/A	7.35	Dry detention pond	Completed
Winter Park	WP-16	Trismen CDS Unit	CDS Unit on 24" outfall	N/A	N/A	0.0	N/A	N/A	0.39	Stormwater Retrofit (CDS)	Completed
Winter Park	WP-17	Trismen Dry 1st Generation Baffle Box	Baffle screen on 15" outfall	N/A	N/A	0.0	N/A	N/A	1.84	Stormwater Retrofit	Completed
Winter Park	WP-18	Elizabeth CDS treating Inlet at Bonita and Dale	CDS on 15" Pipe	05/2004	06/2006	0.0	N/A	N/A	2.35	Stormwater Retrofit	Completed
Winter Park	WP-19	Lake Chelton Outfall Improvement	4 Dry Capture Baffle inlets and boxes	09/2003	01/2004	0.0	N/A	N/A	28.65	Stormwater Retrofit	Completed
Winter Park	WP-20	Lakeview Road Bricking	CDS Installation on 24" Outfall	03/2006	03/2006	0.1	N/A	N/A	9.53	Stormwater Retrofit	Completed
Winter Park	WP-21	Mead Gardens Borrow Pit Pond Retrofit	Retrofit Screening devices (two baffle boxes) to existing MSSW	05/2006	09/2006	15.4	N/A	$560,000	62.06	Stormwater Retrofit	Completed
Winter Park	WP-22	Glencoe Road Bricking	Stormwater capture and screening system (baffle box)	03/2007	06/2007	0.1	N/A	N/A	3.39	Stormwater Retrofit	Completed
Winter Park	WP-23	Laurel Road Dry Retention Pond	On Line Dry retention Pond	05/1999	03/2001	1.7	N/A	N/A	17.15	Dry detention pond	Completed
Winter Park	WP-24	Alum Injection Treatment/ Rollins	Alum injection At Outfalls to Lake Virginia	01/1995	1996	26.8	N/A	N/A	72.99	Alum	Completed
Winter Park	WP-25	9th Grade Center Pond Wet Detention	Wet Detention Pond Retrofit	Pre 1995	Pre 1995	7.6	N/A	N/A	110.8	Wet detention pond	Completed
Winter Park	WP-26	Lakeview Bricking	Stormwater capture and screening system (baffle box)	02/2005	11/2006	0.1	N/A	N/A	6.97	Stormwater Retrofit	Completed
Winter Park	WP-27	Oxford Road Bricking	Stormwater capture and screening system (baffle box)	08/2006	11/2006	0.1	N/A	N/A	5.28	Stormwater Retrofit	Completed

Entity	Project Number	Project Name	Project Detail	Start Date	End Date	TP Reduction (lbs/yr)	Project Cost	Annual O&M Cost	Treatment Acres	Project Type	Status
Winter Park	WP-28	Lake Island Park	Created treatment volume in Lake Mednsen, construct control structures for wet detention treatment	06/1905	03/1996	83.8	N/A	N/A	256.00	Wet detention pond	Completed
Winter Park	WP-29	950 Palmer Ave Retrofit	Stormwater capture and screening system (baffle box)	07/2007	07/2007	0.3	N/A	N/A	18.33	Stormwater Retrofit	Completed
Winter Park	WP-30	Banchory Exfiltration	On-line Retention 0.25 treatment volume	2008	2008	0.4	N/A	N/A	N/A	On-line Retention	Completed
Winter Park	WP-31	Bryan CDS	CDS	2008	2008	0.2	N/A	N/A	N/A	Stormwater Retrofit	Completed
Winter Park	WP-32	E. Lake Sue CDS	CDS	2008	2008	0.1	N/A	N/A	N/A	Stormwater Retrofit	Completed
Winter Park	WP-33	Elizabeth Drive baffle box	Baffle box	N/A	N/A	1.1	N/A	N/A	N/A	Stormwater Retrofit	Completed
Winter Park	WP-34	Street Sweeping	Street sweeping two times per month of 130 miles	N/A	Ongoing	13.6	N/A	N/A	N/A	Street Sweeping	Ongoing
Winter Park	WP-35	Education Efforts	FYN, landscape and fertilizer ordinances, pamphlets, presentations, website, illicit discharge program	N/A	Ongoing	106.3	N/A	N/A	N/A	Education	Ongoing
Winter Park	WP-36	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	151.5	N/A	N/A	N/A	N/A	Completed
Total Projects Reduction						**522.9**					
Total Required Reduction 2010-2014						**370.5**					
Credit for Future BMAPs						**152.4**					

WINTER SPRINGS

ENTITY	PROJECT NUMBER	PROJECT NAME	PROJECT DETAIL	START DATE	END DATE	TP REDUCTION (LBS/YR)	PROJECT COST	ANNUAL O&M COST	STATUS
Winter Springs	WS-1	Solary Canal Stormwater Treatment Area	Regional Stormwater Treatment Facility consisting of an 8.0-acre wet pond and 4.8-acre wetland	1/2010	9/2010	230.0	$1,700,000	N/A	Planned & Funded
Winter Springs	WS-2	Winding Hollow Wetland Treatment Area	Divert No Name Creek flow into wetland treatment system	2020	2020	210.1	$357,000	N/A	Envisioned but Not Funded
Winter Springs	WS-3	Winter Springs and Wedgewood Filtration Devices	Retrofit stormwater outfalls with flow-through filtration devices	2020	2020	24.7	$132,000	N/A	Envisioned but Not Funded
Winter Springs	WS-4	North Orlando Townsite Filtration Devices	Retrofit eastern and western outfalls with flow-through filtration devices	2020	2020	5.2	$80,000	N/A	Envisioned but Not Funded
Winter Springs	WS-5	Highlands Regional Pond Enhancements	Expansion of existing wet pond and redirection of untreated stormwater runoff to the pond	2020	2020	64.5	$1,385,000	N/A	Envisioned but Not Funded
Winter Springs	WS-6	Education Efforts - Update Local Codes and Ordinances (Fertilizer Rule, etc.), FYN	Maximize available public education credits through Code updates, fertilizer ordinance, FYN, etc.	N/A	N/A	92.0	N/A	$3,000	Ongoing
Winter Springs	WS-7	Street Sweeping	Quarterly street sweeping of 142.7 miles	N/A	N/A	7.3	N/A	N/A	Ongoing
Winter Springs	WS-8	Existing BMPs	BMPs that were in place at the time of the TMDL	N/A	N/A	765.2	N/A	N/A	Completed
Total Projects Reduction						**1,399.0**			
Total Required Reduction 2010-2014						**513.0**			
Credit for Future BMAPs						**886.0**			

Appendix E: LID Application in the Lake Jesup Basin

The following tables summarize key LID principles (**Table E-1**) and activities (**Table E-2**) to provide local examples of how those principles are being put into place in the Basin. **Table E-3** identifies local programs and projects that have used multiple LID principles and activities to achieve water quality and/or environmental benefits. Given the success achieved by local governments, it is reasonable to expect that these types of projects will continue to be developed in the basin.

TABLE E-1: LOW IMPACT DEVELOPMENT –APPLICATION OF KEY PRINCIPLES IN THE LAKE JESUP BASIN

Key Principle	Description
Preservation and protection of environmentally sensitive features	The preservation and protection of sensitive areas that affect the hydrology of site, including streams and their buffers, floodplains, wetlands, steep slopes, high-permeability soils, and woodland conservation zones is essential to minimizing hydrologic impacts. The goal is to preserve natural features, such as wetlands, woodlands, and stream buffers, and retain their natural biodiversity. Protection occurs primarily through land use rules established at the local government level, and through Water Management District, state and local land acquisition programs.
Application within the Lake Jesup Basin • All of the communities within the Lake Jesup Basin have policies requiring minimum upland buffers from the edges of wetlands and Conservation Land Use categories that protect sensitive lands within their respective Comprehensive Plans. • Orange County established GreenPLACE (Park Land Acquisition and Conservation for Environmental Protection) to preserve and manage environmentally sensitive lands, and protect water resource lands. The program has invested $10.2 million in purchasing 582 acres of environmentally sensitive lands thus far. • Altamonte Springs has a special Conservation District zoning category and protected land use classification for environmental sensitive land that is considered to be a conservation area. Conservation areas are the floodways of a river or a wetland of sufficient size to host a viable wetland habitat. • Orlando protects environmentally sensitive lands through the utilization of the Resource Protection Overlay Future Land Use Designation and the Resource Protection Overlay Zoning District, as well as environmentally sensitive lands regulations is Chapter 63 of the City's Land Development Code. • Casselberry has a special Conservation overlay that restricts both the density and intensity of construction within the boundaries of the overlay.	
Incorporation of small-scale stormwater treatment systems integrated at the lot level	Lot-level and on-site treatment systems offer the best opportunities for maintaining more natural hydrologic functions, as well as reducing the concentration time needed to move water into larger offsite facilities, if necessary, and enhance community character. The excessive land requirements for large-scale systems and the concomitant loss of terrestrial open space area are also avoided.
Application within the Lake Jesup Basin • Article XI of the City of Oviedo Code recommends stormwater retention or detention in surface facilities, such as grassed swales. To minimize runoff, developments must maximize the infiltration of natural rainfall into the soil and minimize direct overland runoff into adjoining streets and water courses. The Code further encourages infiltration of runoff from driveways, roofs, or other impervious areas through diversion so as to flow over grassed areas whenever possible. Within recharge areas post-development rates and volumes must achieve at least 70% infiltration of all on-site stormwater. Further, impervious surfaces cannot exceed 50% of the total site area. • A general requirement of the Seminole County land development code requires that runoff from driveways, roofs or other impervious areas should be diverted so as to flow over grassed areas prior to flowing into any drainage system whenever possible. The code also allows onsite wetlands for bioretention. • The City of Sanford has specific policies in its Comprehensive Plan encouraging infiltration, roof runoff disconnects, and overland flow.	
Increasing infiltration	Mechanisms that can retain stormwater on-site yet still provide percolation facilitate both the protection of surface water quality and aquifer recharge.
Application within the Lake Jesup Basin • The entire shorelines of Lake Lily and Long Branch Canal in Maitland have been fitted with Geo-tubes to maximize infiltration of runoff and	

Key Principle	Description
minimize transport of runoff into the waterbodies. • The Casselberry stormwater Code specifically addresses and allows underground exfiltration trench systems for percolation of stormwater into the ground (Section 3-12.13). • Casselberry also requires the pre-post differential volumetric retention of all stormwater runoff for the 25 year 24 hour storm event. This requirement is more stringent than both Seminole County and SJRWMD. • The City Hall complex in Oviedo has no curb for parking, with runoff moving through vegetated areas into depressed grassed areas. • The City of Sanford has both Comprehensive Plan policies and land development regulations (Schedule M) that require swales, terraces, and berms. • Longwood is developing a regulation requiring that swales be used on at least one side of residential roadways. • Winter Springs encourages filter strips and the separation of sidewalks from curbs. • A new Winter Park ordinance allows and sets design criteria for underground stormwater systems.	
Reduction of impervious surfaces	Buildings, parking lots, sidewalks and other impervious surfaces generate large amounts of stormwater runoff that must be disposed of to prevent flooding. Reducing impervious surfaces within a site allows for more on-site retention of runoff, reducing offsite impacts.
Application within the Lake Jesup Basin • Seminole County encourages development to use joint or shared access and stormwater facilities to minimize impervious surfaces, as determined by the Development Review Manager. The County also has a "Conservation Village" area in the vicinity of Myrtle Street with a clustering of development/reduction of impervious incentive program. • Though not an official policy, the reduction of impervious parking within the City of Longwood's historic district is strongly encouraged during the site plan process. The types of impervious parking currently in use in the Historic District include crushed rock, gravel, mulch, and grass. • The City of Orlando stormwater utility has an incentive for development to reduce impervious through fee reductions.	
Site design	The consideration of LID strategies during the design phase of development is a way to minimize the impact of that development on water quality. Both regulatory and incentive-based approaches can be used to encourage development that minimizes hydrologic impacts created by the development.
Application within the Lake Jesup Basin • The United States Green Building Council is a coalition of leaders from the building industry working to promote buildings that are environmentally sustainable places to live and work. The Council developed the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ to recognize new construction or major renovations that meet a minimum standard. The system provides credits for maximizing open space, water quantity control, water quality control, the installation of water efficient landscaping, and water use reduction. • Orange County has several LEED certified staff members within both the Environmental Protection, and Building and Planning Divisions, and the Orange County Coroner's Office has been LEED accredited and certified. • The City of Sanford Downtown Overlay District requires LEED compliance for all re-construction, with two projects potentially being designed with green roofs. • Section 60.233 of the Orlando code provides landscaping requirements adjacent to lakes and wetlands that require native plantings in the littoral zone along at least 75% of the lake frontage. • Article XII of the Oviedo code has specific sections on Xeriscaping™ and lake edge landscaping, as well as tree planting and buffering requirements.	

TABLE E-2: LOW IMPACT DEVELOPMENT – KEY ACTIVITIES AND LOCAL PROJECTS

Activities	Description
Green roofs	Green roofs, also known as vegetated roof covers, are multi-beneficial structural building components that reduce roof runoff and maintain water quality by filtering, absorbing and detaining rainfall. They are constructed of a lightweight soil media, underlain by a drainage layer, and a high quality impermeable membrane that protects the building structure. The soil is planted with a specialized mix of plants that can thrive in the harsh, dry, high temperature conditions of the roof and tolerate short periods of inundation from storm events. Numerous studies have demonstrated that green roofs can provide stormwater management, economic benefits, improvements in air quality and moderation of the urban heat island effect.
Local Projects • Longwood staff are encouraging the inclusion of green roof provisions in the update of the City's Comprehensive Plan. • A City of Maitland Community Redevelopment Area (CRA) proposal is considering five locations that may include green roof systems. • One of the goals of the Green Works Orlando Pillars program is to build a roof top/balcony garden at City Hall to raise awareness of green roofs and their benefits.	
Swales and filter strips	Swales and filter strips reduce runoff velocity, provide filtration and allow for infiltration and percolation of runoff.
Local Projects • Altamonte Springs has swale systems throughout the Ronald Reagan subdivision and along Robin Road. A brochure titled "Save Our Swales" discusses the LID concept behind swales, their purpose, and maintenance requirements. • The Casselberry North Lake Triplet West Shore Revegetation project included the removal of invasive and nuisance vegetation, the installation of a water quality swale, and revegetation with native trees, shoreline plants and aquatic plants. • Chapman Road in Oviedo has curb cuts with runoff going into roadside grassed swales. • Mitchell Hammock Road in Oviedo has a center grassed swale. • The Town of Eatonville library has disconnected downspouts with runoff directed through vegetation and a grassed area to shallow depressed area. The Town Hall parking lot has runoff directed to another grassed, depressed area. • The Maitland Center in Altamonte Springs has curb cuts with all lot runoff directed to grassed swales surrounding the complex. • The Spring Hill Apartment Complex in Maitland has lot runoff directed to areas of overland flow, then to shallow depressed areas. • The 7-11 convenience store at the corner of SR 434 and Chapman Road in Oviedo has depressed grassed areas that provide onsite retention.	
Terraces and berms	Terraces and berms surrounding surface water bodies provide a last opportunity for infiltration and treatment of overland flows.
Local Projects • Schedule M of the City of Sanford LDRs requires terraces around lakes. • The Orange County Lakeshore Protection Ordinance (OCC 34-132 requires pollution abatement swales upland of streams and canals and wetlands connected to lakes. • The stormwater management section of the Casselberry Code of Ordinances (Section 3-12.3-P) requires that "waterfront properties which drain	

Activities	Description
directly into adjacent waterbodies shall utilize pre-berms, terracing, swales and natural vegetative buffers to divert, detain, and/or filter stormwater before it enters the receiving waterbody."	
Porous (permeable) pavement	Permeable paver systems are assemblies of rigid blocks that contain drainage voids for passing runoff to the subsurface, where the water is further conveyed through base materials to secondary stormwater treatment systems. They particularly help in reducing the volume of rainfall runoff where they replace impermeable sidewalks and parking lots.
Local Projects • The parking area at Memorial Park in Sanford utilizes the Geogrid system as an underlayment to the grassed parking area. • A Flexi-pave sidewalk has been installed through a Xeriscape demonstration garden located on the southwest corner of the County Administrative Offices in downtown Orlando. The garden also includes native vegetation and a low-volume irrigation system. Flexi-pave is a pour-in-place paving system made from recycled tires by Firestone. Flexi-Pave can be used in new development, replacing traditional hardscapes and serving as an infiltration zone for capturing or controlling runoff. • Seminole County is installing Flexi-pave at its Geneva Wilderness Park. • Lake Mary is utilizing funds from its stormwater utility to pave all public dirt roads with cold-mix permeable pavement. • The Holy Cross Lutheran Church and the Lake Mary Events Center in Lake Mary both have grassed parking with only paved thruways. • The Aloma Baptist Church on SR 436, in Casselberry, utilizes grassed parking throughout the complex.	
Bioretention	Bioretention facilities are small landscaped basins intended to provide water quality management by filtering stormwater runoff before release into secondary stormwater management systems. They use plants and soil to trap and treat petroleum products, metals, nutrients, and sediments. "Rain gardens" are well-known examples of bioretention areas. They are typically a depression area planted with native vegetation that is designed to take all, or as much as possible, of the excess rainwater run-off from development and its associated landscape.
Local Projects • The Maitland Springs Commercial Building complex has all lot runoff directed to a naturally vegetated retention area. • Orange County is designing a model rain garden at the Back to Nature Refuge in Orlando. • The Casselberry stormwater utility code provides an on-site retention credit of up to 50% for residential or commercial properties that exceed minimum requirements. Bioretention facilities qualify for this credit. • Facilities with rain gardens within Maitland are located at the end of George and Boynton Streets, along Packwood Street. • The Hamilton Place subdivision in Winter Park has a rain garden.	
Florida Friendly Landscaping	The objective of Florida friendly landscaping is to establish and maintain healthy landscapes by matching the right plants with existing site conditions so that the use of additional resources, such as water, fertilizer, pesticides and labor, is minimized. Existing native-plant communities are typically the best suited for the climate. By using native plants during landscaping, homeowners can reduce the amount of fertilizers and pesticides used, conserve water, provide habitat for native wildlife and preserve water quality in adjacent waterbodies.

Activities	Description
Local Projects • The Orange County landscape code requires water efficient landscaping, and specifically promotes Xeriscape™ design and maintenance principles. The code also encourages water use zones and allows no irrigation where either native plant habitat is retained, or where water efficient landscaping and irrigation is proposed. • Policy 5.7 within the Lake Mary Conservation Element discourages fertilizers and pesticides on lakefront property, and encourages the use of native and xeriscape plants as landscaping on lake front property. • Seminole County has a water conservation demonstration garden highlighting Xeriscaping and low flow irrigation methods. • The Maitland Public Works Building has an experimental irrigation test site used for investigating mechanisms to minimize landscape irrigation. • Winter Springs is a certified as "Tree City USA" through the National Arbor Day foundation. The City also funds a neighborhood improvement grant program to assist neighborhood groups within the City limits who desire to enhance landscape amenities in the community. • FDEP maintains an interactive Web site to provide information on Florida-friendly plants and landscaping (www.floridayards.org). The site provides basic information on Florida-friendly landscaping, including environmental benefits and guiding principles, and includes a database of native Florida plants.	
Buffers	The use of open space or vegetated buffers minimizes direct stormwater impacts to streams and wetlands. Vegetated buffers in particular, slow overland runoff velocities. SJRWMD has permit requirements of a minimum development buffer of 25 ft adjacent to wetlands, as well as more stringent requirements for properties adjacent to Outstanding Florida Waters or within special rule areas.
Local Projects • All of the communities in the Lake Jesup Basin have open space and yard regulations to provide open space around and between structures that serve to provide opportunities for overland flow of runoff. • The City of Lake Mary created an Environmental Buffer Zone adjacent to each Wetland Protection Zone that extends 25 feet landward of the boundaries of the Wetland Protection Zone (Chapter 160 – Resource Protection Standards). Commercial development must maintain a 200-foot setback from this secondary zone. In the case of single-family development a 75-foot setback is established. • Maitland is using volunteer groups to assist with the re-planting of native trees and undercanopy plants along the shoreline of Lake Nina. Signage along a boardwalk describes the vegetation and principles of LID. • The Longwood development code requires a 50 foot buffer on lakefront properties with no variances allowed. The City's Comprehensive Plan also requires a minimum of 50% xeric or native plantings for landscape. Article III of the Longwood Code of Ordinances encourages clustering development as a means of preserving open space.	
Lakeshore Protection	Lakeshore protection, as an LID activity, is important in the Lake Jesup basin because of the large numbers of lakes within the basin boundaries. The water quality management of these lakes is a priority for the local communities.
Local Projects • Maitland has a full-time Lakes Management Coordinator that implements a Lakes Management Plan. A recent project was the installation of swales and reverse berms around Lake Sybelia. • Seminole County, Altamonte Springs, Casselberry and Orlando are all participants in the Florida LAKEWATCH program. Florida LAKEWATCH is a volunteer citizen lake monitoring program that facilitates "hands-on" citizen participation in the management of Florida lakes through	

Activities	Description
monthly monitoring activities • Altamonte Springs has a brochure on lakefront living that encourages shoreline berms or swales, and discusses the importance of shoreline vegetation and native plants for landscaping. Article IV of the Code of Ordinances specifically addresses lakeshore protection and has provisions for landscaping, water quality and buffering. • The Casselberry lakeshore protection ordinance requires that only native vegetation shall be planted and maintained within the shoreline and lakefront littoral zone. Further, a shoreline protection plan is required that shall include a plan that describes procedures to ensure minimal impacts to water quality. • The Casselberry Stormwater, Lake Management and Water Quality Master Plan includes many LID-related best management practices, plans for lakeshore revegetation, swale and reverse berm guidelines, and public outreach elements. As part of this, Casselberry has developed a Lake Management Guide for lakefront property owners and hosts targeted lakefront workshops for City residents. • The Winter Park Lakes Division manages and maintains all city lakes and waterways through aquatic weed control, access management, canal maintenance, and water quality monitoring. The Division also produces a quarterly "Waterways" newsletter. A city Ordinance requires a lakefront berm for all new and re-developed properties. • Orange County has an ordinance for Lakeshore Protection located in Chapter 15 Article VII of the county code.	
Education and Outreach	Public education and outreach initiatives are the most direct means of providing the public and development community with an awareness and understanding of LID strategies and their role in providing for environmentally sound development practices.
Local Projects • The City of Longwood has produced two stormwater management guides that list numerous LID concepts. One of the guides is designed for homeowners while the other guide targets builders. The citizen's guide encourages the planting and maintenance of vegetation on bare and sloped areas; the routing of roof drainage to lawns, paved driveways, or collection (rain) barrels; and the preservation of existing vegetation. • Orange County has a "Green Building" brochure that promotes water efficient landscaping using native plants, the use of an efficient irrigation system and landscaping designed to prevent water from running off property. A stormwater fact sheet promotes the installation of rain barrels and rain gardens to collect roof runoff. • Orange County also held an LID workshop on February 15, 2008, designed for local governmental staff, elected officials, and building, design, and engineering professionals. The workshop discussed water conservation, open space preservation, native tree canopies, rain gardens, green roofs, permeable paved surfaces, resource efficient landscaping and irrigation, and other LID stormwater management strategies used for water resource protection. • The Orange County Extension Office holds rain barrel workshops and maintains a model rain barrel at its office. • Both Orange and Seminole County participate in the Florida Yards and Neighborhoods Program (FYN). FYN is an environmental educational program of the University of Florida Extension Service, implemented at the county level, to inform homeowners on how they can be more environmentally friendly with their landscape practices, helping to protect Florida's natural environment for future generations. The objectives of Florida Yards & Neighborhoods programs are to reduce stormwater runoff, decrease non-point source pollution, conserve water, enhance wildlife habitat, and create beautiful landscapes. Other partners include the cities of Sanford, Orlando, Casselberry, and Longwood. • Seminole County operates Seminole County Television (SCTV) that shows public service announcements instructing residents that only rain should go down storm drains, not oil or grass clippings. The County also produces a Citizens Guide to Understanding Stormwater that discusses permeable pavement, rain barrels, rain gardens, grassy swales, and vegetated filter strips. They produce a DVD titled the "Citizens	

Activities	Description
	Guide to Lake Management" that includes discussions of LID concepts. Finally, the County maintains a stormwater inlet marking program, a water resources atlas that discusses LID and operates a water conservation demonstration garden. • Orange County operates Orange TV, which provides many of the same types of commercials and programs as SCTV. • Orange County, Seminole County, and SJRWMD are sponsors of the Watershed Action Volunteer (WAV) Program that provides educational outreach and volunteer water quality monitoring. The WAV program implements activities that promote "Rain Gardens", onsite management of stormwater quantity and quality, and Florida Friendly Landscaping methods, all LID implementation strategies. • Maitland is a strong proponent of phosphorus-free fertilizers and has established the "Maitland for Quality" zero phosphorus program to instruct applicators. The City currently has a zero fertilizer or phosphorus application policy on city properties. The City also has a citizen's guide to the city's lakes, and a guide to stormwater pollution prevention. • Casselberry has a how-to guide on designing a waterwise landscape that includes zoning of irrigation for more efficient watering. • The Orlando Stormwater Division has school outreach programs, the stormwater drain signs project, and a yearly training program on BMPs for landscaping for all city contractors. The City also has a public awareness specialist to promote rain gardens and other non-structural approaches to stormwater management. • SJRWMD is supportive of LID from an outreach and education perspective and developed an LID fact sheet for the public (http://sjrwmd.com/publications/pdfs/fs_lowimpactdevelopment.pdf). The District has provided both financial and staff support to the Orange and Seminole county LID workshops.

TABLE E-3: LOCAL MULTI-STRATEGY LOW IMPACT DEVELOPMENT PROGRAMS AND PROJECTS

Project	Description
Lake Mary City Park	The Lake Mary City Park, located on the northeast corner of Rinehart Road and Lake Mary Blvd, has a series of vegetated swales to collect parking lot runoff. The park also has a sizable rain garden planted with a variety of native wetland vegetation. This rain garden receives all the drainage from this major intersection and is likely fully inundated during storm events.
Casselberry	The City is re-developing Anniversary Park at the City Hall complex, and construction plans include demonstration rain gardens, pervious pavements, a model baffle box with a plexiglas cover for viewing the inside, model exfiltration trenches, extensive wetland re-vegetation, swales and berms, Florida-friendly landscaping, stormwater harvesting for irrigation, and an educational boardwalk. Construction is expected to be completed in 2009. Section 6.7.2 of the City's Stormwater Master Plan, which was adopted in September 2007, specifically addresses additional city opportunities for post-construction stormwater management. The section provides a partial listing and descriptions of stormwater Best Management Practices contained in EPA literature (http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm) and elsewhere to reduce runoff volumes and improve downstream water quality. A brief description of reverse berms systems, roadway swales, wetland treatment systems, multi-component pollution abatement facilities, exfiltration trenches, inlets in grass, baffle boxes, LID, green roofs, and bioretention, among others, is given.
Maitland Lakes Management Incentive	The City of Maitland's Lakes Management Division offers following lakes management incentive programs:

Project	Description
Programs	• **Shoreline Revegetation Program -** The City will reimburse qualified residents up to 50% of the cost to purchase and install aquatic plants along their property shoreline. A maximum one-time reimbursement of $200 is being offered. • **Wetland Tree Planting Program -** Bald Cypress trees are native to Florida and provide valuable wildlife habitat, as well as beauty to your shoreline. The City is offering lakefront homeowners up to three, 8-10 foot tall, bald cypress trees at a cost of only $25 per tree. A City representative will work with the homeowner to establish the ideal location for the trees to ensure that the trees will benefit the lake and the shoreline. • **Environmental Swale Program -** The construction of swales helps treat stormwater runoff, as well as prevent sediment, debris, and petroleum-based products, such as oil and grease, from entering our lakes. A City representative will help establish the best location for the swale to ensure that the lakes/canals have maximum benefit. The City of Maitland will pay for 20% of the cost to grade and sod the swale, or $500 per property, whichever is less. • **Fertigation Program -** Fertigation is the application of frequent, but very small doses of fertilizer (phosphorus-free), through a homeowner's irrigation system. The fertigation system is inexpensive; locally available; and helps reduce the amount of phosphorus polluting our lakes. The City is offering new fertigation users a gift certificate redeemable from a local supplier for up to two (2) 40- pound bags of phosphorous-free fertilizer.
Orlando Green Programs	• **Orlando Green Business Program -** The goal of the Orlando Green Business Program is to reach out to the local business community through incentives and education, ensuring pollution prevention and water quality protection of the lakes within the City of Orlando. • **Green Works Orlando -** Green Works Orlando is an environmental action agenda designed to transform Orlando into an environmentally-conscious city. Immediate goals are to conserve natural resources and protect the environment and to increase the amount of trees and green spaces in the city.
Florida Green Building Coalition	Orlando, Orange County, and Seminole County are members of the Florida Green Building Coalition (FGBC), a nonprofit Florida corporation dedicated to improving the built environment. The mission of the coalition is "to provide a statewide green building program with environmental and economic benefits."The resources offered by the FGBC include five green building standards (listed below), the annual GreenTrends Conference, resources for finding green products and professionals, and education programs for industry professionals, consumers and government entities. FGBC Certification Programs • Green Home Standard • Green Development Standard • Green High Rise Standard • Green Local Government Standard for Green Cities and Counties • Green Commercial Buildings Standard

Appendix F: LAKE JESUP MONITORING PLAN SUPPLEMENTAL INFORMATION

Table F-1 outlines the BMAP monitoring network stations and additional stations that the stakeholders currently sample that could be used to supplement the information gathered from the BMAP monitoring network in order to achieve the objectives of the monitoring plan. The column "Station Type" identifies which type of monitoring (water quality, flow, storm event, or biology) will occur at the station. The table also identifies the responsible entity, frequency of sampling, the parameters that will be monitored, and the year the site was established. The sub-basin that each station is located in is identified along with the local station identifier. **Figure F-1** though **Figure F-7** show the locations of the monitoring sites in the basin.

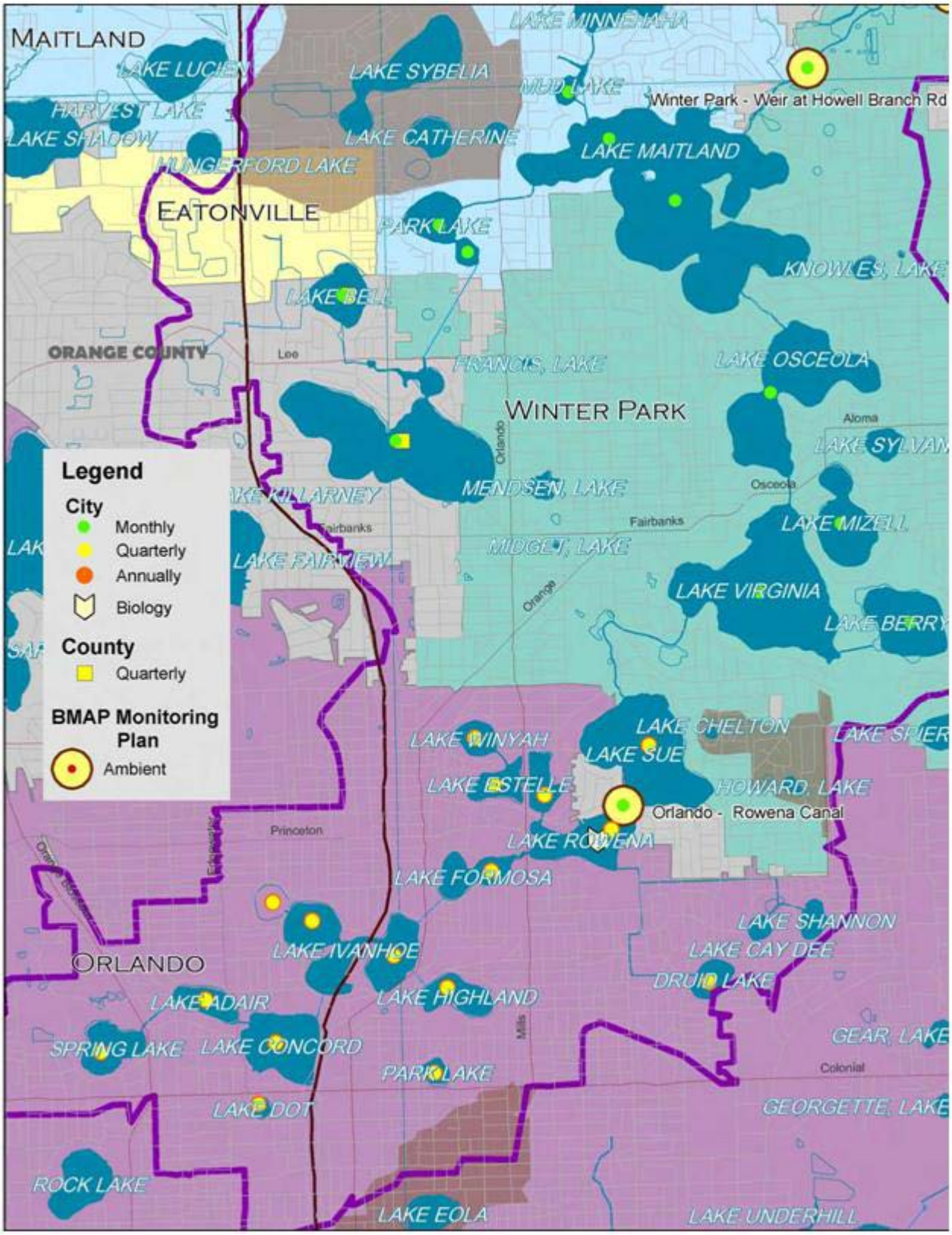


FIGURE F-1: MONITORING STATIONS IN ORLANDO AND WINTER PARK

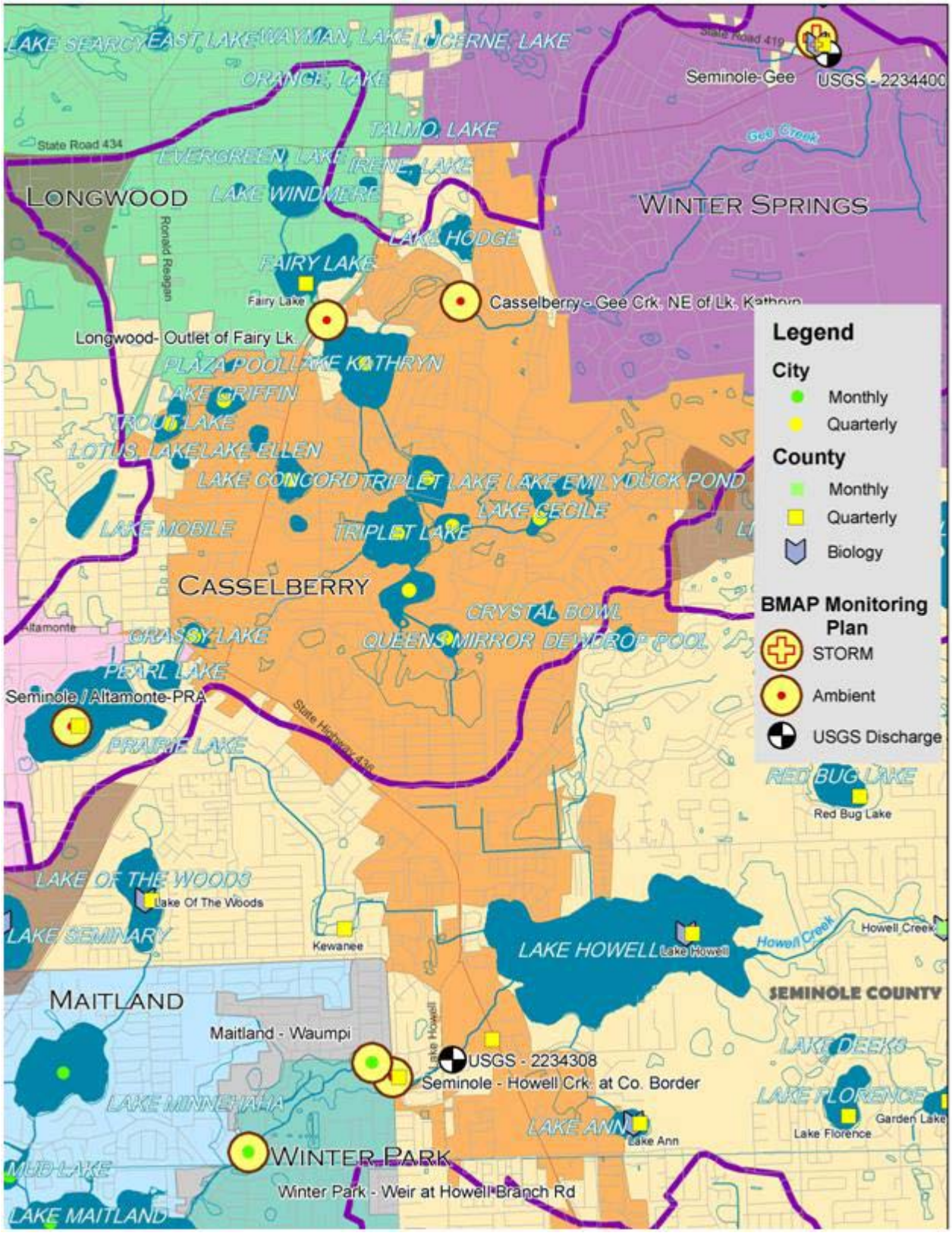


FIGURE F-2: MONITORING STATIONS IN MAITLAND, CASSELBERRY, LONGWOOD, WINTER SPRINGS, AND SEMINOLE COUNTY

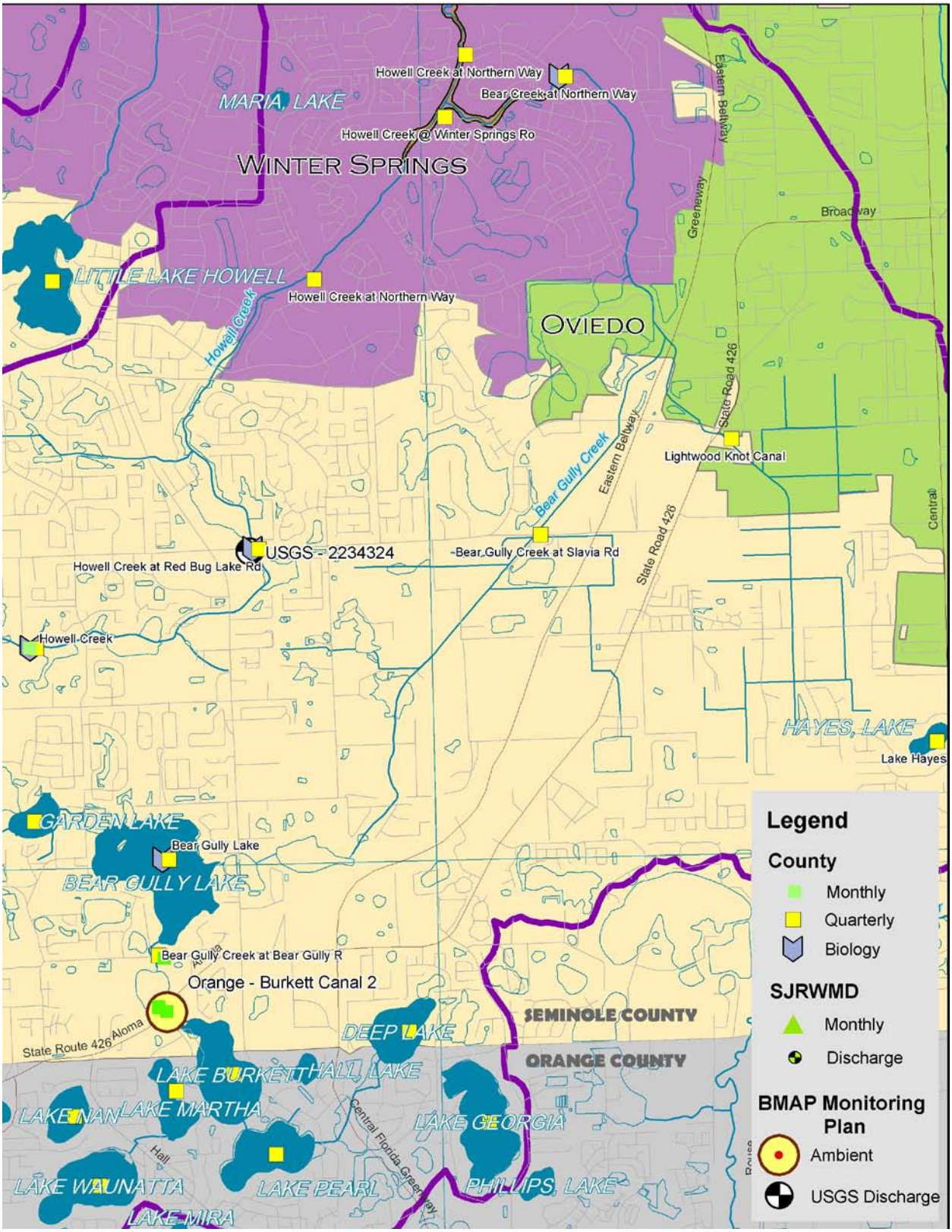


FIGURE F-3: MONITORING STATIONS IN ORANGE COUNTY, SEMINOLE COUNTY, WINTER SPRINGS, AND OVIEDO

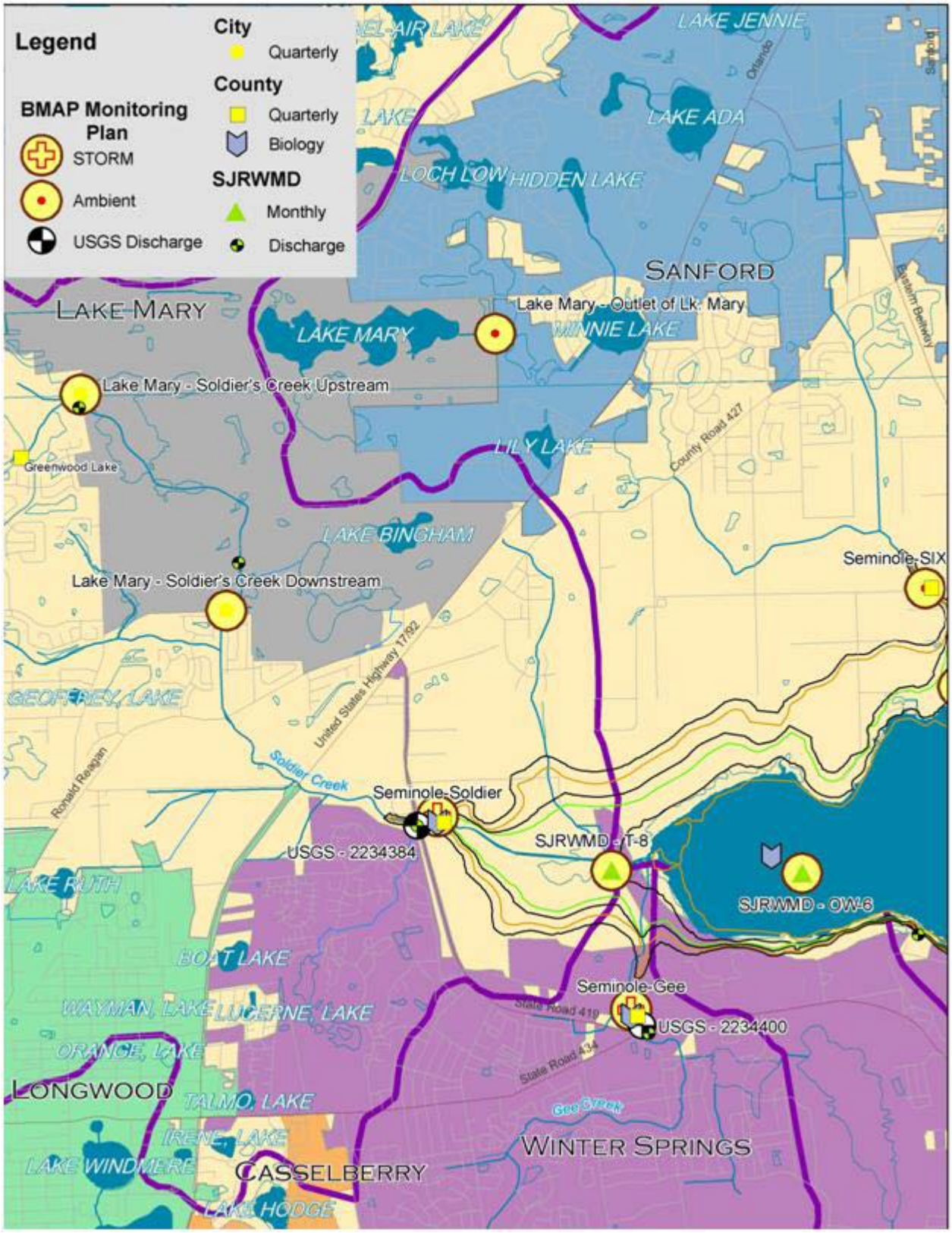


FIGURE F-4: MONITORING STATIONS IN WINTER SPRINGS, LAKE MARY, AND SANFORD

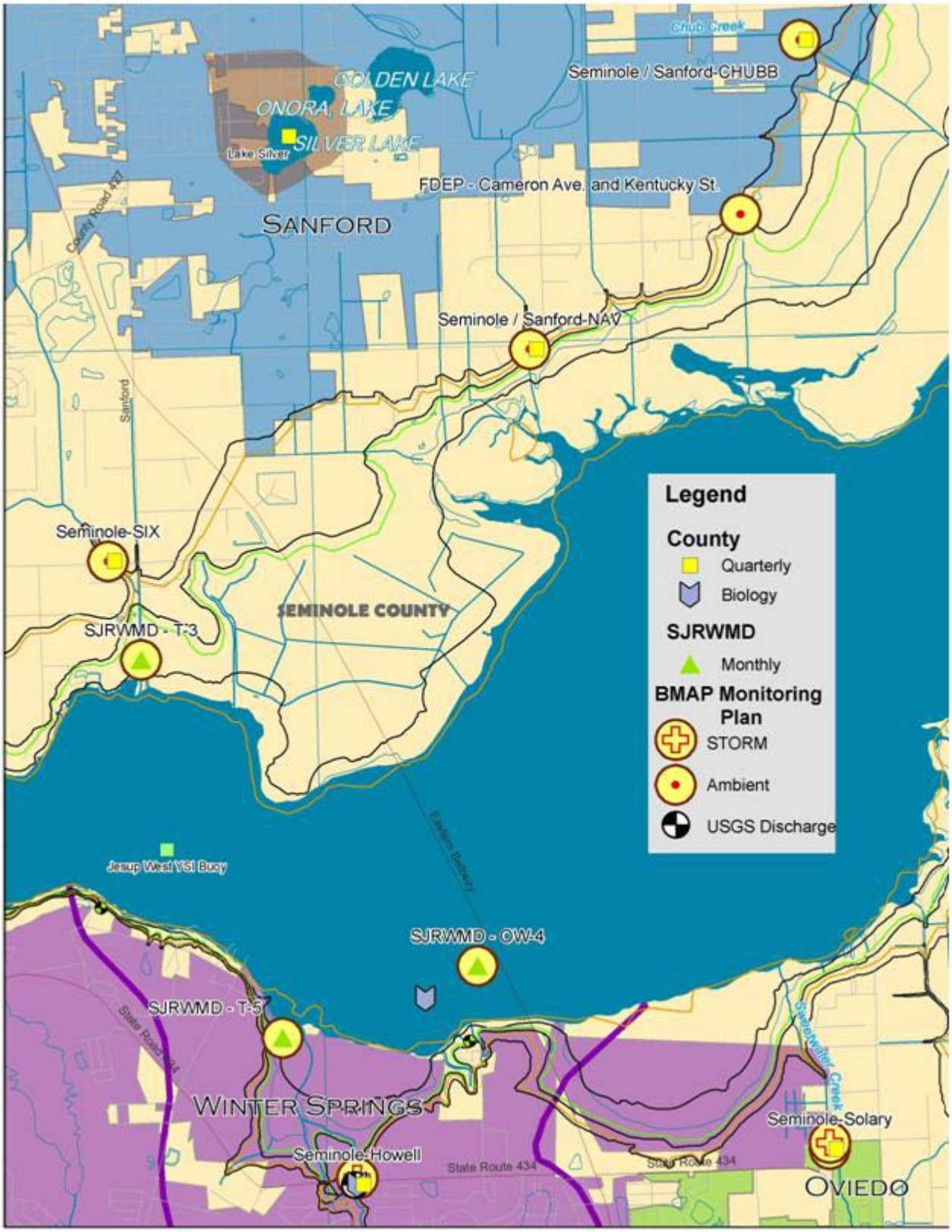


FIGURE F-5: MONITORING STATIONS IN SEMINOLE COUNTY, SANFORD, AND LAKE JESUP

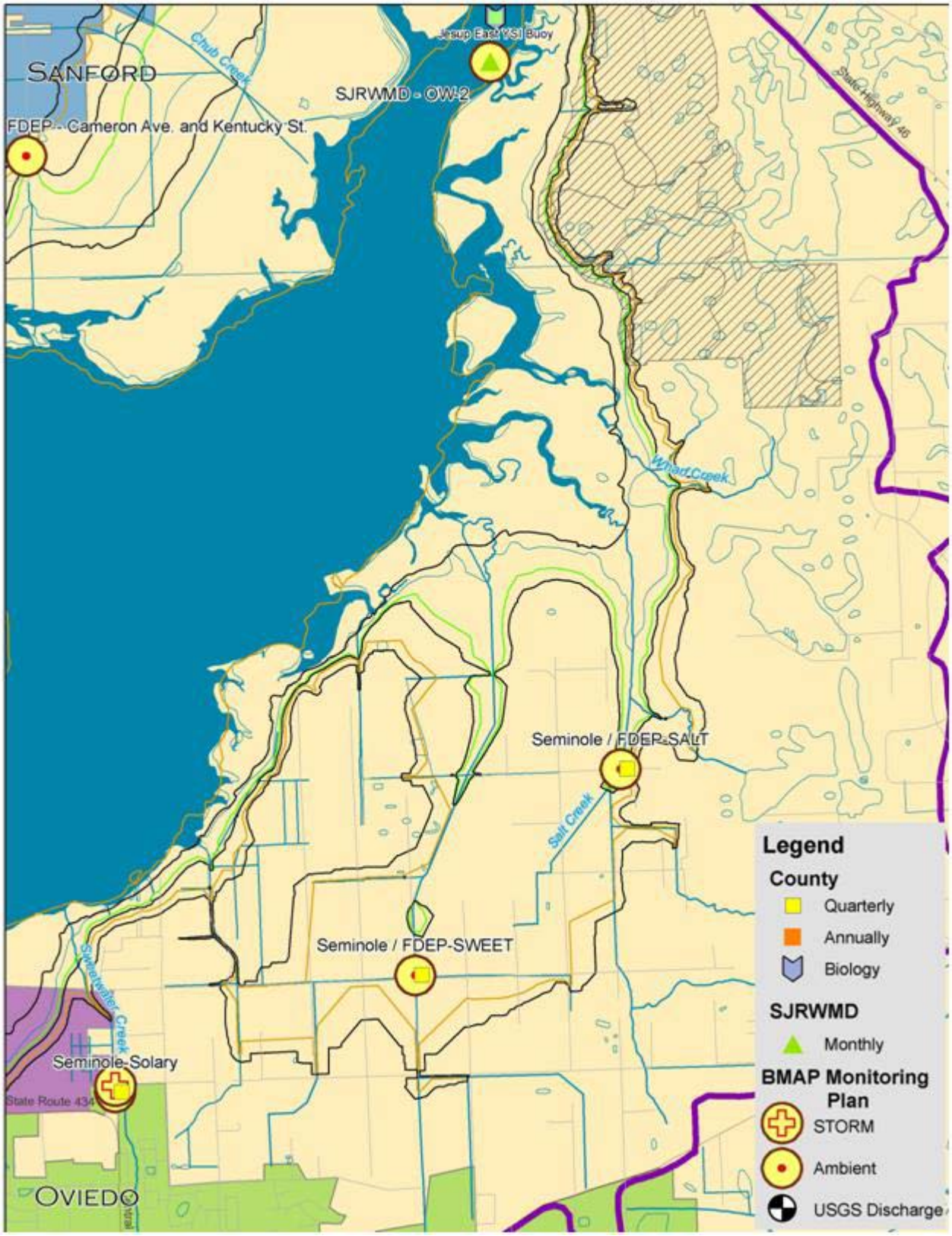


FIGURE F-6: MONITORING STATIONS IN SEMINOLE COUNTY AND LAKE JESUP

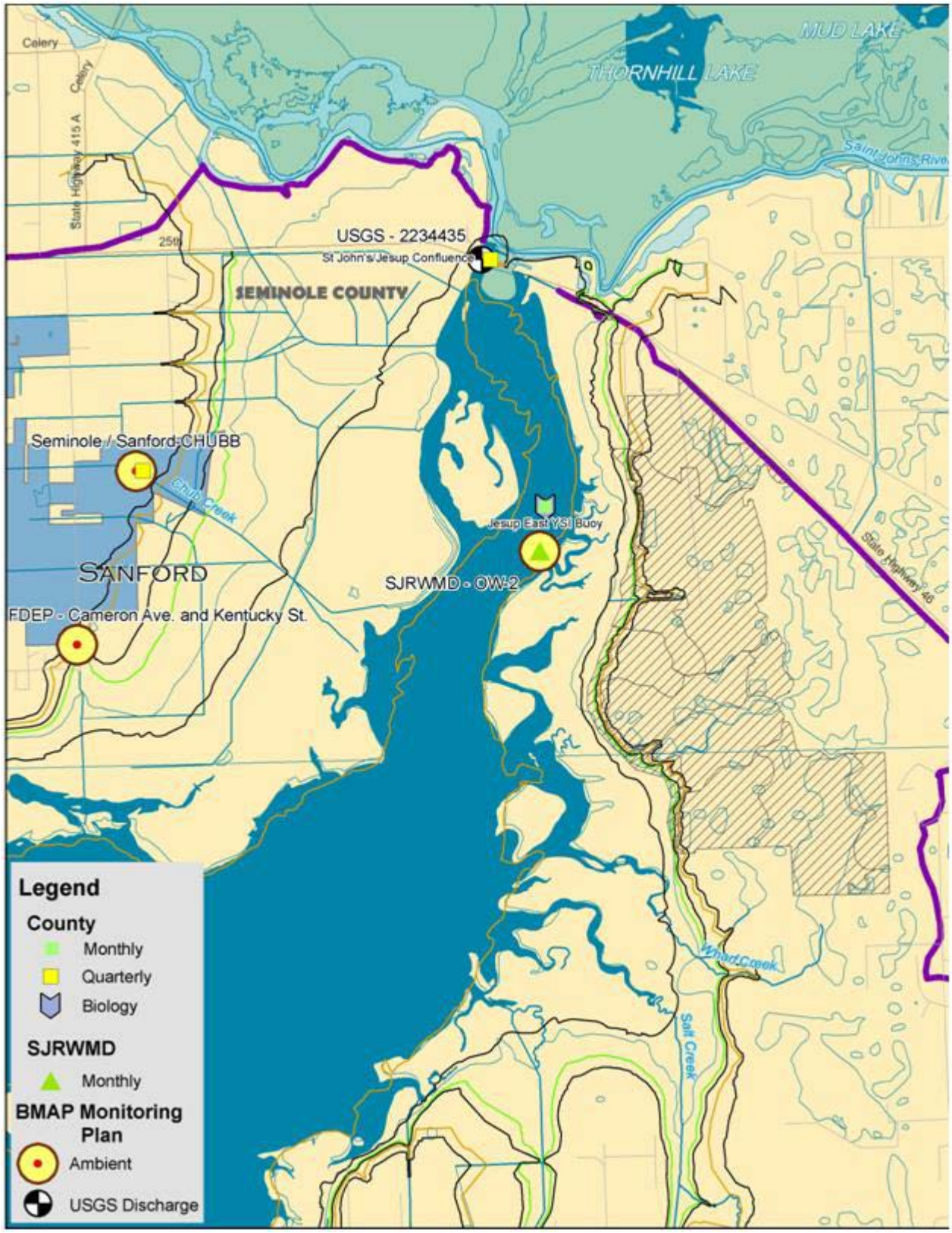


FIGURE F-7: MONITORING STATIONS IN LAKE JESUP

TABLE F-1: MONITORING STATIONS IN THE LAKE JESUP BASIN

SUB-BASIN	SAMPLING ENTITY	STATION ID	STATION DESCRIPTION	STATION TYPE	SAMPLING FREQUENCY	YEAR SITE EST.	SAMPLING PARAMETERS
Bear Gulley	Orange County	HB4	Lake Burkett Center	Water Quality	Quarterly	1967	Field parameters, water chemistry, nutrients, bacteria, metals, chlorophyll-a
		HB62	Lake Martha Center			2007	
		HB29	Lake Nan Center			1971	
		HB47	Deep Lake Center			1990	
		HB40	Lake Waunatta Center			1971	
		HB33	Lake Pearl Center			1971	
		HB14	Lake Georgia Center			1967	
Bear Gulley	Orange County	Burkett Canal 1	Burkett and FDOT pond discharge	Water Quality	Monthly	2007	Field parameters, flow, discharge, nutrients, bacteria
		Burkett Canal 2	Lake Burkett Discharge Upstream of Aloma			2007	
		Burkett Outfall	FDOT pond discharge			2007	
		Burkett Canal 3	FDOT Canal			2007	
Howell Creek	Maitland	Gem	Lake Gem	Water Quality	Monthly		Dissolved oxygen (DO), pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, total suspended solids (TSS), total dissolved solids (TDS), ammonia as N, nitrate/nitrite as N, phosphorous, TN, volatile TSS, orthophosphate as P, TKN
		Maitland	Lake Maitland				
		Minnehaha	Lake Minnehaha				
		Nina	Lake Nina				
		Park	Lake Park				
		Waumpi	Lake Waumpi				
Howell Creek	Orange County	HB21	Lake Killarney Center	Water Quality	Quarterly	1967	Field parameters, water chemistry, nutrients, bacteria, metals, chlorophyll-a, bathymetry
		HB2	Lake Bell Center			1995	
Howell Creek	Orange County	HBC	Howell Creek at 436	Water Quality	Quarterly	1972	Field parameters, water chemistry, nutrients, bacteria, metals, chlorophyll-a, invertebrates
Howell Creek	Orlando	Spn	Spring Lake NW	Water Quality	Annually	1994	Non-ultratrace metals: beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, mercury, nickel, selenium, silver, zinc, hardness (calculation)
		Ad	Lake Adair			1994	
		Co	Lake Concord			1994	
		Ie	Lake Ivanhoe - East			1994	
		Im	Lake Ivanhoe - Middle			1994	
		Iw	Lake Ivanhoe - West			1994	
		Hi	Lake Highland			1994	
		Fm	Lake Formosa			1994	
		Wi	Lake Winyah			1994	
		Ee	Lake Estelle - East			1994	
		Ew	Lake Estelle - West			1994	
		Rw	Lake Rowena			1994	
		Su	Lake Sue			2000	

Sub-Basin	Sampling Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Est.	Sampling Parameters
		Dr	Lake Druid			1995	
		Dt	Lake Dot			1995	
		Pr	Park Lake			1994	
Howell Creek	Orlando	Spn	Spring Lake NW	Water Quality	Quarterly	1989	Field parameters: pH, specific conductance, DO, DO % saturation, temperature, depth, secchi + alkalinity, CBOD, nutrients, TDS, TSS, TVSS, chlorophyll a (corrected), turbidity, fecal coliform
		Ad	Lake Adair			1989	
		Co	Lake Concord			1988	
		Ie	Lake Ivanhoe - East			1986	
		Im	Lake Ivanhoe - Middle			1987	
		Iw	Lake Ivanhoe - West			1987	
		Hi	Lake Highland			1989	
		Fm	Lake Formosa			1987	
		Wi	Lake Winyah			1986	
		Ee	Lake Estelle - East			1987	
		Ew	Lake Estelle - West			1988	
		Rw	Lake Rowena			1987	
		Su	Lake Sue			1988-1991; 2000-present	
		Dr	Lake Druid			1990	
		Dt	Lake Dot			1987	
		Pr	Park Lake			1988	
Howell Creek	Orlando	Rowena Canal	In the canal that connects Lake Rowena to Lake Sue	Flow	Monthly	2008	Flow
Howell Creek	Orlando	Lake Rowena	LCI Lake Rowena	Biology	Bi-annually	2008	Lake Condition Index
Howell Creek	Winter Park	Lake Sue	Lake Sue @ center of lake	Water Quality	Monthly	1995	TN,TKN, NOx, TP, temp, pH, DO, chlorophyll-a, fecal coliform, secchi depth
		Lake Virginia	Lake Virginia @ center of lake			1995	
		Lake Berry	Lake Berry @ center of lake			1995	
		Lake Mizell	Lake Mizell @ center of lake			1995	
		Lake Osceola	Lake Osceola @ center of lake			1995	
		Lake Maitland	Lake Maitland @ center of lake			1995	
		Lake Bell	Lake Bell @ center of lake			1995	
		Lake Killarney	Lake Killarney @ center of lake			1995	
Howell Creek	Winter Park	Howell Creek	10' Upstream of Weir at Howell Branch Road	Water Quality	Monthly	1995	TP

Sub-Basin	Sampling Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Est.	Sampling Parameters
Soldier's Creek	Lake Mary	Longwood Lake Mary Rd. downstream of culvert	Soldier's Creek Upstream	Water Quality	Monthly	2005	Chlorophyll-a (corrected), TP, orthophosphate as P, ammonia as N, nitrate/nitrite as N, TKN, BOD, specific conductance, DO, pH, temperature, TSS
		Behind Austin Street upstream of culvert	Soldier's Creek Downstream			2005	
		New station	Outlet of Big Lake Mary			New	
Gee Creek	Casselberry	New Station	Gee Creek northeast of Lake Kathryn	Water Quality	Monthly	New	Chlorophyll-a (corrected), TP, orthophosphate as P, ammonia as N, nitrate/nitrite as N, TKN, BOD, specific conductance, DO, pH, temperature, TSS
	FDEP	New Station	Cameron Avenue and Kentucky Street	Water Quality	Monthly	New	Chlorophyll-a (corrected), TP, orthophosphate as P, ammonia as N, nitrate/nitrite as N, TKN, BOD, specific conductance, DO, pH, temperature, TSS
	Longwood	New station	Fairy Lake	Water Quality	Monthly	New	Chlorophyll-a (corrected), TP, orthophosphate as P, ammonia as N, nitrate/nitrite as N, TKN, BOD, specific conductance, DO, pH, temperature, TSS
	Seminole County	ANN	Lake Ann	Biology	Annually	2004	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, TDS, ammonia as N, nitrate/nitrite as N, phosphorous, TN, volatile TSS, Orthophosphate as P, BOD, color, TKN
		BGU	Bear Gully Lake			2005	
		HOW	Lake Howell			2004	
		LOW	Lake Of The Woods			2002	
		SEM	Lake Seminary				
	Seminole County	SOL	Soldiers Creek	Biology	Annually	2004	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, phosphorous, TN, volatile TSS, orthophosphate as P, BOD, TKN
		GEE	Gee Creek			2004	
	Seminole County	HCRB	Howell Creek at Red Bug Lake Rd	Biology	Annually	2004	DO, pH, flow, specific conductance, temp, water depth, chlorophyll-a, coliform, ammonia as N, nitrate/nitrite as N, TP, orthophosphate as P, TKN
		HCTF	Howell Creek			2004	
		HOWC	Howell Creek at W SR 434			2008	
		BERC	Bear Gully Creek at Northern Way			2007	
	Seminole County	J1	Jesup 1	Biology	Annually	2004	
		J2	Jesup 2	Biology	Annually	2004	
		J3	Jesup 3	Biology	Annually	2004	

Sub-Basin	Sampling Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Est.	Sampling Parameters
	Seminole County	BERC	Bear Gully Creek at Northern Way	Water Quality	Quarterly	2007	DO, pH, flow, specific conductance, temp, water depth, chlorophyll-a, coliform, ammonia as N, nitrate/nitrite as N, TP, orthophosphate as P, TKN
		BGC	Bear Gully Creek at Bear Gully Rd			2007	
		BGSL	Bear Gully Creek at Slavia Rd			2008	
		HCCB	Howell Creek at County Border			2007	
		HCRB	Howell Creek at Red Bug Lake Rd			2007	
		HCTF	Howell Creek			2007	
		HCWS	Howell Creek @ Winter Springs Road			2008	
		HOWC	Howell Creek at W SR 434			1998	
		LKC	Lightwood Knot Canal			2008	
		NW-N	Howell Creek at Northern Way			2008	
		NW-S	Howell Creek at Northern Way			2008	
	Seminole County	BGU	Bear Gully Lake	Water Quality	Quarterly	1999	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, TDS, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, color, TKN
		FAR	Fairy Lake			2001	
		FLO	Lake Florence			1999	
		GAR	Garden Lake			1999	
		HAY	Lake Hayes			2000	
		KEW	Kewanee			2000	
		LOW	Lake Of The Woods			1999	
		RED	Red Bug Lake			1999	
		SIL	Lake Silver			2008	
		ANN	Lake Ann			1999	
	Seminole County/ Casselberry	HOW	Lake Howell	Water Quality	Bimonthly	1998	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, TDS, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, color, TKN
	Seminole County	ML01	Greenwood Lake	Water Quality	Quarterly	1997	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, TDS, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, color, metals, TKN

Sub-Basin	Sampling Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Est.	Sampling Parameters
	Seminole County/FDEP	SALT	Salt Creek at Packard Ave.	Water Quality	Quarterly/Fill in for monthly	2003	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, TDS, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, color, metals, TKN
	Seminole County	JES	St John's/Jesup Confluence	Water Quality	Quarterly	1998	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, TKN
	Seminole County/Oviedo	SOLARY	Solary Canal	Water Quality	Quarterly/Fill in for monthly	2004	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, Total Dissolved Solids, Ammonia as N, Nitrate/Nitrite as N, Phosphorous, TN, Volatile TSS, Orthophosphate as P, BOD, Color, TKN
	Seminole County/ Altamonte Springs	PRA	Prairie Lake	Water Quality	Quarterly/Fill in for monthly	1999	DO, pH, secchi depth, specific conductance, temp, water depth, chlorophyll-a, coliform, alkalinity, TSS, total dissolved solids, ammonia as N, nitrate/nitrite as N, phosphorous, TN, volatile TSS, Orthophosphate as P, BOD, color, TKN
	Seminole County/FDEP	SWEET	Sweetwater Creek at Howard Ave.	Water Quality	Quarterly/ Fill in for monthly	2004	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, metals, TKN
	Seminole County/Sanford	NAV	Naval Canal at Pineway	Water Quality	Quarterly/Fill in for monthly	2000	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, TKN
	Seminole County	SIX	Six Mile Creek at Myrtle	Water Quality	Quarterly	2000	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, TKN
		SOL	Soldiers Creek			1998	
		GEE	Gee Creek			1998	

Sub-Basin	Sampling Entity	Station ID	Station Description	Station Type	Sampling Frequency	Year Site Est.	Sampling Parameters
	Seminole County/Sanford	CHUBB	Chub Creek at E Lake Mary Blvd	Water Quality	Quarterly/Fill in for monthly	2007	DO, pH, specific conductance, temp, water depth, flow, chlorophyll-a, coliform, alkalinity, TSS, TDS, color, ammonia as N, nitrate/nitrite as N, TP, TN, volatile TSS, orthophosphate as P, BOD, metals, TKN
	Seminole County	Howell	Howell Creek at W SR 434	Storm	Storm	2000	TSS, nitrate/nitrite as N, TN, ammonia as N, TKN, TP, BOD5, fecal coliform
		Solary	Solary Canal at Deleon Street			2001	
		Gee	Gee Creek at SR 434			2000	
		Soldier	Soldiers Creek at SR 419			2000	
		Six	Six Mile Creek at Myrtle Street			2000	
	Seminole County	JESUP-E	Jesup East YSI Buoy	YSI	Every 15 Minutes	2003	DO, pH, specific conductance, temp, turbidity, chlorophyll
		JESUP-W	Jesup West YSI Buoy			2003	
		HOW	Howell YSI Buoy			2006	
	SJRWMD	T-3	Six Mile Creek at Sanford Ave Canal NE of Lk Jesup	Water Quality	Monthly	1995	Field parameters, water chemistry, metals
		T-5	Howell Creek Delta on SW end of Lake Jesup			1995	
		T-8	Gee and Soldier Creek Delta west of Lake Jesup			1995	
	SJRWMD	OW-2	Lk Jesup off Grassy Point	Water Quality	Monthly	1995	Field parameters, water chemistry, metals, chlorophyll-a, light attenuation, plankton
		OW-4	Lk Jesup W of bridge betwn Whites Lndg & Bird Island			1995	
		OW-6	Lk Jesup off center of Far W Arm			1995	
Howell Creek	USGS	2234308	Howell Creek near Altamonte Springs, FL	Flow	60-min	1996	gage height (recorded) --discharge (computed)
		2234324	Howell Creek near Slavia, FL			1972	
		2234344	Howell Creek at State Hwy 434 near Oviedo, FL			1973	
Soldier Creek	USGS	2234384	Soldier Creek near Longwood, FL	Flow	60-min	1972	gage height (recorded) --discharge (computed)
Gee Creek	USGS	2234400	Gee Creek near Longwood, FL	Flow	60-min	1972	gage height (recorded) --discharge (computed)
Lake Jesup	USGS	2234432	Lake Jesup at State Highway 417 near Oviedo, FL	Water Quality	60-min	2008	water temperature (recorded) --specific conductance (recorded) --dissolved oxygen (recorded)
Lake Jesup	USGS	2234435	Lake Jesup outlet near Sanford, FL	Flow	15-min	1941	gage height (recorded) --velocity (recorded) --discharge (computed)

Appendix G: SITE 10 ANALYSES

This appendix includes the following supporting documentation:

1. CDM Memorandum “City of Sanford Site 10 Data Evaluation” dated February 27, 2007.
2. FDEP “Ground Water Assessment Report: Site 10 Lake Jesup Watershed, Sanford Florida” dated March 10, 2008.
3. CDM Memorandum "City of Sanford Site 10 – Lake Jesup Basin Management Action Plan (BMAP) Activities” dated July 24, 2009.

Appendix H: GLOSSARY OF TERMS

303(d) List: The list of Florida's waterbodies that do not meet or are not expected to meet applicable water quality standards with technology-based controls alone.

305(b) Report: Section 305(b) of the CWA requires states to report biennially to the USEPA on the quality of the waters in the state.

Atmospheric deposition: Pollutants, from a variety of sources, which settle out of air by gravity or are deposited onto land or into lakes, rivers and other bodies of water by wind and rain.

Background: The condition of waters in the absence of man-induced alterations.

Baffle box: An underground stormwater management device that uses barriers (or baffles) to slow the flow of untreated stormwater, allowing particulates to settle out in the box before the stormwater is released into the environment.

Baseline period: A period of time used as a basis for later comparison.

Baseline loading: The quantity of pollutants in a waterbody, used as a basis for later comparison.

Basin Management Action Plan (BMAP): The document that describes how a specific TMDL will be implemented; the plan describes the specific load and wasteload allocations as well as the stakeholder efforts that will be undertaken to achieve an adopted TMDL.

Basin status report: For the Middle St. Johns, this document was published in March 2003 by the Florida Department of Environmental Protection. The report documents the water quality issues, list of water segments under consideration for a TMDL, and data needs in the Middle Basin.

Best available technology (BAT) economically achievable: As defined by 40 CFR, §125.3, outlines technology-based treatment requirements in permits.

Best management practices (BMPs): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from nonpoint sources.

Biochemical oxygen demand (BOD): The amount of dissolved oxygen utilized by aquatic microorganisms.

Biomass: The total living biological material in a given area.

Clean Water Act (CWA): The Clean Water Act is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States.

Continuous deflective separation (CDS) Unit: A patented stormwater management device which uses the available energy of the storm flow to create a vortex to cause a separation of

solids from fluids. Pollutants are captured inside the separation chamber while the water passes out through the separation screen.

Designated use: Uses specified in water quality standards for each waterbody or segment (such as drinking water, swimmable, fishable).

Detention pond: A stormwater system that delays the downstream progress of stormwater runoff in a controlled manner, typically by using temporary storage areas and a metered outlet device.

Development of regional impact (DRI): A large development (such as a regional transportation facility, shopping center, commercial building, large subdivision, etc.), which generates effects that cross political jurisdictional lines.

Dissolved oxygen (DO): The amount of oxygen gas dissolved in a given volume of water at a particular temperature and pressure, often expressed as a concentration in parts of oxygen per million parts of water.

Dry season: The dry part of the year when rainfall is low; in the Lake Jesup basin the dry season is defined as November through May.

Environmental Protection Agency (EPA): The United States Environmental Protection Agency was created in December 1970 to address the nation's urgent environmental problems and to protect the public health. The majority of FDEP's regulatory programs has counterparts at the EPA or is delegated from the EPA.

Event mean concentration: The flow-weighted mean concentration of an urban runoff pollutant measured during a storm event.

Exfiltration: Loss of water from a drainage system as the result of percolation or absorption into the surrounding soil.

External loading: Pollutants originating from outside of a waterbody that contribute to the pollutant load of the waterbody.

Florida Department of Environmental Protection (FDEP): The Florida Department of Environmental Protection is Florida's principal environmental and natural resources agency. The Department of Natural Resources and the Department of Environmental Regulation were merged together to create the Department of Environmental Protection effective July 1, 1993.

Ground water or groundwater: Water below the land surface in the zone of saturation where water is at or above atmospheric pressure.

Impairment: The condition of a waterbody that does not achieve water quality standards (designated use) due to pollutants or an unknown cause.

Land development regulations (LDRs): Ordinances enacted by governing bodies for the regulation of any aspect of development and includes any local government zoning, rezoning, subdivision, land assembly or adjustment of platted or subdivided lands, building construction, or sign regulations or any other regulations controlling the development of land.

Load allocations (LA): The portions of a receiving water's loading capacity that are allocated to one of its existing or future nonpoint sources of pollution.

Load capacity: The greatest amount of loading that a waterbody can receive without violating water quality standards.

Loading: The total quantity of pollutants in stormwater runoff which contributes to the water quality.

Macrophyte: Rooted and floating aquatic plants that are large enough to be perceived or examined by the unaided eye.

Margin of safety (MOS): An explicit or implicit assumption used in the calculation of a TMDL, which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. An explicit MOS is typically a percentage of the assimilative capacity or some other specific amount of pollutant loading (e.g., the loading from an out-of-state source). Most DEP-adopted TMDLs include an implicit MOS based on the fact that the predictive model runs incorporate a variety of conservative assumptions (they examine worst-case ambient flow conditions, worst-case temperature, and assume that all permitted point sources discharge at their maximum permittable amount).

Middle Basin: Refers to the Middle St. Johns River Basin.

National Pollutant Discharge Elimination System (NPDES): The permitting process by which technology-based and water quality–based controls are implemented.

Notice of Intent (NOI): The NOI provides formal notification to the Florida Department of Agriculture and Consumer Services (FDACS) of the commitment to implement selected practices or best management practices (BMPs) from a Best Management Practice Program adopted by DACS. It is a form of registration with FDACS of the intention to participate in a particular BMP Program. Furthermore, the submittal of the NOI is required by law if participating landowners desire eligibility for the waiver of liability, the presumption of compliance with water quality standards, and cost share funds for BMP implementation.

Nonpoint sources (NPS): Diffuse runoff without a single point of origin that flows over the surface of the ground by stormwater and is then introduced to surface or ground water. NPS include atmospheric deposition and runoff or leaching from agricultural lands, urban areas, unvegetated lands, on-site sewage treatment and disposal systems, and construction sites.

Nonpoint source pollution: Nonpoint source pollution is created by the flushing of pollutants from the landscape by rainfall and the resulting stormwater runoff, or by the leaching of pollutants through the soils into the ground water.

Particulate: A minute separate particle, as of a granular substance or powder.

Pollutant Load Reduction Goals (PLRGs): PLRGs are defined as estimated numeric reductions in pollutant loadings needed to preserve or restore designated uses of receiving bodies of water and maintain water quality consistent with applicable state water quality standards. PLRGs are developed by the water management districts.

Point source: An identifiable and confined discharge point for one or more water pollutants, such as a pipe, channel, vessel, or ditch.

Pollutant: Generally any substance, such as a chemical or waste product, introduced into the environment that adversely affects the usefulness of a resource.

Pollution: An undesirable change in the physical, chemical, or biological characteristics of air, water, soil, or food that can adversely affect the health, survival, or activities of humans or other living organisms.

Removal efficiency: A description of how much of a given substance (metals, sediment, etc.) has been extracted from another substance.

Retention pond: A stormwater management structure whose primary purpose is to permanently store a given volume of Storm Water runoff, releasing it by infiltration and /or evaporation.

Runoff curve: A calculated number representing the percentage of rainfall which becomes runoff for a given area.

Quality assurance (QA): An integrated system of management activities involving planning, implementation, documentation, assessment, reporting, and quality improvement to ensure that a process, product, or service meets defined standards of quality.

Quality control (QC): The overall system of technical activities that measures the attributes and performance of a process, product, or service against defined standards to verify that they meet the established data quality objectives.

Septic tank: A watertight receptacle constructed to promote separation of solid and liquid components of wastewater, to provide limited digestion of organic matter, to store solids, and to allow clarified liquid to discharge for further treatment and disposal in a soil absorption system.

Silviculture: The science of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values of landowners and society on a sustainable basis.

Starting points: The pollutant concentrations and flows used as a basis from which nutrient reductions must be achieved.

STORET: The U.S. Environmental Protection Agency's STOrage and RETrieval database, used nationally for water quality data storage.

Stormwater: Water that results from a rainfall event.

Stormwater runoff: The portion of rainfall which hits the ground and is not evaporated, percolated or transpired into vegetation, but rather flows over the ground surface seeking a receiving water body.

Submersed: Growing or remaining under water.

Sub-basin: Hydrologic units within a watershed that function as a mini-watershed, the boundaries of which are defined by topography and drainage patterns.

Surface water: Water upon the surface of the earth, whether contained in bounds created naturally or artificially or diffused. Water from natural springs is classified as surface water when it exits from the spring onto the earth's surface.

Surface Water Improvement and Management (SWIM) Waterbody: A waterbody designated by statute or by a water management district for priority management to restore and maintain water quality, habitat, and other natural features of the waterbody. The Middle Basin has this special designation.

Total Maximum Daily Loads (TMDLs): The sum of the individual wasteload allocations for point sources and the load allocations for nonpoint sources and natural background. Prior to determining individual wasteload allocations and load allocations, the maximum amount of a pollutant that a waterbody or waterbody segment can assimilate from all sources while still maintaining its designated use must first be calculated. TMDLs are based on the relationship between pollutants and in-stream water quality conditions.

Total nitrogen (TN): TN is the combined measurement of nitrogen in nitrate (NO_3), nitrite (NO_2), ammonia, and organic nitrogen found in water. Nitrogen compounds function as important nutrients to many aquatic organisms and are essential to the chemical processes that occur between land, air, and water. The most readily bio-available forms of nitrogen are ammonia and nitrate. These compounds, in conjunction with other nutrients, serve as an important base for primary productivity.

Total phosphorus (TP): TP is the combined measurement of phosphorus in phosphate (PO_4) and organic compounds found in water. TP is one of the primary nutrients that regulates algal and macrophyte growth in natural waters, particularly in fresh water. Phosphate, the form in which almost all TP is found in the water column, can enter the aquatic environment in a number of ways. Natural processes transport phosphate to water through atmospheric deposition, ground water percolation, and terrestrial runoff. Municipal treatment plants, industries, agriculture, and domestic activities also contribute to phosphate loading through direct discharge and natural transport mechanisms. The very high levels of TP in some of Florida's streams and estuaries are usually caused by phosphate-mining and fertilizer-processing activities.

Total suspended solids (TSS): The measurement of TSS consists of determining the dry weight of particulates in the water column. Both organic and inorganic materials contribute to TSS in water.

Trophic state index (TSI): The TSI measures the potential for algal or aquatic weed growth, and is used to indicate the water quality of lakes and estuaries. Its components include Total Nitrogen, TP, and chlorophyll.

Turbidity: The presence of suspended material such as clay, silt, finely divided organic material, plankton, and other inorganic material in the water.

Wasteload allocations (WLAs): Pollutant loads allotted to existing and future point sources, such as discharges from MS4s.

Waterbody identification (WBID) numbers: WBIDs are numbers assigned to hydrologically based drainage areas within a river basin.

Water column: The water within a waterbody between the surface and sediments.

Water quality index: Determines the quality of Florida's streams, black waters, and springs. Categories include: water clarity, dissolved oxygen, oxygen-demanding substances, nutrients, bacteria, and macroinvertebrate diversity.

Water quality standards (WQS): (1) Standards comprised of designated most beneficial uses (classification of water), the numeric and narrative criteria applied to the specific water use or classification, the Florida Anti-degradation Policy, and the moderating provisions contained in Chapters 62-302 and 62-4, F.A.C. (2) State-adopted and EPA-approved ambient standards for waterbodies. The standards prescribe the use of the waterbody (such as drinking, fishing and swimming, and shellfish harvesting) and establish the water quality criteria that must be met to protect designated uses.

Watershed: Topographic area that contributes or may contribute runoff to specific surface waters or an area of recharge.

Watershed management approach: The process of addressing water quality concerns within their natural boundaries, rather than political or regulatory boundaries. The process draws together all the participants and stakeholders in each basin to decide what problems affect the water quality in the basin, which are most important, and how they will be addressed.

Wet season: The rainy part of the year; in the Lake Jesup basin the wet season is defined as June through October.

Appendix I: BIBLIOGRAPHY OF KEY REFERENCES AND WEBSITES

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WEBSITES:

TABLE I-1: STORMWATER AND WATER QUALITY PROTECTION WEBSITES

LOCAL AND REGIONAL SITES	
SJRWMD Programs *Outreach information*	http://www.sjrwmd.com/programs.html http://www.sjrwmd.com/programs/outreach.html
Orange County Water Atlas	http://www.orange.wateratlas.usf.edu/
Seminole County Water Atlas	http://www.seminole.wateratlas.usf.edu/
STATE SITES	
General Portal for Florida	http://www.myflorida.com
FDEP *Watershed Management* *TMDL Program* *BMPs, public information,* *NPDES Stormwater Program* *NPS funding assistance* *Middle St. Johns River Basin Water Quality Assessment Report*	http://www.dep.state.fl.us/ http://www.dep.state.fl.us/water/watersheds/index.htm http://www.dep.state.fl.us/water/tmdl/index.htm http://www.dep.state.fl.us/water/nonpoint/pubs.htm http://www.dep.state.fl.us/water/stormwater/npdes/index.htm http://www.dep.state.fl.us/water/nonpoint/319h.htm http://www.dep.state.fl.us/water/basin411/sj_middle/assessment.htm
FDACS Office of Agricultural Water Policy	http://www.floridaagwaterpolicy.com/
FDACS Division of Forestry	http://www.fl-dof.com
University of Florida/ Institute of Food and Agricultural Sciences	http://lake.ifas.ufl.edu/
NATIONAL SITES	
Center for Watershed Protection	http://www.cwp.org/
US EPA Office of Water *EPA Region 4 (SE US)* *Clean Water Act history*	http://www.epa.gov/water http://www.epa.gov/region4 http://www.epa.gov/Region5/water/cwa.htm
United States Geological Survey: Florida Waters	http://sofia.usgs.gov/publications/reports/floridawaters/#options