BASIN MANAGEMENT ACTION PLAN

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

in the

UPPER OCKLAWAHA RIVER BASIN

Developed by the Upper Ocklawaha Basin Working Group
in Cooperation with the
Florida Department of Environmental Protection

Division of Water Resource Management

Bureau of Watershed Management

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For additional information on total maximum daily loads and the watershed management approach in the Upper Ocklawaha River Basin, contact

Mary Paulic
Florida Department of Environmental Protection
Bureau of Watershed Management, Watershed Planning and Coordination Section
2600 Blair Stone Road, Mail Station 3565
Tallahassee, FL 32399-2400
Email: mary.paulic@dep.state.fl.us
Phone: (850) 245–8560; Suncom: 205–5560
Fax: (850) 245–8434

LIST OF ACRONYMS

BMAP	Basin Management Action Plan
BMP	Best management practice
BOD	Biological oxygen demand
BWG	Basin Working Group
CARL	Conservation and Recreation Lands
CDBG	Community Development Block Grant
CDS	Continuous deflective separation
cfs	Cubic feet per second
Chl-a	Chlorophyll *a*
CLIP	Clean Lakes Initiative Program
CR	County Road
DACS	Florida Department of Agriculture and Consumer Services
DEP	Florida Department of Environmental Protection
DO	Dissolved oxygen
DOF	Division of Forestry
DOT	Florida Department of Transportation
DRI	Development of Regional Impact
EMC	Event mean concentration
EPA	U.S. Environmental Protection Agency
ERP	Environmental Resource Permit
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FWRA	Florida Watershed Restoration Act
GIS	Geographic information system
GSACSC	Green Swamp Area of Critical State Concern
IWR	Impaired Surface Waters Rule
JPA	Joint Planning Agreement
kg	Kilograms
kg/ha/yr	Kilograms per hectare per year
lbs	Pounds
lbs/acre/yr	Pounds per acre per year
lbs/yr	Pounds per year
LCWA	Lake County Water Authority
LDRs	Land development regulations
LID	Low-impact development
MCAVA	Marion County Aquifer Vulnerability Assessment
MEP	Maximum extent practicable
mg/L	Milligrams per liter
MOS	Margin of safety
MS4	Municipal separate storm sewer system
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSRA	North Shore Restoration Area
NuRF	Nutrient reduction facility
OAWP	Office of Agricultural Water Policy (DACS)
OCEPD	Orange County Environmental Protection Department
OFW	Outstanding Florida Water
P2000	Preservation 2000
PAHs	Polycyclic aromatic hydrocarbons
PLRG	Pollutant load reduction goal
PMRA	Pine Meadows Restoration Area
ppb	Parts per billion
ppm	Parts per million
QA	Quality assurance
QC	Quality control

SCI	Stream Condition Index
SJRWMD	St. Johns River Water Management District
SOR	Save Our Rivers
SR	State Road
SRF	State revolving fund
SW	Stormwater
SWFWMD	Southwest Florida Water Management District
SWIM	Surface Water Improvement and Management
SWMP	Stormwater management program
TMDL	Total maximum daily load
TN	Total nitrogen
TOC	Total organic carbon
TP	Total phosphorus – phosphates analyzed as total phosphorus
TSI	Trophic State Index
TSS	Total suspended solids
TWG	Technical Working Group
UF	University of Florida
UF–IFAS	University of Florida–Institute of Food and Agricultural Sciences
USACOE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA WRP	U.S. Department of Agriculture Wetlands Reserve Program
WBID	Waterbody identification (number)
WMD	Water management district
WMM	Watershed Management Model
WMP	Watershed Management Plan
WAV	Watershed Action Volunteers
μg/L	Micrograms per liter

I. ADOPTED UPPER OCKLAWAHA RIVER BASIN MANAGEMENT ACTION PLAN

UPPER OCKLAWAHA RIVER BASIN WORKING GROUP MEMBERS AND OTHER PARTICIPANTS

ORGANIZATION/ INTEREST GROUP	BWG REPRESENTATIVE	ELECTED OFFICIAL LIAISON	OTHER CONTRIBUTORS
LOCAL GOVERNMENT			
Lake County	Fred Schneider Mary Hamilton	Elaine Renick	David Crowe David Hansen* Allan Hewitt Amye King Blanche Hardy John Kruse Jeff Richardson Shannon Suffron Debbie Stivender** Greg Welstead Tom Wheeler Walter Wood Cathie Mcgwier Karen Rosick
Lake County Water Authority	Mike Perry Lance Lumbard	Sean Parks	Ron Hart Robert Taylor**
Lake Soil and Water Conservation District	Brad Russ	Nadine Foley	
Marion County	Gail Mowry	Andy Kesselring	Troy Kuphal Shane Williams
Orange County	Lori Cunniff Dr. M. Krishnamurthy	Teresa Jacobs	Liz Johnson Rick Baird Robert van den Akker* Penny Post Dan Homblette Julie Bortles Ron Novy
Polk County	Robert Kollinger	TBD	
Apopka	Jessica Schilling	John Land	
Clermont	Cheryl Parker	Jack Hogan	Preston Davis Elaine Renick** Rebecca Vanderbeck*
Eustis	Larry Konieczko	Evelyn Smith	Gwen Manning** Chin Khor*
Fruitland Park	John Bostic	Christopher Bell	
Groveland	Larry Walker Michael Wheeler	Allen Sherrod	Teresa Greenham*
Howey-in-the-Hills	Harwood Padget	Chris Sears	
Lady Lake	Ken Keough Butch Goodman	Ty Miller/ Paul Hannan	
Leesburg	Ray Sharp	C. Robert Lovell	Jim Richards Ed Horton David Crane
Mascotte	Robert Holland	Jeff Krull	
Minneola	Mark O'Dell Craig Raines	Joe Teri	
Montverde	Rick Crews	Dale Heathman	
Mount Dora	Paul Ritter Nick McRay	James Yatsuk	Roberta Stegemerten Robert Thielhelm Bob Herndon Chris Dilley*
Tavares	Robert Wolfe Heath Frederick	Nancy Clutts Sandy Gamble	Robert Speaks** Aaron Mercer*
Umatilla	Ken White	TBD	Tim Scobie** Glenn Irby
Winter Garden	Alex Nasser	Bob Buchanan	Theo Graham ** April Breen David Hamstra Robert Smith*
Ocoee	Steve Krug	Scott Vandergrift	Tonya Elliott April Breen David Hamstra David Wheeler*

* Former BWG representative.
** Former elected official liaison.

UPPER OCKLAWAHA RIVER BASIN WORKING GROUP MEMBERS AND OTHER PARTICIPANTS *(continued)*

Organization/ Interest Group	BWG Representative	Elected Official Liaison	Other Contributors	
Regional and State Agencies				
St. Johns River Water Management District	David Walker Gene Caputo	Clay Albright	Rolland Fulton Mike Coveney	Maryann Utegg–Watershed Action Volunteers
Florida Fish and Wildlife Conservation Commission	John Benton	Dennis David		
Florida Department of Agriculture and Consumer Services	Carol Johnson		Jody Lee	Terry Pride
Florida Department of Transportation	Patrick Muench		Tim Kelly Richard Fowler	Michael Hill* Robert Potts
Florida Department of Community Affairs	Not Applicable		Richard Deadman	
Florida Department of Environmental Protection—Central District	Chris Ferraro		Vivian Garfein, Director Barbara Bess Tom Bess	Tara Plank
Florida Department of Environmental Protection—Tallahassee	Not Applicable		Eric Livingston Mary Paulic Fred Calder	Terry Pride* Xueging Gao Wayne Magley
Private and Environmental Interests				
Agriculture	Bill Benham Keith Truenow			
Alliance to Protect Water Resources, Inc. (APWR)	Nancy H. Fullerton			
Ocklawaha Valley Audubon Society	Linda Bystrak			
Additional Public Participants				
Andreyev Engineering			Susanna Littell	
B&H Consulting			Jim Shira	
Applied Sciences			Don Moores	
BCI Engineering			John Kiefer Terry Dykehouse	Tim Kelly Walt Reigner
Boyle Engineering			Sue Woodbery	Mike Howe
Brown and Caldwell			Kurt Frahn	
Eustis Chamber of Commerce			Sharron Semento	
Green Consultants			Tim Green	
HCBassMasters			A.J. Willeguer	
Jones Edmunds			Brett Cunningham	Liz Perez Lora Bailey
PEAR			George Wolf	
Professional Engineering Consultants (PEC)			David Hamstra April Breen	
Picciola Island Homeowners Association			Ann Griffin	
Unaffiliated Citizens			Ed Schlachtenhaufen Herb Danczyk Leonard Wheeler Charles Clark	Mary Anderson Dr. Ronald Ney Ron Regan
Stormwater 360			Michael Bateman	
SAIC			Kathy Harrigan	Heather Waters

* Former BWG representative.

2007 UPPER OCKLAWAHA RIVER BASIN MANAGEMENT ACTION PLAN ADDRESSING THE 2003 TMDLS

The Upper Ocklawaha River Basin Management Action Plan (BMAP) was developed by basin stakeholders over a two-year period. The BMAP addresses waters in the Upper Ocklawaha River Basin that the Florida Department of Environmental Protection (DEP) has identified as impaired, for which Total Maximum Daily Loads (TMDLs) have been established. The BMAP does not address all of the water quality issues in the basin but focuses on reducing total phosphorus (TP)[1] discharges to surface waters that are identified as impaired. The BMAP documents the management actions that have been or will be undertaken by local, regional, state, or private entities to reduce the amount of TP released into the basin.
Reducing the discharges of TP into the basin will help achieve water quality standards and designated uses established by DEP. DEP has designated that the water quality of the Upper Ocklawaha River Basin should be suitable for recreational use and for the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The TP reductions achieved by the management actions included in the BMAP will help the Upper Ocklawaha River Basin attain this designated use.

While developing the BMAP, the Upper Ocklawaha Basin Working Group (BWG) discussed the basin's water quality issues and placed each issue into one of three categories. Primary issues are directly linked to TMDLs and were targeted during this BMAP cycle. Secondary issues are those that generally result from impacts of the primary issues. Finally, other issues that did not have a substantial link to the current TMDLs were also identified.

This BMAP presents a plan for reducing nutrient loadings in the basin using a phased approach. During the first five-year cycle, the BWG members will focus on reducing the larger pollution sources. The BWG members will also be evaluating other pollution sources that require additional research or that represent a relatively smaller percentage contribution to the total loading. The adopted BMAP reflects this phased implementation of TMDLs. The BMAP should be considered a working document. It is a plan that outlines management actions, establishes a strategy to monitor implementation and water quality trends, and establishes a framework for adapting the plan when needed. The plan is discussed in further detail in the following sections.

AP.1. Background

The Upper Ocklawaha BMAP has been developed as part of DEP's TMDL Program (authorized by the Florida Watershed Restoration Act [FWRA] [Section 403.067, Florida Statutes [F.S.]). DEP implements the act using a watershed management approach that includes a five-year rotating basin cycle. Each year of the cycle represents a different activity for the waters within a given basin group, as follows: Initial Basin Assessment,

[1] TP is the combined measurement of phosphorus as orthophosphate (PO4), other inorganic phosphorus compounds, and organic phosphorus compounds found in water and expressed as amounts of phosphorus. TP is used in aquatic science as a measure of the biological productivity of a waterbody. It is one of the primary nutrients regulating algal and macrophyte growth in natural waters, particularly in fresh water. While it is essential to the growth of plants and other organisms in aquatic systems, excessive amounts increase the rate of plant growth and cause accelerated eutrophication and algal blooms. Phosphorus is a limiting nutrient in many ecosystems, meaning that its availability controls the growth rate of plants and other organisms. Orthophosphate, the form in which almost all inorganic forms of phosphorus are 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, stormwater runoff, and other domestic activities also contribute to phosphate loading through direct discharge and natural transport mechanisms. .

Strategic Monitoring, Data Analysis and TMDL Development, ***Basin Management Action Plan Development***; and Basin Management Action Plan Implementation. At the end of each five-year, five-phase cycle, a new cycle begins for each group of basins in which additional waters may be identified for TMDL establishment and implementation.

The Upper Ocklawaha River Basin is located mostly in Lake County. It also encompasses the northwest portion of Orange County, southern Marion County, and the northern part of Polk County. The basin includes the following waterbodies of interest:

- *Lake Apopka and the Apopka-Beauclair Canal;*
- *The Clermont Chain of Lakes (Minneola, Minnehaha, and Louisa, along with 12 other smaller lakes), connected by the Palatlakaha River;*
- *The Harris Chain of Lakes including Lakes Harris, Dora, Beauclair, Eustis, Little Harris, and Carlton, Dead River; Dora Canal and Trout Lake along with*
- *Lake Griffin and Lake Yale, the Yale-Griffin Canal, some tributaries to Lake Griffin, Emeralda Marsh, and Haynes Creek.*

AP.2. Total Maximum Daily Loads

TMDLs are water quality targets for waterbodies that DEP has identified as impaired for specific pollutants (such as TP, total nitrogen [TN], and others). TMDLs, which DEP adopts by rule, establish the maximum amount of specific pollutants that a waterbody can assimilate while maintaining water quality standards, which are indicated by designated uses. All surface waters (including wetlands) in the Upper Ocklawaha River Basin are designated as Class III waters in accordance with Rule 62-302, Florida Administrative Code (F.A.C.), meaning that they must have suitable water quality for recreational use and for the propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

To establish a TMDL, DEP assesses each impaired waterbody, the pollutant(s) contributing to the impairment, and the amount of the pollutant(s) entering the waterbody during a specified period. DEP then determines the level of pollutant(s)—the TMDL—that each waterbody can receive and still maintain its Class III designated use (the TMDL), and calculates the corresponding pollutant reduction needed to achieve the TMDL.

Ten waterbodies in the basin did not meet their designated uses and were verified by DEP as impaired. TP is the primary pollutant contributing to the impairment of all these waterbodies. In Trout Lake and the Palatlakaha River, TN contributes to the problem, and biological oxygen demand (BOD) is also identified as a pollutant contributing to the impairment in the Palatlakaha River.

In 2003, DEP adopted TMDLs for the following 10 impaired waterbodies and associated tributary and connecting canals and streams (e.g., Haynes Creek, Dead River, Apopka-Beauclair Canal, Dora Canal, Helena Run, Apopka Spring, and Yale-Griffin Canal) in the Upper Ocklawaha River Basin:

- *Lake Apopka*
- *Lake Beauclair*
- *Lake Carlton*
- *Lake Dora*
- *Lake Eustis*
- *Trout Lake*
- *Lake Harris (includes Little Lake Harris)*
- *Palatlakaha River (north of State Road [SR] 50)*
- *Lake Griffin*
- *Lake Yale*

Table AP.1 lists the TMDLs for these waterbodies. As part of the second rotation of the basin management cycle in the Upper Ocklawaha River Basin, DEP is collecting data to further analyze the water quality impairments in the basin and establish additional TMDLs.

TABLE AP.1. TMDLS IN THE UPPER OCKLAWAHA RIVER BASIN

SUB-BASIN	WATERBODY IDENTIFICATIONS WBID(S)	TMDL	TARGET CONCENTRATION	TMDL BASELINE LOAD[1]	WASTELOAD ALLOCATIONS		LOAD ALLOCATION (NONPOINT)	OVERALL NEEDED REDUCTION
					WASTEWATER	NPDES STORMWATER[2]		
		(lbs/yr)	(ppb)	(lbs/yr)	(lbs/yr)	(% reduction)	(lbs/yr)	(lbs/yr)
LAKE APOPKA								
TOTAL PHOSPHORUS [3]	2835A,C,D	**35,052**	55	**137,451**	2,668	None	31,216	**102,399**
LAKE BEAUCLAIR								
TOTAL PHOSPHORUS	2834C	**7,056**	32	**46,672**	None	85	7,056	**39,616**
LAKE CARLTON								
TOTAL PHOSPHORUS	2837B	**195**	32	**477**	None	59	195	**282**
LAKE DORA								
TOTAL PHOSPHORUS	2831A,B	**13,230**	31	**39,646**	None	67	13,230	**26,416**
LAKE EUSTIS/ HAYNES CREEK								
TOTAL PHOSPHORUS	2817A,B	**20,286**	25	**35,503**	None	43	20,286	**15,217**
TROUT LAKE								
TOTAL PHOSPHORUS	2819A	**521**	28	**2,604**	None	80	521	**2,083**
TOTAL NITROGEN		9,733	780	24,165	None	60	9733	14,432
LAKE HARRIS/ LITTLE LAKE HARRIS	2838A,B 2832/2817C							
TOTAL PHOSPHORUS		**18,302**	26	**26,864**	None	32	18,302	**8,562**
PALATLAKAHA RIVER	2839							
BOD		43,042	None	49,351	None	12.8	43,042	6,309
TOTAL NITROGEN		16,696	None	17,604	None	5.2	16,696	908
TOTAL PHOSPHORUS		**2,207**	None	**2,350**	None	6.1	2,207	**143**
LAKE GRIFFIN								
TOTAL PHOSPHORUS	2814A	**26,901**	32	**77,881**	None	66	26,901	**50,980**
LAKE YALE/ LAKE YALE CANAL	2807A 2807							
TOTAL PHOSPHORUS		**2,844**	20	**3,158**	None	10	2,844	**314**

Note: lbs/yr – pounds per year ppb – parts per billion

[1] TMDL baseline loads were taken from more recent estimates by the SJRWMD, except for the Palatlakaha River, Lake Carlton, and Trout Lake, whose loadings were estimated by DEP. Most of the baseline loading estimates developed by SJRWMD were calculated for the period from 1991–2000; Lake Apopka loadings are calculated for the period from 1989–94. DEP estimated baseline loadings for Lake Carlton from 1991–2000 and Trout Lake from 1995–2000. The baseline loading year for the Palatlakaha River was 1991.

[2] NPDES Stormwater refers to discharges associated with municipal separate storm sewer systems (MS4s), which are discussed in **Section 3.4.2** of the supporting document. The reduction required is a percent of the current MS4 discharge.

[3] Numbers for Lake Apopka were converted from metric tons per year. The TMDL includes an explicit margin of safety (MOS) of 1,168 lbs/yr.

AP.3. BMAP Process

The BMAP development process is structured to achieve cooperation and consensus among a broad range of interested parties. Stakeholder involvement is essential to develop, gain support for, and secure commitments to implement the BMAP. Under statute, DEP invited stakeholders to participate in the Upper Ocklawaha BMAP development process and encouraged public participation to the greatest practicable extent. DEP held three noticed public meetings in the basin to discuss and receive comments during the planning process.

In June 2004, DEP convened the Upper Ocklawaha BWG to develop a BMAP to achieve the TMDLs for the basin. Stakeholders chose unanimously to establish one BWG, with the option of creating small working groups to address specific concerns or issues. Members of the BWG comprise these subgroups, which meet separately from the BWG.

The BWG, which is made up of stakeholder members representing a variety of entities, took a consensus-based, collaborative approach when making decisions on the content of the BMAP. It was necessary to define what constitutes a consensus agreement for the BWG, short of unanimous agreement. However, the BWG concluded that accepting a proposal without full unanimity would be a default position, when necessary to move the process forward and to complete development of the BMAP on schedule. The BWG agreed to make every effort to develop proposals that all members could support. **Table AP.2** summarizes the Upper Ocklawaha River BWG organizational structure, process, membership, and citizen involvement efforts.

The members of the BWG met nearly monthly from June 2004 through June 2006 with subsequent meetings on November 9, 2006; January 25, 2007; and April 21, 2007. To solicit participation from the general public, ads announcing the BWG meeting were periodically placed in the local newspaper, the *Daily Commercial*. As discussion with BWG members proceeded to a point where decisions about the specific responsibilities of each partner were discussed, meetings were formally noticed in the *Florida Administrative Weekly*. The BWG created a Technical Working Group (TWG) with the responsibility of providing a technical review of issues before the BWG and reporting that information back to the BWG for their discussion. The TWG met on an as-needed basis at the request of the BWG and usually in conjunction with a BWG meeting.

Four public meetings/workshops were also held (on April 15, 2004; March 10, 2005; November 10, 2005; and May 18, 2006) to solicit comments from all interested parties, disseminate information, and allow for public discussion. In addition, a number of special briefings and presentations were carried out as needed for city councils, county commissions, elected official liaisons from local governments, special interest groups, community organizations, and others.

TABLE AP.2. BASIN WORKING GROUP ORGANIZATIONAL STRUCTURE

BASIN WORKING GROUP (BWG)

Function:
- Develop a consensus-based BMAP to implement TMDLs in the Upper Ocklawaha River Basin
- Has final decision-making role on BMAP development
- Includes Technical Working Group (TWG) subcommittee

Makeup:
- Lake County and 12 municipalities in the county:
  - City of Clermont
  - City of Eustis
  - City of Fruitland Park
  - City of Groveland
  - Town of Lady Lake
  - City of Leesburg
  - City of Mascotte
  - City of Minneola
  - Town of Montverde
  - City of Mount Dora
  - City of Tavares
  - City of Umatilla
- Lake County Water Authority
- Marion County
- Orange County and 3 municipalities in the county:
  - City of Apopka
  - City of Ocoee
  - City of Winter Garden
- Polk County
- St. Johns River Water Management District
- Florida Department of Transportation
- Florida Fish and Wildlife Commission
- Florida Department of Agriculture and Consumer Services
- Florida Department of Environmental Protection
- Agriculture industry representative
- Alliance to Protect Water Resources, Inc. (environmental representative)

Meetings/Workshops Held:
- Monthly meetings generally held on the second Thursday of the month from June 2004 to June 2006, with subsequent meetings held on:
  - November 9, 2006
  - January 25, 2007
  - April 21, 2007

CITIZEN INPUT

Function:
- Ensure that all interested parties are involved and heard in the TMDL process
- Ensure the broad dissemination of TMDL information and the BMAP
- Allow for public discussion of issues and strategies

Makeup:
- Interested parties and the public at large

General Public Meetings/Workshops Held:
- April 15, 2004
- March 10, 2005
- November 10, 2005
- May 18, 2006

Note: *Several interested citizens also attended the BWG meetings regularly*

SPECIAL BRIEFINGS/PRESENTATIONS (AS NEEDED)

Function:
- To brief councils, commissions, special interest groups, community organizations, and others on the TMDL process and the progress of the BWG, as requested or needed

Makeup:
- Affected and/or interested elected bodies, organizations, and other groups in the basin

ELECTED OFFICIAL LIAISONS

Role/Function:
- Serve as point of contact for elected local governing bodies
- Represent the citizens in their jurisdictions
- Attend BWG and public meetings, as desired
- Provide feedback to the BWG
- Assist in developing effective means of informing and involving elected officials**, and** in securing their endorsement of a consensus BMAP

Makeup:
- One elected official appointed by and representing each local government participating in BMAP development. Periodic briefings as a group to the individual elected officials appointed by each local government to serve as a liaison to the BMAP development process.

Elected Official Liaison Briefings:
- January 26, 2005 October 26, 2005

Local Government Elected Body Briefings:
- April 2006 January 2007

AP.3.1. Allocations

The TMDL provides a basis for allocating acceptable loads among all of the known pollutant sources in a watershed, so that appropriate control measures can be implemented and water quality standards achieved. An adopted TMDL is expressed as the sum of all point source load allocations, nonpoint source load allocations, and an implicit or explicit MOS, which takes into account any uncertainty concerning the relationship between effluent limitations and water quality.

Under the FWRA (Subsection 403.067[7], F.S.), the TMDL allocation may be an "initial" pollutant allocation of allowable pollutant loads among point and nonpoint sources. In such cases, the "detailed" allocation to specific point sources and specific categories of nonpoint sources must be established in the BMAP. The FWRA further states that the BMAP may make detailed allocations to individual "basins" (i.e., sub-basins) or to all basins as a whole, as appropriate. Both initial and detailed allocations must be determined based on a number of factors listed in the FWRA, including cost-benefit, technical and environmental feasibility, implementation time frames, and others.

The Upper Ocklawaha BWG agreed that, for the purposes of the initial BMAP, it would not be appropriate to try to calculate more specific allocations than those adopted as part of the TMDL. Therefore, the "detailed" allocation chosen was to all sub-basins as a whole, based on the following considerations:

- *There are no significant point sources in the Upper Ocklawaha River Basin. The complexity of calculating more detailed allocations among nonpoint sources would demand time and effort that would delay plan development without benefiting the outcome.*
- *Major restoration projects by the SJRWMD and the Lake County Water Authority (LCWA) are projected to substantially reduce pollutant loadings. In addition, Lake County, Orange County, and various local governments are conducting and planning significant stormwater projects that will contribute to load reductions. Local governments in the basin are increasingly taking responsibility for managing their discharges to surface waters.*
- *There is a wide range of experience, expertise, and resources among the local governments and other entities in the basin responsible for stormwater management. The BMAP process is an opportunity for some to build on their beginning efforts and for others to share their knowledge and resources.*

AP.3.2. Upper Ocklawaha Basin Management Action Plan

The BWG determined that management actions addressing TP, for which all 10 waterbodies in the basin are impaired, should reduce the other pollutants for which TMDLs were established. Therefore, the BWG focused on developing a plan that would reduce TP loadings to the impaired waters.

This section provides significant information on the types of management actions being implemented by the BWG members. Information is provided on the types of actions considered and programs administered in the basin by the SJRWMD; the Florida Department of Agriculture and Consumer Services (DACS); the LCWA; and Lake,

Orange, Polk, and Marion Counties. Table AP.3 summarize the net reductions in TP loading that will be achieved for each of the 10 impaired waterbodies. **Tables AP.4** through **AP.10** include specific information on individual projects implemented by BWG members. The tables contain net estimated reduction in TP loads for each project as well as an estimate of the cost of implementation. The final discussion in this section focuses on future TP loadings and reductions. Information is provided on how future TP loadings from growth were considered in this process and how the BWG will investigate and consider additional management actions over the next 5 years.

The Upper Ocklawaha River BMAP represents the collaborative effort of local stakeholders in the basin to identify current and planned management actions to achieve the TMDLS for TP. The management actions (completed, ongoing, and planned) identified in the BMAP are targeted at addressing both the pollutant loads from historical and current sources and from the estimated future loads associated with population growth and associated land use changes in the basin.

The management actions included in the BMAP by the BWG recognize and build on numerous existing programs that reduce pollutant loads to the Upper Ocklawaha River Basin. The BWG relied on the water quality and quantity programs its member organizations were already implementing as a source of projects that addressed the water quality impairments identified in the Upper Ocklawaha River Basin TMDLs. To meet the targeted pollutant load reductions, the BMAP includes specific projects from stormwater control programs (such as the SJRWMD's Environmental Resource Permit [ERP] Program), existing land acquisition, water conservation, low impact development (LID) programs, and programs in response to special areas (i.e, the Wekiva Study Area), as well as Surface Water Improvement and Management (SWIM) Program plans implemented by the SJRWMD. The activities identified in the BMAP complement and depend on these programs, but do not replace them as a mechanism to achieve the pollutant reduction goals estimated in the BMAP.

The BWG has developed the Upper Ocklawaha BMAP as a planning document that presents an overview of the issues and efforts across the basin and summarizes the implemented and planned activities addressing TP reductions in the basin. Additional documents that support the projects, studies, and programs may be included in the BMAP.

The range of management actions identified includes activities such as the following:

- *Stormwater Retrofits:*
  - Paving and drainage upgrades,
  - Failing infrastructure replacement and improvement, and
  - Sediment and debris collection boxes (baffle boxes).
- *Urban Structural Best Management Practices (BMPs):*
  - Regional wet detention stormwater ponds, and
  - Dry retention stormwater ponds.
- *Urban Nonstructural BMPs:*
  - Street sweeping, and

- Cleaning up pet waste.

- *Habitat Restoration:*
  - Marsh construction,
  - Wetland restoration, and
  - Gizzard shad harvesting.

- *Ordinances and Land Development Regulations (LDRs):*
  - Development guidelines,
  - Septic tank ordinances, and
  - Local stormwater rules more stringent than state or water management district rules.

- *Education and Outreach:*
  - Watershed Action Volunteers (WAV) Program,
  - Lakefront property owner's guides, and
  - Water atlases.

- *Agricultural BMPs:*
  - Crop rotation,
  - Filter strips, and
  - Exclusion of livestock from sensitive areas.

Efforts by the St. Johns River Water Management District

The projects implemented by the SJRWMD through the Lake Apopka and Upper Ocklawaha SWIM Plans have significantly reduced TP loading to impaired waters in the basin and improved aquatic habitat throughout the basin. The Lake Apopka and Upper Ocklawaha SWIM Plans were first adopted in 1987 and 1989, respectively, in compliance with the 1987 SWIM Act (Sections 373.451–373.4596, F.S.). Further reductions in TP loading resulting from restoration projects in these SWIM plans are a major component of the strategy to achieve TMDLs in the basin.

The Upper Ocklawaha River Basin SWIM area includes the Harris Chain of Lakes north of Lake Apopka and the Upper Ocklawaha River to the confluence of the Silver River near SR 40 in Marion County. The restoration efforts of both the Lake Apopka and Upper Ocklawaha SWIM Plans focus primarily on reducing nutrients and other pollutants in stormwater that flows into SWIM waterbodies from former agricultural areas (muck farms). Other efforts include in-lake treatment to reduce the recycling of nutrients by harvesting gizzard shad, re-establishing more natural water level fluctuations and flows, and restoring aquatic and wetland habitats at former muck farms.

Within the area addressed by the Upper Ocklawaha River BMAP, activities that exceed SJRWMD permitting thresholds must be authorized by an ERP. To obtain an ERP where existing ambient water quality does not meet state water quality standards, an applicant must demonstrate that the proposed activity will result in a net improvement in the parameters that do not meet water quality standards.

Efforts by the Florida Department of Agriculture and Consumer Services (and Private Agricultural Producers)

In addition to the specific management actions identified in the BMAP, the implementation of agricultural BMPs in the basin contributes to pollutant load reductions. Through the Office of Agricultural Water Policy (OAWP) and Division of Forestry, DACS develops, adopts, and implements agricultural BMPs to improve water quality and water conservation. DACS has adopted by rule BMPs that target the following operations in the basin:

- *Ridge citrus (Rule 5E-1.023, F.A.C.),*
- *Leatherleaf fern (Rule 5E-1.023, F.A.C.),*
- *Interim measure for container-grown plants (Rule 5E-1.023, F.A.C.),*
- *Vegetable and agronomic crops (Rule 5M-8, F.A.C.), and*
- *Silviculture (Rule 5I-6.002, F.A.C.).*

The OAWP's BMP implementation role involves assisting agricultural producers in selecting, funding, and maintaining BMPs. OAWP staff and service providers work with producers to submit Notices of Intent (NOIs) to implement BMPs that identify the measures appropriate for their operations. Service providers also give technical assistance to producers and help implement cost-share programs that leverage regional, state, and federal funds.

Although DACS' BMP program is nonregulatory, Subsection 403.067(7)(b), F.S., requires that nonpoint pollutant sources (such as agriculture) included in a BMAP demonstrate compliance with pollutant reductions established to meet a TMDL, either by implementing BMPs or conducting water quality monitoring prescribed by DEP or a water management district. To date, producers in the Upper Ocklawaha River Basin from the Ridge citrus, container-grown plant, and fern industries have submitted NOIs (covering about 13,500 acres) to implement rule-adopted BMPs.

Efforts by the Lake County Water Authority

The LCWA is a key funding partner for local jurisdictions throughout the basin. This grant funding has enabled numerous stormwater retrofit projects identified in the BMAP. In addition, the LCWA is proposing to construct a nutrient reduction facility (NuRF) to further treat water released from Lake Apopka and provide the timely achievement of TMDL goals for Lakes Beauclair, Dora, Eustis, and Griffin.

The NuRF will eliminate an additional 65 percent of the TP load to Lake Beauclair. This reduction will positively affect Lakes Dora, Eustis, and Griffin as well, since the Lake Apopka discharge represents a significant portion of their hydrologic budget. Additional TP reduction is important because Lake Apopka's TMDL target concentration is almost twice as high as the targets for the lakes downstream. The project's estimated load reduction to Lake Beauclair is 5,000 lbs/yr, based on the remaining load to Lake Beauclair after projected improvements to Lake Apopka by current restoration efforts.

Efforts by Local Governments

Four counties and 15 towns and cities participated in developing the Upper Ocklawaha BMAP. The BMAP identifies numerous projects completed or proposed by these local

governments that address untreated stormwater discharges to the lakes. The stormwater retrofit projects include activities ranging from the installation of baffle boxes to the creation of detention ponds. These governments have also developed ordinances that address critical issues such as redevelopment requirements, green space, and septic tank maintenance. The efforts of these jurisdictions are an essential component of the BMAP.

All four counties (Lake, Marion, Orange, and Polk) that contribute to the Upper Ocklawaha River Basin have established comprehensive programs for addressing pollutant loads, in addition to individual stormwater retrofit and other treatment projects. Lake County and Orange County have made significant contributions to pollutant control and load reductions in the basin.

Lake County has taken a proactive approach toward TMDLs by focusing its basin studies and concentrating immediate stormwater retrofit efforts on the Upper Ocklawaha River Basin. These studies will help in the design of cost-effective projects to manage stormwater and reduce TP loads to TMDL waters. Through cost-share project partnerships, the county provides additional support to other local governments working to reduce pollutant loadings.

Orange County has also implemented a variety of programs, including the following:

- *The Clean Lakes Initiative Program (CLIP) to provide educational and financial incentives to help citizens take individual ownership of their lakefront and watershed, and*
- *An agreement by the Parks Department to reduce the use of phosphorus fertilizer and herbicide applications on all parklands.*

Marion County has initiated several programs and resource assessment activities, such as the development of a countywide Watershed Management Plan, a Water Resource Assessment and Management Study, and a Springshed Protection Program. The county's Clean Water Program is partnering with the University of Florida's Program for Resource Efficient Communities to develop and conduct seminars on LID options and results for water resources.

Polk County is not heavily developed in the area discharging to the Upper Ocklawaha River Basin. Future development for most of the area is restricted as part of the Green Swamp Area of Critical State Concern (GSACSC). Development in the remaining acreage, most of it former citrus groves, will be provided central sewer service and reuse water for irrigation.

Net Estimated Loadings of Total Phosphorus to TMDL Waters

The BWG calculated a net estimated loading for each sub-basin, beginning with the TP loads estimated in the TMDL analysis as its baseline. The BWG then factored in the TP reductions expected from the proposed management actions along with estimated TP loadings from future development (through 2010). After considering these three factors (baseline, management actions, and future growth), the BWG determined a net estimated TP load for each sub-basin.

Starting with the baseline loadings for sources of TP in each sub-basin, the BWG reviewed the estimated change in TP loading after the implementation of projects and

activities in this plan. This analysis factored in the estimated load reductions from implemented and planned projects and the estimated loading changes associated with future growth, resulting in a net estimated TP load for each impaired waterbody. Implemented projects are those completed as of the end of 2005. Future projects are those planned for initiation or completion after 2005. The estimated load changes from future growth are based primarily on future land use maps. These net loadings may be updated as part of BWG follow-up on BMAP implementation.

The BWG's analysis also considered changes in the tributary contribution to a waterbody's nutrient load. In general, this TP load changes proportionally with the change in upstream water quality. For example, implemented and future acquisition and restoration projects in Lake Apopka have improved water quality to the extent that the TP load to Lake Beauclair, just downstream, will be reduced by 35,752 lbs/yr. These improvements in upstream water quality are reflected in the nutrient load for each affected downstream waterbody. A net TP load for the lake or waterbody is estimated after factoring in all the projected changes in loading.

Figure AP.1 presents a map of the anticipated outcomes of BMAP implementation in the Upper Ocklawaha River Basin TMDL waters. This map illustrates the importance of addressing the TP load reductions in Lake Apopka to achieving the targeted load reductions in the downstream lakes (e.g., Beauclair, Dora, and Eustis). The SJRWMD restoration and treatment programs provide the most significant load reduction efforts in the basin. The SJRWMD's ERP permit requirements will help sustain the water quality improvements achieved through restoration. The net effect of the load reduction in Lake Apopka will be to benefit the downstream lakes by reducing the TP load coming into the lakes.

Table AP.3 presents numeric data on the anticipated outcomes of BMAP implementation and provides specific details on the current and anticipated load reductions from different types of activities for each sub-basin. The table also presents the net estimated loading of TP to TMDL waters in the Upper Ocklawaha River Basin after BMAP implementation of the proposed management actions. The data presented in the table represent only the projects that have quantifiable TP load reductions. There are many additional projects where the TP load reduction cannot be quantified.

Figure AP.1 and **Table AP.3** clearly show the large TP load reductions that will be achieved through BMAP implementation by BWG organizations. The last column of the table summarizes how more than 244,000 lbs/yr of TP are projected to be removed from the Upper Ocklawaha River Basin. Although the estimates used in the table and to create the figure are conservative (e.g., water quality improvements associated with nonquantifiable load reductions are not considered) they do indicate that additional effort is needed to achieve all of the targeted TP reductions for all impaired lakes in the basin. Additional studies and assessments are included as part of the BMAP to characterize the sources and management opportunities in these sub-basins.

The BMAP presents a plan for reducing nutrient loadings in the basin using a phased approach. During the first five-year cycle, the BWG members will focus on reducing the larger pollution sources. The BWG members will also be evaluating other pollution sources that require additional research or that represent a relatively smaller percentage contribution to the total loading.

Some issues, such as septic tanks, were not directly addressed during the first five years of the BMAP implementation, because of they represent a relatively small percentage of pollutant loading. The relative importance of loadings from some sources (e.g., septic tanks, future growth) increases after the implementation of the BMAP's management actions, which will reduce TP loadings by 244,349 lbs/yr. For these issues, BWG members are implementing a variety of activities. Some will conduct detailed sub-basin studies to characterize nutrient sources to the lakes and build on existing ordinances, and may, in some areas, consider additional treatment strategies (e.g., advanced septic systems design or centralized wastewater treatment facilities). Others may also revise land use development regulations or update public education strategies to address nutrient loads. In addition, the communities of Lake County, Mount Dora, Eustis, Orange County, Apopka, Ocoee, and Winter Garden are participating in an extensive effort to reduce the water quality impacts on springs and river systems as part of the Wekiva Springs Protection Effort implementing the Wekiva Parkway and Protection Act.

BWG efforts to implement the proposed management actions, monitor their implementation and water quality trends in the basin, further characterize pollutant sources, and evaluate additional load reduction options are all critical to a phased implementation approach. It is especially critical for the sub-basins that are currently not projected to achieve the TMDL target (e.g., Lakes Carlton, Harris, and Yale, and Trout Lake). The additional research and evaluation of options to be conducted by BWG members is essential. The BWG members involved in these efforts will research the issues in their communities and make the appropriate management decisions for their citizens.

With this consideration, the BMAP should be considered a working document that includes a strong plan of management actions to address the larger pollution sources and research to improve the understanding of the basin and the additional measures needed to meet the TMDL targets.

In addition, an adaptive management approach will be used during BMAP implementation to identify and make modifications to the BMAP when circumstances change, or feedback mechanisms indicate that a more effective strategy is needed. Tracking implementation, monitoring water quality and pollutant loads, and holding periodic BWG meetings to share information and expertise are key components of the adaptive management approach to be used. **Sections AP.4** and **AP.5** present details of the monitoring, tracking, and follow-up strategy.

FIGURE AP.1. ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION IN UPPER OCKLAWAHA RIVER BASIN TMDL WATERS

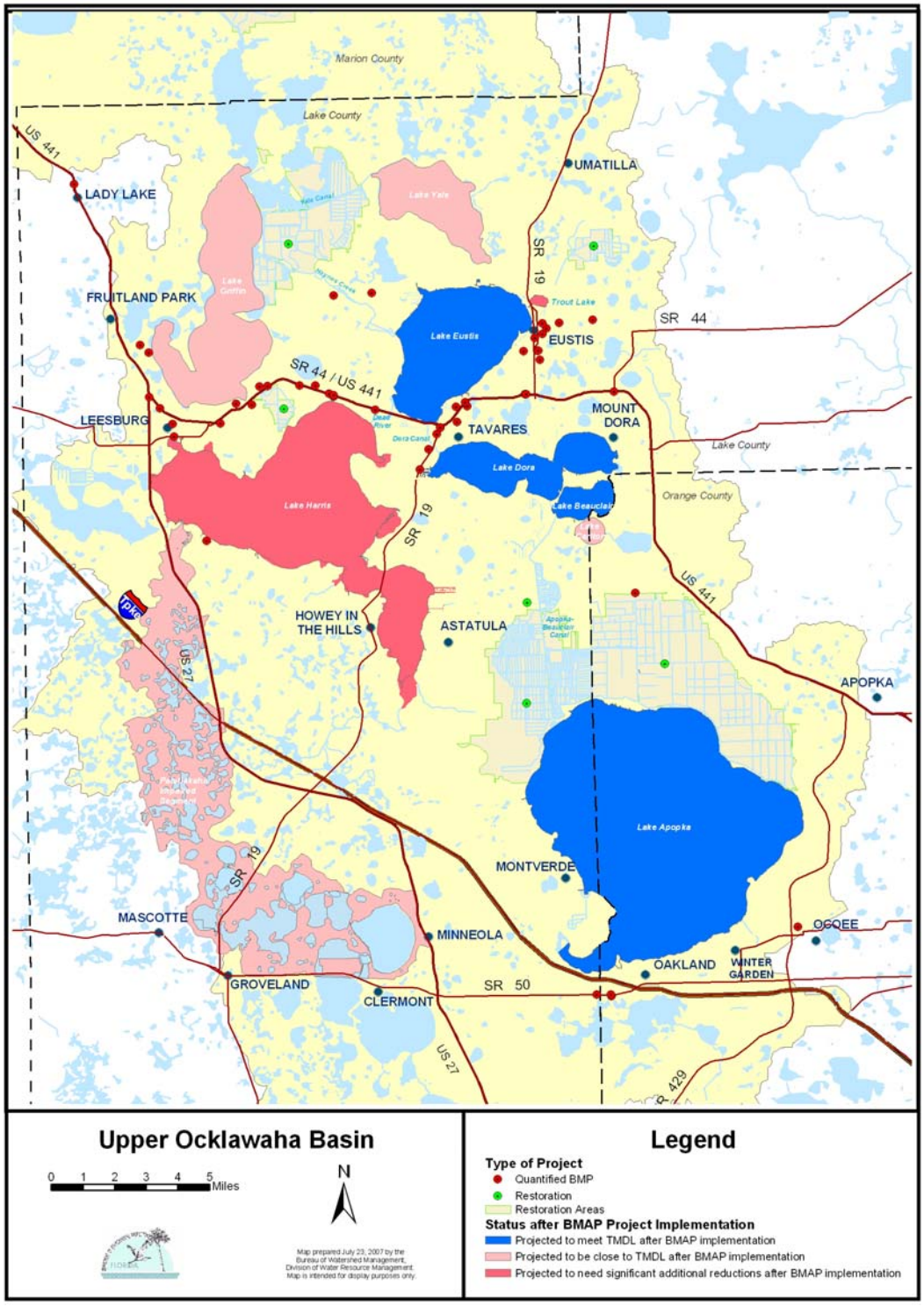


TABLE AP.3. SUMMARY OF NET ESTIMATED LOADINGS OF TOTAL PHOSPHORUS TO TMDL WATERS IN THE UPPER OCKLAWAHA RIVER BASIN AFTER BMAP IMPLEMENTATION

Sub-basins	Lake Apopka	Lake Beau-clair	Lake Carlton (trib to Lake Beau-clair)	Lake Dora	Lake Eustis	Trout Lake (trib to Lake Eustis)	Lake Harris & Little Lake Harris	Palatla-kaha (trib to Lake Harris)	Lake Griffin	Lake Yale (trib to Lake Griffin)	Basinwide Totals
	Net Estimated Loads										
Loading information											
TMDL *Baseline* TP-loading (lbs/yr)	**137,451**	**46,672**	**477**	**39,646**	**35,503**	**2,604**	**26,864**	**2,350**	**77,881**	**3,158**	**372,606**
Loading Changes from Implemented Projects											
a. Tributary inflows	- -	*-26,015*	- -	*-20,071*	*-10,762*	- -	- -	- -	*-7,813*	- -	*-64,661*
b. Agricultural discharges	*-117,015*	- -	- -	- -	*-746*	- -	*-174*	- -	*-22,703*	- -	*-140,638*
c. Restoration	*37,477*		- -	- -	*-603*	- -	*-4,441*	- -	*-18,747*	- -	*-13,686*
d. Stormwater	*-35*	- -	- -	*8*	*-313*	- -	*-98*	- -	*-202*	- -	*-640*
e. Point sources or other treatment options	*1,256*	- -	- -	- -	- -	- -	- -	- -	- -	*-109*	*1,147*
f. Explicit margin of safety	*1,168*	- -	- -	- -	- -	- -	- -	- -	- -	- -	*1,168*
(Subtotal) Estimated change from implemented projects (TP loading lbs/yr)	-77,149	-26,015	0	-20,063	-12,424	0	-4,713	0	-49,465	-109	*-189,938*
Loading Changes from Future Projects											
a. Tributary inflows	*-134*	*-9,746*	- -	*-11,379*	*-6,114*	- -	*-99*	- -	*-4,310*	- -	*-31,984*
b. Agricultural discharges	*0*	- -	- -	- -	*-458*	*-19*	- -	- -	- -	- -	*-477*
c. Restoration	*-26,231*		- -	- -	*-138*	*-726*	*-2,465*	- -	*415*	- -	*-29,145*
d. Stormwater	*0*	- -	- -	- -	*-145*	- -	*-150*	*-13*	*-185*	- -	*-493*
e. Point sources or other treatment options	- -	*-5,000*	- -	- -	- -	- -	- -	- -	- -	- -	*-5,000*
f. Explicit margin of safety	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	*0*
(Subtotal) Estimated change from future projects (TP loading lbs/yr)	-26,365	-14,746	0	-11,379	-6,855	-745	-2,714	-13	-4,080	0	*-66,897*
Estimated change from *implemented and future projects* (TP loading lbs/yr)	**-103,514**	**-40,761**	**0**	**-31,442**	**-19,279**	**-745**	**-7,427**	**-13**	**-53,545**	**-109**	**-256,835**
Estimated change from *growth* (TP loading lbs/yr – 2001–2010)	**0**	**831**	**240**	**1,263**	**3,040**	**592**	**2,874**	**346**	**2,694**	**606**	**12,486**
Estimated change from *projects and growth* (TP-loading lbs/yr)	**-103,514**	**-39,930**	**240**	**-30,179**	**-16,239**	**-153**	**-4,553**	**333**	**-50,851**	**497**	**-244,349**
Net estimated TP-loading (lbs/yr)	**33,937**	**6,742**	**717**	**9,467**	**19,264**	**2,451**	**22,311**	**2,683**	**27,030**	**3,655**	**128,257**
TMDL (Total Maximum Daily Load) (lbs/yr)	35,052	7,056	195	13,230	20,286	521	18,302	2,207	26,901	2,844	126,594
Additional TP load reduction needed	0	0	522	0	0	1,930	4,009	476	129	811	7,877

* TP load reductions for implemented and future projects are represented by negative values (a minus sign)
** All other TP loadings (e.g., baseline, increases, net estimated, TMDLs, and additional load reductions) needed are indicated by positive values.
*** If there is no load reduction or increase associated with a specific category of implemented or future project, a double dash " - - " is shown.
****Numbers in the Basinwide Totals column are estimates as double counting of loadings occurred during TMDL development for Lake Carlton and Lake Beauclair and for Trout Lake and Lake Eustis. Trout Lake is part of the watershed loading contributing to Lake Eustis and Lake Carlton is part of the watershed loading contributing to Lake Beauclair.

Cost of BMAP Implementation

The estimated cost of the management actions included in the Upper Ocklawaha BMAP totals more than $195 million. Funding sources range from local stormwater fees to regional and state cost-share grants. BWG members will explore new opportunities for funding assistance as part of BMAP follow-up. This estimate does not include costs for the implementation of DACS programs and DOT stormwater projects.

Members of the BWG proposed projects that were part of their existing programs, as well as new projects or programs where additional effort was needed to address pollutant load reductions. In many cases the projects proposed in the BMAP are jointly funded or implemented by multiple organizations. The BWG assumed that responsible organizations considered the proposed projects cost-effective for achieving TP reductions as well as other community-based benefits (e.g., reducing flooding, eliminating direct discharges to a lake).

Specific Management Actions Included in the BMAP

Tables AP.4 through **AP.10,** listed below, summarize the management actions proposed by the BWG to address the TMDLs in the basin, including structural BMPs; agricultural BMPs; restoration and water quality improvement projects; regulations, ordinances, and guidelines; special studies and planning efforts; education and outreach efforts; and basic stormwater management program implementation. The tables are extensive and therefore are provided at the end of the chapter.

TABLE AP.4A. STRUCTURAL BMPS—QUANTIFIABLE LOAD REDUCTIONS

TABLE AP.4B. STRUCTURAL BMPS—LOAD REDUCTIONS NOT CURRENTLY QUANTIFIED

TABLE AP.5. AGRICULTURAL BMPS

TABLE AP.6. RESTORATION AND WATER QUALITY IMPROVEMENT PROJECTS

TABLE AP.7. REGULATIONS, ORDINANCES, AND GUIDELINES

TABLE AP.8. SPECIAL STUDIES AND PLANNING EFFORTS

TABLE AP.9. EDUCATION AND OUTREACH EFFORTS

TABLE AP.10. BASIC STORMWATER MANAGEMENT PROGRAM IMPLEMENTATION

Estimates of Future Loadings from Growth and Future Management Actions

As mentioned above, the TP loadings considered as part of the BMAP included those associated with future growth across the basin. Consequently, the management actions considered by stakeholders include pollution prevention activities that address TP loadings from new development (or redevelopment) through regulations, ordinances, or guidelines. There are also many management actions in the BMAP aimed at preventing water quality problems through public and private sector education and outreach.

The preventive management actions are considered Lake- and Stream-friendly Activities. They can include LID planning and engineering, education, and local ordinances or LDRs that protect water quality by maintaining or enhancing predevelopment water flow and reducing pollutant loads in developing and urban watersheds.

Tables AP.4 through **AP.10** present current Lake- and Stream-friendly Activities implemented by the BWG, but these activities are predominantly found in **Table AP.3** (regulations, ordinances, and guidelines) and **Table AP.9** (education and outreach efforts). The BWG will consider additional Lake- and Stream-friendly Activities through the following steps:

1. *The collection of data/inventory of Lake- and Stream-friendly Activities across the Upper Ocklawaha River Basin. This will include an inventory of what each community is currently doing and/or has planned, and an assessment of the lessons learned from the implementation of these efforts (i.e., level of activity and success of activity in helping to protect and/or improve water quality).*
2. *The distribution of a summary of the inventory and the lessons learned by BWG members during the implementation of these activities. The summary will identify incentives for and obstacles to implementation and success.*
3. *The development of a plan for future Lake- and Stream-friendly management actions in the basin, consideration of existing and new ideas, and identification of the most effective techniques that should be considered by jurisdictions and entities in the Upper Ocklawaha River Basin to improve and/or expand the implementation of key/successful approaches.*
4. *The creation of proposals for improved, expanded, and/or new activities by individual jurisdictions and entities, or collectively by the BWG. Proposals will also include incentives for using LID planning techniques, educational opportunities, and/or ordinance and policy changes.*

DACS also plans to address future agricultural loadings. To meet the intent of the FWRA with regard to agriculture, from 2007 to 2011 the OAWP will carry out the following activities:

- *Adopt BMP manuals of statewide application for cow/calf, equine, container-grown plants, in-ground nurseries, and sod operations.*
- *Intensify its efforts to sign up producers for BMP implementation in the Upper Ocklawaha River Basin. Field staff will meet with growers and grower organizations to inform them of existing and new BMP programs and opportunities for cost-share, and to assist them with BMP selection and NOI submittal.*
- *Work with UF-IFAS and DEP to identify priority citrus BMPs and verify their effectiveness.*
- *Develop a BMP implementation assurance program to follow up with a sample of citrus producers on whether they are implementing BMPs and keeping records according to their submitted NOIs.*
- *Evaluate the need for implementation assurance programs for other commodities in the basin and develop them on a priority basis, as needed and feasible.*
- *By April 2008, and annually thereafter, provide to the Upper Ocklawaha BWG an inventory of NOIs in the basin by BMP program, showing acreages or other applicable reporting metrics, and key BMPs being implemented.*
- *By the end of 2011, report to the BWG on:*

- The findings of any citrus or other BMP effectiveness projects relevant to the basin being conducted by or in partnership with the OAWP, and
- The results and progress of any BMP implementation assurance programs being conducted by the OAWP in the basin.

AP.4. Monitoring Program

As part of the BMAP, the TWG designed a strategy for monitoring water quality and measuring pollutant loads. This strategy builds on existing water quality monitoring program commitments made by DEP, the SJRWMD, Lake County, Orange County, WAV volunteers, and the LCWA. The strategy addresses monitoring design, quality assurance (QA), data management, and data interpretation techniques that measure progress in achieving the TMDLs, while allowing for evaluation and feedback that better refine the monitoring strategy and provide information to better define how to achieve the TMDLs. The objectives of the monitoring strategy are as follows:

- *Primary Objective: Monitor TMDL waterbodies to:*
  - Determine whether the target TP concentrations used to develop the TMDLs are being achieved, and
  - Determine whether expected improvements in other water quality indicators are being achieved.
- *Secondary Objective: Measure loadings of TMDL targeted pollutants as:*
  - Tributary loadings, and
  - Loadings associated with specific sources or projects, as feasible.

A network of stations representative of the impaired lakes, the tributaries between the lakes, and the Palatlakaha River are monitored for the water quality indicators listed in **Table AP.11**. Information provided by the monitoring network will be useful in evaluating the cost-effectiveness of load reduction strategies, modifying existing and selecting future load reduction strategies, coordinating agency/group monitoring efforts to reduce duplication and conserve resources, and increasing the understanding of the relationship between pollutant loads and waterbody response.

Data collected by the network are maintained by DEP in a central database available to partners, and must meet QA requirements set by DEP. Additional interagency data comparisons and QA checks will be conducted as practical.

Observations of water quality conditions and trends will be reported to the BWG and the public at least annually. A more complete analysis of trends in the progress made toward achieving designated use will be made on a five-year basis, corresponding with DEP's watershed management cycle.

TABLE AP.11. CORE AND SUPPLEMENTAL WATER QUALITY INDICATORS

WATER QUALITY INDICATORS	LAKES	CANALS	PALATLAKAHA RIVER
Core Indicators			
Biological Oxygen Demand (BOD)			√
Chlorophyll *a* (Chl-a)	√	√	√
Dissolved Oxygen (DO)			√
Stream Condition Index (SCI)			√
Total Nitrogen (TN)	√	√	√
Total Phosphorus (TP)	√	√	√
Trophic Condition per the Trophic State Index (TSI)	√		
Supplemental Indicators			
Algal Biomass	√		
Alkalinity	√	√	√
BOD			√
Clarity Measured as Secchi depth	√	√	√
Color	√		
Conductivity	√	√	√
Dissolved Oxygen (DO)	√	√	
pH	√	√	√
Temperature	√	√	√
Total Organic Carbon (TOC)	√	√	
Total Suspended Solids (TSS)	√	√	√
Turbidity	√	√	√
Unionized Ammonia	√	√	√
Field Conditions during Sampling	√	√	√

AP.5. Tracking and Follow-up Actions

BMAP implementation will be a long-term process. Some key projects with significant estimated load reductions will extend well beyond the first five years of BMAP implementation. This means that TMDLs established for the basin likely will not be achieved in the near term. The BWG will track its implementation efforts and monitor water quality in TMDL waterbodies (through existing water quality monitoring programs), to ensure that the BMAP is carried out and to measure its effectiveness. The BWG will meet periodically (approximately every six months) to discuss implementation issues, consider new information, and determine other management actions needed for waterbodies that are not projected to meet their TMDLs.

Each entity responsible for implementing management actions as part of the BMAP will complete an annual report for submittal to the BWG and DEP. The report will track the implementation status of any management actions listed in the BMAP and document additional management actions undertaken to further the water quality improvements in the basin. The report will primarily comprise a table of data elements such as the following:

- *BMAP project,*
- *Affected area,*
- *Brief description,*
- *Project start/end,*

- *Project/activity status,*
- *TP removal estimate,*
- *Project monitoring results, and*
- *Comments.*

The BWG will review the annual reports to assess progress in meeting the goals of the BMAP. At its semiannual meetings, the BWG will also develop follow-up steps or modifications to the agreed-on management actions as necessary to achieve the targeted pollutant reductions.

Adaptive management involves setting up a mechanism for making course corrections in the BMAP when circumstances change or feedback mechanisms indicate that a more effective strategy is needed. The FWRA requires that the plan be revised, as appropriate, in collaboration with basin stakeholders. All or part of a revised BMAP must be adopted by secretarial order. Adaptive management measures include the following:

- *Procedures to determine whether additional cooperative actions 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, and*
- *Descriptions of the BWG's role after BMAP completion.*

Tracking implementation, monitoring water quality and pollutant loads, and holding periodic BWG meetings to share information and expertise are key components of adaptive management.

AP.6. Commitment to Plan Implementation

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 Upper Ocklawaha BWG have demonstrated their willingness to confer with and support each other in their efforts.

BWG members have signed individual statements of commitment to BMAP implementation, or adopted resolutions that were collected and kept by DEP as part of the record of BMAP development and implementation. **Figure AP.2** provides an example of the statement of commitment, and **Table AP-12** (at the end of this chapter) lists the signatories to the BMAP.

FIGURE AP.2. COMMITMENT TO BMAP IMPLEMENTATION

2007

UPPER OCKLAWAHA RIVER BASIN MANAGEMENT ACTION PLAN

STATEMENT OF COMMITMENT TO PLAN IMPLEMENTATION

The Upper Ocklawaha River Basin Management Action Plan (BMAP) was finalized as a consensus document on April 26, 2007, by authorized representatives of the agencies and organizations listed as members of the Upper Ocklawaha River Basin Working Group (BWG).

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

- Seek the necessary approvals and funding to implement the consensus management actions identified in the BMAP, and implement 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 ensure that the BMAP is carried out.
- Inform DEP and the BWG of any permanent obstacles to carrying out management actions for which they are responsible, including technical, funding, and legal obstacles.
- Conduct water quality monitoring according to the monitoring strategy developed by the Technical Working Group and approved by the BWG.
- Continue to use a coordinated and comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements.
- Continue to communicate and coordinate actions and funding across agencies and programs with regard to BMAP implementation.

TABLE AP.4A. STRUCTURAL BMPS—QUANTIFIABLE LOAD REDUCTIONS

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	Waterbody Identification (WBID) Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
DORA04 - SR 500 US 441-Basin 300A	Lake Saunders / US 441 from Lake Eustis Dr. to County Road (CR) 44B Basin 300A. Exfiltration trench. No increase in TP with road improvement.	3.04	2831B	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 8/2007
DORA05 - SR 500 US 441-Basin 300A,B,C,D	Lakes Saunders and Woodward / US 441 from Lake Eustis Dr. to CR 44B - Basin 300A, B, C, & D.	-10.51	2831B	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 8/2007
DORA09 - State Road 19 in Tavares-System 1	Lake Eustis / SR 19 from 1.9 miles south of US 441 to US 441 - System 1 (Basins 1-4). Wet pond detention.	-2.02	2831B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
DORA10 - State Road 19 in Tavares-System II	Dora Canal / SR 19 from 1.9 miles south of US 441 to US 441 - System II (Basins 1 & 2). Wet pond detention. No increase in TP load with road improvement.	1.19	2831B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
DORA11 - State Road 19 in Tavares-System III	Dora Canal / SR 19 from 1.9 miles south of US 441 to US 441 - System III (Basins 1 & 2). Wet pond detention. No increase in TP load with road improvement.	7.78	2831B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS02 - Haynes Creek Park Retrofit	Haynes Creek Park located on South Haynes Creek Rd. near Ocklawaha Rd. / Dry retention pond and about 400 ft. of retention ditches with ditch blocks along South Haynes Creek Rd. Site is county park in single-family residence neighborhood. Park captures runoff from 8.2-acre watershed via South Haynes Creek Rd.	6.40	2817A; 2817B	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851) / --	Design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004
EUS06 - Eustis Street/Ward Avenue Stormwater Facility	Eustis St. and Ward Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	36.26	2817B	City of Eustis / LCWA - 50% ; Legislature - 50% / LCWA / DEP	$355,550	Complete / 8/1/2003
EUS07 - Salem Street and Magnolia Avenue Retrofit	Salem St. and Magnolia Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	62.54	2817B	City of Eustis / DOT - $600,000; EUSTIS - $150,000 / DOT	$750,000	Complete / 2001
EUS08 - South Grove Street and Palm Avenue Stormwater Facility	South Grove St. Eustis / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	32.41	2817B	City of Eustis/LCWA / LCWA - $56,000; EUSTIS - $58,700 / --	$114,700	Complete / 2002
EUS09 - Barnes Avenue and Center Street Retrofit	Barnes Ave. and Center St. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	4.84	2817B	City of Eustis / Eustis - $100,000 / --	$100,000	Complete / 2003
EUS10 - Stevens Avenue Retrofit	Stevens Ave. and Donnelly St. / Divert stormwater runoff to dry detention pond via store sewer retrofit for total treatment and storage. Construction of new storm sewers. Divert runoff prior to discharge into Lake Eustis to new detention pond at Stevens Ave. and Donnelly St.	40.64	2817B	City of Eustis / DOT - $990,000;Eustis - $75,000 / DOT	$1,065,000	Complete / 2006

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	Waterbody Identification (WBID) Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
EUS11 - Russell Avenue Retrofit	Russell Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	30.97	2817B	City of Eustis / LCWA -50%;Eustis - 50% / LCWA	150,000	Complete / 7/1/2004
EUS12 - Hazzard Avenue Retrofit	Hazzard Ave. / Divert stormwater runoff to wet retention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	14.02	2817B	City of Eustis / LCWA - 50%;Eustis - 50% / LCWA	$76,539	Complete / 7/1/2004
EUS13 - South Grove Street and Steven Avenue Retrofit	Intersection South Grove St. and Steven Ave. in Eustis / Stormwater retrofit. Exfiltration trenches.	14	2817B	City of Eustis / Eustis Stormwater Utility Fee / --	$100,000	Complete / 4/15/2006
EUS14 - SR 500 US 441-Basin A	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin A. Wet pond detention. No increase in TP with road improvement.	26.33	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS15 - SR 500 US 441-Basin C	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin C. Wet pond detention. No increase in TP with road improvement.	3.9	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS16 - SR 500 US 441-Basin D	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin D. Wet pond detention. No increase in TP load with road improvement.	-1.47	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS17 - SR 500 US 441-Basin E	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin E. Wet pond detention. No increase in TP with road improvement.	15.19	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS18 - SR 500 US 441-System C	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System C. Wet pond detention. No increase in TP with road improvement.	21.15	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS19 - State Road 19 in Tavares-System IV	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System IV (Basin 2). Wet pond detention. No increase in TP load with road improvement.	9.82	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS20 - SR 500 US 441	Lake Juanita / US 441 from Lake Eustis Dr. to CR 44B. Wet pond detention. No increase in TP load with road improvement.	1.85	2817B	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 8/2007
EUS21 - SR 500 US 441	Lake Juanita / US 441 from Lake Eustis Dr. to CR 44B. Wet pond detention. No increase in TP with road improvement.	3.28	2817B	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 8/2007
EUS22 - SR 500 US 441-System D	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System D- No detention. No increase in TP load with road improvement.	-1.99	2817B	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
EUS23 - South Bay Street and Eustis Street Retrofit	Intersection South Bay St. and Eustis St. in Eustis / Stormwater retrofit. Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	80	2817B	City of Eustis / LCWA - $289,000;DEP- $155,000;SJRWMD- $206,000 / LCWA / DEP / SJRWMD	$650,000	Complete / 7/20/2006
EUS24 - North Bay Street and Clifford	Intersection North Bay St. and Clifford Ave. in Eustis / Stormwater retrofit. Divert stormwater runoff to dry	51	2817B	City of Eustis / LCWA -$327,250; Eustis-$327,250 / LCWA / DEP /	$654,500	Ongoing / Projected completion 2007

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	Waterbody Identification (WBID) Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
Avenue Retrofit	detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.			SJRWMD		
GRIF05 - Lazy Oaks Retrofit	Lazy Oaks community located on western side of Lake Griffin, on shore of lake. / Lake Griffin basin retrofit projects. Exfiltration trench. Rental cottages in Lazy Oak community and single-family residential development on western side of Lake Griffin. Steep slopes convey stormwater as sheetflow over paved surface within Lazy Oaks. Adjacent subdivision with fairly large lots. Stormwater from 4-acre area conveyed by roadside swales to 12-inch outfall pipe into Lake Griffin. Exfiltration system will retain 80% of annual runoff volume, corresponding to 0.28 to 0.45 inches of runoff volume. 490 feet of exfiltration trench proposed.	19	2814A	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - Lake County Water Authority stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004
GRIF06 - Griffwood Community Retrofit	Griffwood Community Mobile Home Park located on western side of Lake Griffin. / Lake Griffin basin retrofit projects. Exfiltration trench. Site has steep slopes and dense development. Exfiltration with drainage inlets located in roadway at bottom of hill. Exfiltration system designed to treat first 0.5 inch of runoff, which represents 76% of annual runoff volume. System comprises 440 feet of 3-foot exfiltration system.	33.00	2814A	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - Lake County Water Authority stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004
GRIF07 - Brittany Estates Retrofit	Brittany Estates Mobile Home Park community located on southern side of Lake Griffin / Lake Griffin basin retrofit project. Exfiltration trench and expansion of existing retention pond. Densely populated mobile home park with steep slopes. Existing dry detention pond at bottom of hill that overflowed during heavy storms. Roads have inverted crown configuration that convey stormwater. Exfiltration system and larger dry detention pond to treat runoff. Exfiltration will treat first 0.5 inch of runoff from 4.65-acre upper contributing basin, representing 76% of annual runoff volume. 221 feet of 3-foot exfiltration pipe. Lower 5.1-acre basin fitted with 240 feet of 3-foot exfiltration pipe. Shallow berm along Lake Griffin to direct runoff to larger redesigned dry detention pond. Existing 6-inch outfall pipe replaced with control structure, headwall, and new pipe.	12.50	2814A	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - Lake County Water Authority stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2005
GRIF10 - Whispering Pines Regional Stormwater Retrofit	Whispering Pines Basin / Stormwater retrofit. Construction of 2 stormwater ponds. Expected 66% reduction in TP.	130	2814A	Leesburg / Leesburg - 50%; LCWA - 50% / LCWA / DEP	$1.5 million	Ongoing / Projected completion 12/1/2007
GRIF12 - Lake Griffin State Park Retrofit	Lake Griffin State Park / Stormwater retrofit.	11.0	2814A	DEP / DEP - 50%; LCWA - 50% / LCWA	$82,535	Complete / 6/1/2004
GRIF13 - SR 500 US 441-Basin 100	Lake Griffin / US 441 from west of Griffin Rd. to east of Perkins St. - Basin 100. Wet pond detention. No increase in TP load with road improvement.	54.66	2814A	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	Waterbody Identification (WBID) Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
GRIF14 - SR 500 US 441-Basin 200	Lake Griffin / US 441 from West of Griffin Rd. to east of Perkins St. - Basin 200. Wet pond detention. No increase in TP load with road improvement.	74.06	2814A	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008
GRIF15 - SR 500 US 441-Basin 2	Lake Griffin / SR 500/US 441 Leesburg - Basin 2. No increase in TP load with road improvement.	9.59	2814A	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008
GRIF22 - Mid-Florida Lakes Mobile Home Park Retrofit	Mid-Florida Lake Mobile Home Park located east of Lake Griffin along Haines Creek / Exfiltration trenches. Exfiltration trench will operate as off-line retention system.	42.00	2817A	Lake County Public Works / Lake County Stormwater Assessment - 50%;LCWA - 35%; Legislature - 4% / LCWA / DEP	$390,000	Complete / 9/2005
HAR01 - Lakeshore Drive Stormwater Project	Near Venetian Gardens Canals - East Dixie Ave. Leesburg / Stormwater detention pond. Removes nutrient loading from Venetian Canals and Lake Harris.	2.20	2838A	City of Leesburg / Leesburg - 34.5% ;LCWA - 34.5% ;Legislature - 31% / LCWA / DEP	$185,756	Complete / 7/1/2003
HAR04 - SR 500 US 441-System A	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System A. Dry retention pond. No increase in TP load with road improvement.	12.91	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR05 - SR 500 US 441-System B1	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System B1. Dry retention pond. No increase in TP with road improvement.	17.95	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR06 - SR 500 US 441-System B2	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System B2. Wet pond detention. No increase in TP load with road improvement.	9.58	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR07 - SR 500 US 441-Basin 1	Lake Harris / SR 500 - US 441 Leesburg - Basin 1. No increase in TP load with road improvement.	12.52	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR08 - SR 500 US 441-Basin 3	Lake Harris / SR 500 - US 441 Leesburg - Basin 3. No increase in TP load with road improvement.	11.02	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR09 - SR 500 US 441-Basin 4	Lake Harris / SR 500 - US 441 Leesburg - Basin 4. No increase in TP with road improvement.	3.92	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR10 - SR 500 US 441-Basin 5	Lake Harris / SR 500 - US 441 Leesburg - Basin 5. No increase in TP with road improvement.	21.85	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR11 - SR 500 US 441-Basin 6	Lake Harris / SR 500 - US 441 Leesburg - Basin 6. No increase in TP with road improvement.	4.5	2838A	DOT, District 5 / Florida Legislature / --	Not available	Complete / Complete
HAR13 - Hollondel Road Stormwater Pond	Lake Harris Basin / Stormwater pond. SJRWMD is assisting with purchase of property. Design of pond is next step.	150	2838A; 2838B	Lake County Public Works / Lake County Stormwater Assessment; SJRWMD / SJRWMD	$140,000 design cost	Ongoing / Ongoing
LAP09 - Jones Avenue Regional Stormwater Management Project Section	North of Lake Apopka, city of Apopka, north shore of Lake Apopka / Jones Avenue Regional Stormwater Management Project in northern part of north shore area is a 15-acre regional wet detention pond and 20-acre wetland restoration project located in Section 19,20, 21;Township 20S;Range 27E. It serves an area of 1,000 acres during 100-year flood elevation. It treats 0.35 inches over 500 acres. Project reduces maintenance of ditches along Jones Ave. Improves	945	2835D	Orange County Public Works / Orange County - $4.3 million; SJRWMD Ad valorem - $300,000 (plus land costs for both partners) / SJRWMD Lands Division	$4,600,000	Ongoing / Projected completion 8/2007

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	Waterbody Identification (WBID) Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
	water quality: removes TP and TSS. Reduces stormwater runoff from hazardous waste site. Habitat restoration. Net decrease in TP and other parameters.					
LAP14 - SR-50-Basin G	Johns Lake / SR-50 from west of Hancock Rd. to east of Turnpike -Basin G. Wet pond detention.	-2.8	2835B	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007
LAP15 - SR-50-Basin H	Johns Lake / SR-50 from west of Hancock Rd. to east of Turnpike -Basin H. Wet pond detention. No increase in TP load with road improvement	13.46	2835B	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007
LAP16 - SR-50-Basin I	Johns Lake / SR-50 from west of Hancock Rd. to east of Turnpike -Basin I. Dry detention pond. No increase in TP load with road improvement.	-0.02	2835B	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007
LAP18 - Berg Drive	Lake Apopka / Stormwater retrofit Section 16; Township 20; Range 27. Exfiltration chambers for discharge of stormwater. Percolation of existing stormwater through ground.	1.9	2835D	Orange County Public Works / Orange County Public Works / --	$207,000	Complete / 6/1/2000
LAP19 - Water Street	Lake Apopka Basin / Stormwater retrofit Section 23; Township 22; Range 27. Retention pond. Treatment and or percolation of stormwater.	22.8	2835D	Orange County Public Works / Orange County Public Works / --	$104,000	Complete / 7/1/2000
LAP25 - Pioneer Key Regional Stormwater Project	Pioneer Key Mobile Home Park / Regional stormwater improvements with water quality enhancements. Construction of regional wet detention stormwater treatment pond. Reduce pollutant loading to Lake Apopka. Project completed in 2 phases. Pioneer Key Regional Stormwater Facility funded by DEP. Additional work will include reconstruction of roadways, installation of storm sewers, sanitary sewer, potable water, and sidewalks within road right of way. Second phase of construction to Pioneer Key II Mobile Home Park funded by Orange County Community Block Grant (CDBG).	134	2835D	Ocoee Public Works / City of Ocoee and private property owner - 67.3%; Orange County Community Development Block Grant - 32.7%; DEP-$900,000 / Orange County Community Development Block Grant Program; DEP	$2,500,000	Complete / 10/1/2006
PAL14 - US 27-Basin 1	Big Creek / US 27 from US 192 to North Boggy Marsh Rd. - Basin 1. Wet pond detention. No increase in TP load with road improvement.	13.3	2839	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 1/2008

TABLE AP.4B. STRUCTURAL BMPS—LOAD REDUCTIONS NOT CURRENTLY QUANTIFIED

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
ABC02 - Lois Drive baffle box	Lois Dr. - unincorporated Lake County / Baffle box included with drainage improvements.	2835C	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Complete / 2005
CLR01 - Baffle boxes	Throughout city of Clermont / 7 baffle boxes with hydrocarbon absorbent pillows installed. Each unit 15 ft. by 5.33 ft. by 7 ft .deep. Units installed recently; no estimate of debris and sediment removed.	2839	City of Clermont / City of Clermont / --	Not available	Ongoing / ongoing
DORA01 - Lake Dora Avenue improvement project	Lake Dora Ave. in Mt Dora (Lake Dora - northeast shore) / Failing infrastructure replacement and improvement. Failing infrastructure - twin corrugated metal pipes in residential yard. Pipes were part of stormwater conveyance system discharging untreated runoff from old Hwy. 441. Continuous deflective separation (CDS) unit removes sediments and particulates. Pollutants targeted were organic matter (tree litter) and sediment fines.	2831B	Lake County Public Works / Lake County Stormwater Assessment / --	Design - $45,270 Construction -$82,640	Complete / 2003
DORA02 - Tavares stormwater retrofit	Downtown Tavares / Reduce sediment input to Lake Dora.	2831B	Tavares / Tavares -34.5%;LCWA - 34.5%;Legislature - 31% / LCWA / DEP	$60,000	Complete / 2004
DORA03 - Old Hwy 441 and Lake Dora	North side of Lakeshore Dr., old Hwy. 441 east of Tavares / Deteriorating ditch and pipe system discharged stormwater from Old Hwy. 441 to Lake Dora. Upgrade of inlets and construction of wet detention pond to treat highway runoff. Reduce stormwater inputs to Lake Dora.	2831B	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Complete / 2003
DORA16 - Lake Gertrude Outfall Improvements	Lake Gertrude sub-basin / Proposed improvements to Lake Gertrude outfall. Lake Gertrude is tributary discharge to Lake Dora. Lake County and Mt. Dora have interlocal agreement to authorize project.	2823A; 2831B	City of Mt. Dora / Not available / Lake County Public Works	$635,000	Ongoing / Ongoing
EUS05 - Stormwater Retrofit	North Tavares / Sediment and debris collection box. Baffle box.	2817B	City of Tavares/LCWA / Tavares - 34.5%; LCWA - 34.5%; Legislature- 31% / DEP	$30,000	Complete / 1/1/2004
GRIF08 - Canal Street Retrofit	Canal St. / Stormwater retrofit, construct 2.4-acre pond.	2814A	Leesburg / Leesburg - 75%; LCWA - 25% / LCWA	$200,000	Ongoing / 7/1/2007
GRIF16 - Picciola Road ditches	Picciola Road - unincorporated Lake County / Recontouring of ditches. Addition of ditch blocks.	2814A	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Pending / Construction planned for 2007
GRIF17 - Harbor Oaks retrofit	Harbor Oaks / Exfiltration system installed.	2814A	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Pending / Construction planned for 2007
GRIF18 - Lakeside Village Retrofit	Lakeside Village / Underdrain system placed in recontoured ditches located along shoreline.	2814A	Lake County Public Works / Lake County Stormwater Assessment / --	$400,000	Complete / May 2007
GRIF20 - Lake Griffin Marina Improvements	Lake Griffin Marina / Swale improvements planned.	2814A	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Pending / Construction planned for 2008
GRIF21 - CR 466B Swale Improvements	CR 466B / Swale improvements planned for 2008.	2814A	Lake County Public Works / Lake County Stormwater Assessment / --	Not available	Pending / Construction planned for 2008
HAR14 - Dead River	Lake Harris Basin / Stormwater park. Lake County Public Works is	2838A;	Lake County Public Works / Lake	Not	Ongoing / Ongoing

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
Road Stormwater Park	partnering with Public Lands to purchase property.	2838B; 2817C	County Stormwater Assessment / Lake County Public Lands	available	
LAP21 - Burch's Quarters Community Development Project	Lake Apopka Basin / Paving and drainage upgrades - Section 22; Township 22; Range 27. Resurfacing and overbuilding of existing pavement; installation of proposed storm sewer system, cross drains; construction of dry retention pond and associated outfall system. Treatment of stormwater by percolation into ground.	2835D	Orange County Public Works / Housing and Community Development Block Grant / --	$1,356,000	Complete / 11/1/2006
LAP22 - East Bay Streets Community Development Project	Lake Apopka Basin / Paving and drainage upgrades - Section 13, 24; Township 22; Range 27. Roadway improvements will include resurfacing and overbuilding of existing pavement. Miami curbing and sidewalks will be installed based on proposed typical section. Drainage improvements include installation of proposed storm sewer, cross drains, construction of retention ponds and associated outfall system.	2835D	Orange County Public Works / Housing and Community Development Block Grant / --	$1,700,000 estimate	Pending / Projected start date 6/1/2007
LAP28 - Shore Drive and Lake Blvd-Johns Lake Retrofit	Shore Drive and Lake Blvd. / Exfiltration and outfall improvements.	2835B	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Construction planned for 2008
LAP29 - Lake Fuller Retention Pond	Lake Fuller watershed / Runoff from southern Apopka was redirected to 10-acre detention pond. Stormwater discharge removed from Lake Fuller. Lake is within watershed of Lake Apopka and indirectly benefits Lake Apopka through reduction of stormwater runoff and loading from watershed.	2835D	City of Apopka / City of Apopka / --	Not available	Complete / Complete
PAL15 - Lake Minneola Shores Ditch Reconstruction	Lake Minneola Shores-CR561A / Ditches in Minneola Shores (CR 561A) were recontoured, had paved bottoms removed, and ditch blocks were added. Project provides for capture of runoff and enhanced infiltration.	2839	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Complete / 2004
PAL16 - Lakeshore Drive Clermont Retrofit	Lakeshore Dr. in Clermont / Exfiltration system constructed. Required recontouring of ditches and reworking of road shoulder. Project provides for capture of runoff and enhanced infiltration.	2839	Lake County Public Works / Lake County Stormwater Assessment / --	$180,000	Complete / 2005
PAL17 - Elbert Street and Virginia Street Swale	Elbert St. (Lake Minnehaha) and Virginia St. (Lake Minneola) in Clermont / Swale and swale blocks added. Projects will provide capture of runoff and enhanced infiltration.	2839	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Projected start 2008
Tavares02 - Baffle Boxes	Tavares / Baffle boxes have been placed in many of direct stormwater discharges into lakes. City has installed more than 10 baffle boxes during past 5 years. Funds were provided by LCWA and DEP. Boxes collect sediments and debris and prevent their entry into lakes. May remove some TP if attached to sediment.	2831B; 2817B	City of Tavares / City of Tavares / --	Not available	Ongoing / Ongoing
TROUT03 - Trowell Avenue Baffle Boxes	Lake Umatilla watershed / Installation of 2 baffle boxes at edge of Lake Umatilla to catch sediment carried in stormwater before it enters Lake Umatilla. Lake Umatilla drains into Trout Lake via Hicks Ditch. Funding for project was supplied by community block grant obtained with assistance of SJRWMD.	2819A	City of Umatilla / Not available / SJRWMD	Not available	Complete / Complete
TROUT04 - Kentucky Avenue Retention Pond	Kentucky Avenue-Lake Umatilla watershed / Retention pond located on Kentucky Ave. will reduce stormwater inputs into Lake Umatilla. Lake Umatilla drains into Trout Lake via Hicks Ditch.	2819A	City of Umatilla / FEMA-El Nino grant; / State	$1,468,320	Complete / Complete
TROUT06 - Getford Road Stormwater Park	Trout Lake Basin / Lake County stormwater master plan implementation. Joint project between Lake County and city of Eustis. Construction of stormwater pond with passive park features.	2819A	Lake County Stormwater / Lake County Stormwater Assessment; City of Eustis; DEP / City of Eustis	$2,000,000	Ongoing / Ongoing

Note: Though reductions in TP loading are not currently quantified, better future methodologies may allow calculation for many projects.

TABLE AP.5. AGRICULTURAL BMPS

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
MARION02 - Clean Farms Initiative	Marion County - countywide / Clean Farms Initiative is designed to assist Marion County farm owners and managers with implementation of BMPs, and to recognize them for their cooperative efforts. Clean Farms Initiative promotes BMPs for animal waste and nutrient management on agricultural lands. Initiative was begun by passage of Resolution 04-R-384, by Marion County Board of County Commissioners, recognizing importance of agriculture to county's history and economy, while also recognizing need to protect water resources. As part of Initiative, more than 7,500 surveys and brochures were mailed in October 2006 to owners of agricultural land, ranging from large operations of several hundred acres to small tracts of land with fewer than a dozen animals. Survey measures current manure management and fertilization practices. Results of survey, and input from focus groups held in February and March 2007, will be used to direct Initiative's next steps aimed at protecting and preserving water resources.	Marion_County	Marion County Clean Water Program / Marion County Clean Water Assessment; General Revenue; SWFWMD grant / Marion County Planning Department ; Marion County Extension Service ; Marion County Soil and Water Commission; SWFWMD	$15,000	Ongoing / Ongoing
NUTRIENT01 - Ridge Citrus BMP Implementation and Compliance	Upper Ocklawaha Basin / Suite of BMP practices that address nutrient and irrigation management for Ridge citrus. Implementation of Rule 5E-1.023, F.A.C., Notice of Intent, Procedures for Landowners and Leaseholders to Submit a Notice of Intent to Implement Nitrogen Best Management Practices. Management of agricultural runoff reduces nutrient loadings. Adoption by rule of document, *Nitrogen Best Management Practices (BMPs) for Florida Ridge Citrus.*	Basin_wide	Department of Agriculture and Consumer Services, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Ongoing
NUTRIENT05 - Statewide Cow/calf BMP Manual Development and Implementation	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for cow/calf agriculture operations. Reduce nutrient loadings in runoff from cow/calf agriculture operations.	Basin_wide	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing
NUTRIENT06 - Statewide Equine BMP Manual Development and Implementation	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for horse management. Management of agricultural runoff reduces nutrient loadings.	Basin_wide	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing
NUTRIENT07 - Statewide BMP Manual for Container Grown Plants	Upper Ocklawaha Basin / Revision and adoption of manual that addresses BMPs for container-grown plants. Management of agricultural runoff reduces nutrient loadings.	Basin_wide	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing
NUTRIENT08 - Statewide Sod Operations BMP Manual Development and Adoption	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for sod operations. Reduce nutrient loadings in runoff from agricultural operations.	Basin_wide	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing
NUTRIENT09 - Silviculture Best Management Practices Implementation and Compliance	Upper Ocklawaha Basin silviculture lands / BMPs for silviculture applied to industrial, public, and private lands. Silviculture BMP implementation and compliance. Silviculture BMPs were established in mid-1970s in response to Clean Water Act, and revised most recently in 2004. These BMPS are minimum standards for	Basin_wide	DACS,, Division of Forestry / Not available / Private landowners	Not available	Ongoing / Implementation ongoing

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
	protecting and maintaining water quality and wildlife habitat during forestry activities. BMPs address fertilization, and new projects include annual basinwide BMP Survey and targeted training.				
NUTRIENT10 - Statewide BMP Manual for In-ground Nurseries	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for in-ground nurseries. Management of agricultural runoff reduces nutrient loadings.	Basin_wide	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Pending / 2010 for manual adoption; implementation will be ongoing

TABLE AP.6. RESTORATION AND WATER QUALITY IMPROVEMENT PROJECTS

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs /yr)	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
ABC01 - Nutrient Reduction Facility	Apopka-Beauclair Canal/CC Ranch / Water in Apopka-Beauclair Canal treated off-line with alum. Removes phosphorus containing compounds from Lake Apopka discharge. Reduce loading from Lake Apopka to Lake Beauclair and Apopka-Beauclair Canal.	5,000	2835A; 2834C	LCWA / LCWA;Legislature / SJRWMD/DEP	$5,200,000	Ongoing / Projected completion 8/1/2007
BCL02 - Suction dredging of western Lake Beauclair	Western end of Lake Beauclair / Suction dredging to remove 1 million cubic yards of sediment in western end of Lake Beauclair.	Unknown	2834C	FWC/LCWA/SJRWMD / cost share / --	$12,000,000	Pending / Projected completion 8/1/2008
BCL03 - Gizzard shad harvest	Lake Beauclair in-lake removal of fish / Harvest of gizzard shad by commercial fishermen. Removal of fish removes nutrients from lake. Reduces recycling of nutrients from sediments and reduces sediment resuspension (TSS). Stabilizes bottom to reduce TSS.	Unknown	2834C	SJRWMD / SJRWMD Ad valorem; Legislative appropriation / --	$150,000/year in 2005 and 2006	Ongoing / Ongoing
DORA13 - Gizzard shad harvest	Lake Dora in-lake removal of fish / Harvest of gizzard shad by commercial fishermen. Part of experimental assessment with UF and FWC. Removal of fish removes nutrient from lake. Reduces recycling of nutrients from sediments and reduces sediment resuspension (TSS). Stabilizes bottom to reduce TSS.	Unknown	2831B	SJRWMD / SJRMWD Ad valorem; Legislative appropriation / --	$150,000/year in 2005 and 2006	Ongoing / Ongoing
EUS25 - Pine Meadows Restoration Area	Pine Meadows Restoration Area. Muck farm is east of Trout Lake and discharges to Hicks Ditch. / Reduce TP loadings from former muck farm. Restore aquatic, wetland, and riverine habitat. Chemical treatment of soil (alum) to bind phosphorus containing compounds. Reduce nutrient outflow to feasible level of 1.1 kg/ha/yr of TP, or about 1 lb. per acre. Trout Lake is tributary to Lake Eustis. Reduction in nutrient loading benefits both Lake Eustis and Trout Lake.	1,487 - Lake Eustis; 726 - Trout Lake	2817B	SJRWMD / SJRWMD / --	$1,300,000 combined cost for both lakes	Ongoing / Ongoing
GRIF01 - Lake Griffin Emeralda Marsh Restoration	Emeralda Marsh Conservation Area (northeast marshes) north of Haines Creek / Lake Griffin Emeralda Marsh restoration: To be managed for wetland habitat restoration, planting; alum treatment to bind phosphorus containing compounds in sediments; manage excess nutrient outflow; and remove TSS. Manage nutrient outflow to Lake Griffin to feasible loading of 1.1 kg/ha/yr TP, or about 1 lb. per acre.	41,450	2814A	SJRWMD / SJRWMD Ad valorem; Legislative appropriation / --	$15,000,000 for land acquisition	Ongoing / Ongoing
GRIF02 - Gizzard Shad Harvest	Lake Griffin in-lake removal of fish / Gizzard shad removal from Lake Griffin by commercial fishermen. Expanded to Lake Dora and Lake Beauclair, with possible future expansion to other lakes in Harris Chain. Remove and export nutrients via fish. Reduces recycling of nutrients from sediments and reduces sediment resuspension (TSS). Stabilizes bottom to reduce TSS.	Unknown	2814A	SJRWMD / SJRWMD Ad valorem; Legislative appropriation; LCWA / --	$1,000,000 spent since 2002 harvest	Ongoing / Ongoing
HAR02 - Lake Harris Conservation Area	North shore of Lake Harris / Restoration of former muck farm. Chemical treatment of soil (alum) to bind phosphorus containing compounds for nutrient control. Aquatic and wetland habitat restoration. Reduce and manage nutrient outflow to Lake Harris to feasible loading of 1.1 kg/ha/yr TP, or about 1 lb. per acre.North shore of Lake Harris / Restoration of former muck farm. Chemical treatment of soil (alum) to bind phosphates for nutrient control. Aquatic and wetland habitat restoration. Reduce and manage nutrient outflow to Lake Harris to feasible loading of 1.1 kg/ha/yr, or about 1 lb. per acre.	6,665	2838A	SJRWMD / Ad valorem; legislative appropriation / --	$550,000	Ongoing / Ongoing
HAR03 - Harris Bayou Conveyance Project	Harris Conservation Area to Lake Griffin / Establish water flow connection to Lake Griffin. Modification of hydrodynamics to accommodate higher flows of water.	Unknown	2838A	SJRWMD / Ad valorem; legislative appropriation / --	$5,000,000	Ongoing / Projected completion 12/31/2007

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs /yr)	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
LAP05 - Lake Apopka Constructed Marsh flow-way Phase 1	Northwest shore of Lake Apopka / Constructed marsh on northwest shore of lake. Lake water pumped through marsh to remove particulates and nutrients from lake water. Marsh designed to treat about 150 cubic feet per second (cfs).	External reduction: 4,864 and flow-way: 17,640 to 22,050	2835D	SJRWMD / SJRWMD - SWIM Legislative Appropriation/ Ad Valorem/Beltway Mitigation Lake County/LCWA - $1,000,000 EPA - $1,000,000 / LCWA/ Lake County/EPA	Total $~15 million in land acquisition / $4.32 million Phase 1 flow-way construction	Ongoing / Ongoing
LAP06 - North Shore Restoration Area	North shore of Lake Apopka / Wetland habitat restoration. Remediate pesticide "hot spots" in soil.	99,960	2835D	SJRWMD / SJRWMD/Legislative appropriation - P2000:SOR: CARL; USDA WRP / USDA	$~100 million in land acquisition	Ongoing / Ongoing
LAP07 - With-in Lake Habitat Restoration	Lake Apopka / Planting of wetland vegetation in littoral zone, largely north shore. Helps improve fishery, improve water quality and may reduce nutrient levels, stabilize bottom, and reduce TSS.	Unknown	2835D	SJRWMD / SJRWMD ad valorem / --	~$10,000 annually	Ongoing / Ongoing
LAP08 - Removal of Gizzard Shad	Lake Apopka / Harvest of gizzard shad by commercial fishermen. Removal of fish removes nutrient from lake. Reduces recycling of nutrients from sediments and reduces sediment resuspension (TSS). Stabilizes bottom to reduce TSS.	Unknown	2835D	SJRWMD / SJRWMD ad valorem ;Lake County; LCWA; Legislature appropriation / Lake County/LCWA	~$500,000 annually	Ongoing / Ongoing
TROUT01 - Pine Meadows Restoration Area	Pine Meadows Restoration Area. Muck farm is east of Trout Lake and discharges to Hicks Ditch. / Reduce TP loadings from former muck farm. Restore aquatic, wetland, and riverine habitat. Chemical treatment of soil (alum) to bind phosphorus containing compounds. Reduce nutrient outflow to feasible level of 1.1 kg/ha/yr of TP, or about 1 lb. per acre. Trout Lake is a tributary to Lake Eustis. Reduction in nutrient loading benefits both Lake Eustis and Trout Lake.	1,487 - Lake Eustis; 726 - Trout Lake	2817B; 2819A	SJRWMD / SJRWMD / --	$1,300,000 combined cost for both lakes	Ongoing / Ongoing

TABLE AP.7. REGULATIONS, ORDINANCES, AND GUIDELINES

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
EUSTIS03 - Stormwater design rules	Within city of Eustis jurisdiction / Eustis code Sec. 115-5. Eustis stormwater rules for new development are more stringent than state or SJRWMD rules. All new development must provide stormwater treatment meeting city requirements and are subject to review by staff. City staff do field inspections of new construction. Eustis rule has 3 design criteria: 100-year storm, 50-year storm, and 25-year storm based on geotechnical and soil conditions. SJRWMD only requires 25-year peak storm flow design criteria. Most development within Eustis requires 50- or 100-year design criteria.	2831B	City of Eustis / Eustis Stormwater Utility Fee / --	Not available	Ongoing / Ongoing
LAP01 - Apopka Basin Development Guidelines, contained within County Land Development Regulations.	Lake County portion of Lake Apopka watershed including Johns Lake / Apopka Basin Development Guidelines, contained within Lake County Land Development Regulations. Provides ground and surface water protection.	2835D; 2835C	Lake County Environmental Services / Not available / --	Not available	Ongoing / Ongoing
LC01 - Golf Course Resource Management Plan	Lake County - countywide / Golf Course resource management plans are applicable to the unincorporated portion of Lake County. They apply to new and existing golf courses. Regulatory approach that will provide protection to ground and surface waters.	Lake_county	Lake County Environmental Services / Lake County / --	Not available	Ongoing / Ongoing
LC02 - Lake County Shoreline Protection Guide	Lake County - countywide / Lake front property owner guide. Guide for lakefront land owners on water resource issues including shoreline protection, stormwater BMPs, erosion, and aquatic plants. Outreach program targeted at county residents. Inform property owners of better land management practices to improve water quality protection.	Lake_county	Lake County Environmental Services / Lake County / --	Not available	Ongoing / Ongoing
MARION01 - Springshed Protection Program	Rainbow and Silver Springsheds / Prevent further degradation of water quality of Rainbow and Silver Springs, and reduce or eliminate existing sources of pollution. Marion County Board of County Commissioners is conducting hearings on amendments to county's Comprehensive Plan that would establish primary and secondary springs protection zones; limit expansion of existing, or development of new, uses and activities in these zones; address wastewater disposal issues; encourage Florida-friendly landscaping; provide additional stormwater runoff treatment; and encourage use of low-impact development techniques.	Marion_County	Marion County Planning Department / / Marion County Clean Water Program; SWFWMD	Not available	Ongoing / Ongoing
ORANGE02 - Orange County Clean Lakes Initiative Program	Unincorporated Orange County located within Lake Apopka, Lake Beauclair, and Lake Carlton drainage basins / Financial assistance (Incentive program) for homeowners who voluntarily install berms and swales or restore shoreline/littoral zone with native vegetation. Up to $1,000 reimbursement and waiver of permit fee to qualified applicants.	Orange_county	OCEPD / Not available / --	Not available	Ongoing / Ongoing
ORANGE03 - Orange County Surface Water Protection Code	Unincorporated Orange County / Orange County Code, Chapter 15, Articles II and IV. Orange County Air and Water Pollution Control Act provides protection and regulation of pollution and contamination of air, soil, and water resources of Orange County.	Orange_county	OCEPD / Not available / --	Not available	Ongoing / Ongoing
ORANGE08 - Orange County Parks Phosphorus (measured as phosphate) Fertilizer Use Reduction	Orange County Parks, including Trimble, Roosevelt, Nichols, Magnolia Park, Chapin Station, Winter Garden Station, and County Line Station. / OCEPD and Parks Department agreed to reduce use of phosphorus fertilizers for each new lawn care and maintenance contract issued on all park facilities. Agreement includes use of reduced phosphorus (measured as phosphate) between 0-5%	Orange_county	OCEPD / Not available / Orange County Parks Department	Not available	Ongoing / Ongoing

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
	on turf areas (athletic fields, recreational and waterfront parks). Higher percentages of phosphorus are allowable in localized areas (i.e. flower beds, trees and shrubs) needing greater amounts onan as needed basis. Prohibition on use of fertilizers, pesticides—specifically herbicides—within 10 feet of shoreline. Application of weed controls directly rather than by broadcast methods. Limitation of nitrogen (measured as water soluble organic nitrogen) to less than 0.5 lb. per 1,000 square feet. The parks fertilizer program contracts with landscape companies will be adjusted for 2008 to reflect the changes that will occur as the result of passage by DACS of the Urban Turf Fertilizer Rule (5E-1.003 F.A.C.), that goes into effect on Dec. 31, 2007.				
PAL01 - Septic Tank LDR	GSACSC / Septic tanks within Green Swamp are required to be pumped every five years. Land Development Regulation addresses ground and surface water protection.	2839	Lake County Environmental Services / Not available / --	Not available	Ongoing / Ongoing
PAL11 - Groveland Septic Tank Prohibition	GSACSC, Palatlakaha River including lakes / No septic tanks permitted in Green Swamp or on new development sites in Groveland. Addresses ground water protection.	2938	City of Groveland / Developer as part of site development process. / Developer as part of site development process.	Not available	Complete / Ongoing
PAL12 - Green Swamp Additional Stormwater Runoff Retention	GSACSC / 3 inches of runoff to be retained in most effective recharge areas in GSACSC. Addresses ground and surface water protection.	2938	City of Groveland / Developer as part of site development process. / Developer as part of site development process.	Not available	Complete / Ongoing
PAL22 - Groveland Septic Tank LDR	GSACSC within Groveland city limits / Septic tanks within Green Swamp are required to be pumped every five years. Land Development Regulation addresses ground and surface water protection.	2839	City of Groveland / Not available / --	Not available	Ongoing / Ongoing
UMATILLA01 - Green Space Ordinance	Within city limits of Umatilla / Umatilla Land Development Regulations, Chapter 6, Zoning District Regulations require that new development in Umatilla must set aside 25% of area as green space.	2819A ; 2807A	City of Umatilla / Not available / --	Not available	Ongoing / Ongoing
UMATILLA02 - Stormwater Development Ordinance	Within city limits of Umatilla / Umatilla Code of Ordinances, Subdivision Regulation (k) Storm Drainage 19-53. All new development in Umatilla is required to retain stormwater runoff on site.	2819A; 2807A	City of Umatilla / Not available / --	Not available	Ongoing / Ongoing

TABLE AP.8. SPECIAL STUDIES AND PLANNING EFFORTS

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
DORA14 - Lake Dora, Beauclair, and Carlton Basin Study	Lake Carlton. Lake Beauclair. Lake Dora drainage basin within Lake County. / Lake Carlton basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities.	2837B; 2834C; 2831B	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000 for 3 lakes	Ongoing / Ongoing
DORA15 - Lake Saunders Flood Study	Lake Saunders sub-basin / Priority project identified from Lake Dora Basin Study.	2831B; 2830A; 2830	Lake County Public Works / Lake County Stormwater Assessment / --	$43,102	Ongoing / Ongoing
EUS04 - Lakes Eustis and Silver Lake Drainage Evaluation	Lake Eustis and Silver Lake Basins / Lake Eustis and Silver Lake drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lakes.	2817B	Lake County Public Works / Lake County Stormwater Assessment / --	$184,000	Complete / Complete
GRIF04 - Lake Griffin Basin Drainage Evaluation	Lake Griffin Basin / Lake Griffin basin drainage evaluation, per county's stormwater program. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lakes. Precursor to stormwater retrofit and restoration activities. BCI contracted to assess and inventory stormwater management features and outfalls, delineate drainage subbasins, estimate and prioritize pollutant loads by subbasin, and develop conceptual projects that address pollutant load reductions.	2814A; 2817A	Lake County Public Works / Lake County Public Works - 50%; DEP - 50% / --	$92,410	Complete / 2003
HAR12 - Lake Harris and Little Lake Harris Basin Study	Lake Harris/Little Lake Harris drainage basin / Lake Harris and Little Lake Harris drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities.	2838A	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Ongoing / Ongoing
LAP02 - Lake Apopka Basin Drainage Inventory	Lake Apopka Basin / Lake Apopka Basin Drainage Inventory, per Lake County's Stormwater Program. Precursor to stormwater retrofit or restoration activities. BCI contracted to assess and inventory stormwater management features and outfalls and delineate drainage subbasins.	2835D; 2835C	Lake County Public Works / SJRWMD - $12,567 cost-share grant ; Lake County Stormwater Assessment - $12,567 / SJRWMD	$25,135	Complete / 2002
LAP04 - Johns Lake Stormwater Master Plan	Johns Lake drainage basin / Orange and Lake Counties' Stormwater Programs stormwater Master Plan. Part of Apopka Drainage Basin inventory. Johns Lake Master Plan was joint project between Orange County, Lake County, and LCWA done by Miller, Sellen, Connor, and Walsh. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lake to determine nonpoint sources of pollution.	2835D	Lake County Public Works; Orange County Public Works; LCWA / Lake County Stormwater Assessment-$24,958; Orange County-$200,000; LCWA-$25,000 / --	$250,000	Complete / 10/2003
LAP20 - Lake Apopka Master Plan - Orange County	Lake Apopka / Lake Apopka Master Plan done by Camp, Dresser, and McKee. Stormwater management plan for Lake Apopka. Phase 1 complete, ongoing with Phases 2 and 3. Identify retrofit opportunities to remove nutrient loading into Lake Apopka.	2835D	Orange County Public Works / Orange County Public Works / --	$250,000	Ongoing / Phase 1 complete; Phases 2 and 3 in progress
MARION04 - Marion County Aquifer Vulnerability Assessment (MCAVA)	Marion County - countywide / Identification of vulnerable areas of aquifer. Project provides scientifically defensible water-resource management and protection tool that will facilitate planning of human activities to help in minimizing adverse impacts on ground water quality. Aquifer vulnerability maps are displayed in classes of relative vulnerability (one area is more vulnerable than another). Maps	Marion_County	Marion County Clean Water Program / Marion County Clean Water Assessment / DEP / SWFWMD / SJRWMD / UF	$82,850	Ongoing / Projected completion August 2007

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
	benefit local government, planners, and developers in guiding growth into more appropriate areas (e.g., ground water recharge areas) and improving site selection for expanding existing or establishing new well fields.				
PAL02 - Drainage Evaluation: Lakes Louisa, Minnehaha, and Minneola	Basins of Lakes Louisa, Minnehaha, and Minneola / Drainage Evaluation of basins of Lakes Louisa, Minnehaha, and Minneola. Precursor to stormwater retrofit or restoration activities. Stanley Consultants contracted to assess and inventory stormwater management features and outfalls, delineate drainage subbasins, estimate and prioritize pollutant loads by sub-basin, and develop conceptual projects that address pollutant load reduction.	2839	Lake County Public Works / Lake County Stormwater assessment - $50,000 ; SJRWMD - $50,000 stormwater cost-share grant LCWA - $64,951 stormwater grant / SJRWMD/LCWA	$164,951	Complete / Complete
PAL08 - Lake Minnehaha Study and Stormwater Improvements	South of SR 50 and west of US 27 / Lake Minnehaha Study and Stormwater Improvements; project will involve study followed by design of recommended improvements; goal is to collect and treat stormwater before it enters the lake; began study June 2004. Project is currently in conceptual/study phase – specific design has not yet been determined.	2839	City of Clermont Engineering Dept. / 75% LCWA grant; 25% Clermont Stormwater Fees / LCWA	Study/ Design $64,000; Construction Costs TBD	Ongoing / Ongoing
PAL09 - Lake Winona Study and Stormwater Improvement	South of SR 50 and west of US 27 / Lake Winona Study and Stormwater Improvements; Project will involve study followed by design of recommended improvements; goal is to collect and treat stormwater before it enters the lake; began study June 2004. Project is currently in conceptual/study phase – specific design has not yet been determined.	2839	City of Clermont Engineering Dept. / 75% LCWA grant;25% City Stormwater Fees / LCWA	Study/ Design $40,000; Construction Costs TBD	Ongoing / Ongoing
PAL13 - Groveland Stormwater Study	City Core, north and south of SR 50 / Stormwater study and development of master plan for older parts of city of Groveland.	2938	City of Groveland / Groveland Community Redevelopment Agency and possible grants. / City of Groveland and Groveland Community Redevelopment Agency	$150,000	Complete / 2006
PAL21 - Lower Palatlakaha River Basin Study	Lower reaches of Palatlakaha River and connected lakes / Basin study of lower Palatlakaha River Basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. PEC is performing study.	2839	Lake County Public Works / Lake County Stormwater Assessment / --	$323,211	Ongoing / Ongoing
TROUT05 - Trout Lake Basin Study	Trout Lake Basin / Basin study of Trout Lake basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Study is continuation of Lake Eustis Basin Study. Study performed by PEC.	2819A	Lake County Public Works / Lake County Stormwater Assessment / --	$130,000	Ongoing / Ongoing
YALE01 - Lake Yale Basin Study	Lake Yale sub-basin / Basin study of Lake Yale sub-basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Inwood is performing study for county. Marion County participating in study by providing information/data for their part of basin.	2807A	Lake County Public Works / Lake County Stormwater Assessment / --	$266,374	Ongoing / Ongoing

TABLE AP.9. EDUCATION AND OUTREACH EFFORTS

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
APOPKA02 - Educational outreach	Apopka city-wide / Various educational activities that inform and give guidance to citizens on importance of water as a resource. Activities included presentations, newspaper articles, handouts, mailouts on topic of water conservation and stormwater runoff. Storm drain stenciling program that engages local volunteers. Informs residents of discharges into surface waters. Indirect benefit to Lake Apopka by reducing pollutant sources and runoff within watershed.	2835D	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing
EUSTIS02 - Support of WAV Program	Within city of Eustis jurisdiction / Eustis is partner and financial supporter of WAV Program. WAV provides assistance to city with implementation of educational programs and water quality monitoring to support Eustis's MS4 Permit.	2817B	City of Eustis / Eustis Stormwater Utility Fee / Lake County/LCWA	5,000 annually	Ongoing / Ongoing
LADYL01 - Support of Lake County Watershed Action Volunteers Program	Within jurisdiction of Lady Lake / WAV is public education and participation program serving residents of Lake Lake and is Phase II MS4 requirement. Potential for increasing community participation in BMPs that protect water resources.	2814A	Town of Lady Lake / Town of Lady Lake / --	$7,500 per year	Ongoing / Ongoing
LC03 - Lake County Water Resource Atlas	Lake County - countywide / Web-based outreach education program focused on water resource issues. Web- based outreach program targeted at residents of Lake County. Objective is to inform residents about water resource issues, including TMDLs, stormwater, water quality, etc. Helps to promote good stewardship and wise use of water resources.	Lake_county	Lake County Environmental Services / Lake County / Lake County Stormwater; LCWA	$90,000	Ongoing / Ongoing
LC05 - Support of Watershed Action Volunteers Program	Lake County - countywide / WAV Program is outreach program to residents of Lake County. WAV is public education and participation program for residents of Lake County that enhances knowledge and awareness of stormwater management. Part of MS4 Phase II public education requirement.	Lake_county	Lake County Public Works / Lake County Stormwater Assessment / --	$20,000 per year	Ongoing / Ongoing
MARION5 - Marion County Low Impact Development Practices	Marion County - countywide / Encourage adoption of LID practices to preserve and protect water resources. To foster LID not only within Marion County's springs protection zones, but throughout county, Clean Water Program conducted day-long seminar for developers, engineers, landscape architects, and construction professionals in April 2007. Seminar shared LID options and discussed impact of LID on water resources.	Marion_County	Marion County Clean Water Program / Marion County Clean Water Assessment / University of Florida	$82,850	Complete / March 2007
ORANGE06 - Support of Watershed Action Volunteers Program in Orange County	Orange County - countywide / WAV Program is public education and participation program for residents of Orange County. Part of MS4 Phase I public education requirement.	Orange_county	OCEPD / Not available / --	$12,000 per year	Ongoing / Ongoing
ORANGE07 - Orange County Water Resource Atlas	Orange County - countywide / Web-based outreach education program focused on water resource issues. Web-based outreach program targeted at residents of Orange County. Objective is to inform residents about water resource issues, including TMDLs, stormwater, water quality, etc.	Orange_county	OCEPD / Not available / -City of Winter Garden and City of Apopka	Annual maintenance fee for county-wide atlas is	Ongoing / Ongoing

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
				$57,650.	
PAL07 - Clermont Storm Drain Marking	Throughout city of Clermont / Storm drain marking: Signs were placed on all inlets in city with direct discharge to a lake; project completed. Signs were placed on 350 inlets. Discourages dumping of chemicals or other harmful substances in stormwater inlets.	2839	City of Clermont Engineering Dept. / Clermont Stormwater Fees / --	$720, in kind labor	Complete / 6/26/2005

TABLE AP.10. BASIC STORMWATER MANAGEMENT PROGRAM IMPLEMENTATION

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
APOPKA01 - Street sweeping	Apopka city-wide / Street sweeping to reduce debris and sediment entering Lake Apopka. The benchmark frequency for sweeping shall be quarterly or as needed. Removes sediment and debris from streets that would otherwise contribute potential nutrient loadings to Lake Apopka.	2835D	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing
APOPKA03 - Stormwater collection system maintenance	Apopka city-wide / / Maintenance and cleaning of stormwater inlets, ditches, swales, and ponds. The benchmark frequency for this routine maintenance shall be quarterly or as needed. Indirect benefit to Lake Apopka by reducing pollutant sources and runoff within watershed.	2835D	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing
CLR02 - Street Sweeping	Commercial area of Clermont and main roads / City sweeps streets within commercial area and main roads. The frequency benchmark shall be monthly or as needed. The performance benchmark shall be 650 miles of road swept with approximately 328 cubic yards of material removed annually	2839	City of Clermont / City of Clermont / --	Not available	Ongoing / Ongoing
EUSTIS01 - Street Sweeping and Drainage Maintenance	Throughout City of Eustis / City, FDOT and citizen groups sweep streets. Downtown Village streets are swept weekly (52 times/year). Other streets are swept monthly. The performance benchmark shall be 1,110 miles of road swept with 1,587 cubic yards of material removed annually.	2817B; 2819B	City of Eustis / Eustis Stormwater Utility Fee / --	$234,951 per year	Ongoing / Ongoing
LADYL02 - Street Sweeping	Within jurisdiction of Lady Lake / Town-wide street sweeping to remove dirt and debris. The benchmark frequency shall be quarterly or as needed. Removal of debris and potential pollutants prevents their entry into lakes. The performance benchmark shall be 250 cubic yards of material removed annually.	2814A	Town of Lady Lake / Town of Lady Lake / --	$25,000 per year	Ongoing / Ongoing
LADYL03 - Storm Water System Maintenance	Within the jurisdiction of Lake Lake / Town-wide curb and gutter cleaning and catch basin vacuuming. Remove pollutants and debris before entering stormsewer system. The benchmark frequency for this routine maintenance shall be quarterly or as needed.	2814A	Town of Lady Lake / Town of Lady Lake / --	Not available	Ongoing / Ongoing
LAP27 - Montverde Boat Ramp Swale Improvement	Montverde boat ramp / Improvements made to swale system.	2835D	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Construction planned for 2008
LAP28 - Shore Drive and Lake Blvd-Johns Lake Retrofit	Shore Dr. and Lake Blvd. / Exfiltration and outfall improvements.	2835B	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Construction planned for 2008
LEESBURG01 - Street Sweeping	Leesburg city limits. / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency shall be monthly covering an estimated 170 miles of pavement each month. The performance benchmark for removal shall be 50 cubic yards of debris collected and disposed of each month.	2814A	City of Leesburg Environmental Services / Leesburg Stormwater Utility Fee / --	$125,000 per year	Ongoing / Ongoing
MTDORA01 - Street Sweeping	Within city limits of Mt. Dora / Citywide street-sweeping program. Removes sediments and debris from streets and prevents their entry into lakes. May remove some TP if attached to sediment. The benchmark frequency for this activity shall be quarterly or as needed.	2831B	City of Mt. Dora / City of Mt. Dora / --	Not available	Ongoing / Ongoing
OCOEE01 - Street Sweeping	Ocoee city limits. / Sweeping of city maintained streets to remove dirt, vegetaton, and debris. The benchmark frequency for street sweeping is bi-monthly and covers about 1,159 miles with a performance removal of 206 tons of debris collected annually.	2835A; 2835D	City of Ocoee Stormwater Department / City of Ocoee / --	Not available	Ongoing / Ongoing
ORANGE01 - Street Sweeping in the Lake Apopka Basin	Unincorporated Orange County within the Lake Apopka Basin / Contractor and FDOT conduct street sweeping. Contractor and FDOT sweep about 460 miles of road periodically on an annual county-wide basis. The benchmark for sweeping shall be 3,000 cumulative miles annually. Based on typical street sweeping, the debris picked up would be approximately 28 tons.	2835D	OCEPD/Public Works / Orange County	Based on Orange County contract rates, the estimated annual cost would be $60,000.	Ongoing / Ongoing
ORANGE04 - Street sweeping in the Lake Carlton and Lake Beauclair Basins	Orange County–maintained roads in sub-basins that contribute to Lake Carlton and Lake Beauclair, which are primarily roads around Lake Ola and areas to the north of that lake. / Contracted street-sweeping services on Orange County–maintained roads. Basin area approximately 6,522 acres.	2834C; 2837B	OCEPD / Not available / --	Estimated cost based on Orange County contract rates is $3,300.	Ongoing / Ongoing

Project Number - Project Name	General Location / Description	WBID Number	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date
	Within that area, the benchmark is 13.87 miles of roads swept monthly for annual total mileage of 166.44. Estimated amount of debris collected through that effort is a performance removal of 3,080 pounds.				
PAL18 - Disston Avenue and Bike Trail	Forrest Subdivision / Installation of piping, catch basins, sidewalk replacement, driveway repair, relocated existing water lines needed for existing stormwater pond in Forrest Subdivision. Improvements to existing stormwater treatment system that will better protect water resources.	2839	City of Minneola / Minneola stormwater fund / --	$80,132.50	Ongoing / Ongoing
PAL19 - The Crescent	Installation of new curb and gutter, road surface, new inlet basin, sod, as improvements for existing pond. Improvements to existing stormwater treatment system that will better protect water resources.	2839	City of Minneola / DEP grant / DEP	$740,000	Complete / Complete
PAL20 - Firestone/WaterFord Landing	Waterford Landing Subdivision / Install piping, manholes, open and repair road, concrete flume as part of improvements for existing pond in Waterford Landing Subdivision.	2839	City of Minneola / Minneola stormwater fund / --	$91,077	Ongoing / Ongoing
Tavares01 - Street Sweeping	Tavares / Citywide street-sweeping program. Removes sediment and debris from streets that would otherwise contribute potential nutrient loadings to Lakes Dora and Eustis. The benchmark frequency for sweeping shall be quarterly or as needed.	2831B; 2817B	City of Tavares / City of Tavares / --	Not available	Ongoing / Ongoing
WNTRGAR01 - Street Sweeping	Winter Garden city limits / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency for sweeping shall be quarterly or as needed. The performance benchmark shall be 4,355 miles of pavement swept with 312 cubic tons of debris collected annually.	2835A; 2835D	Winter Garden Public Works Department / City of Winter Garden / --	Not available	Ongoing / Ongoing
GROVE01 - Street Sweeping	Groveland city limits / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency for street sweeping shall be once every 30 days or as needed.	2839	City of Groveland Public Works Division / City of Groveland / --	$19,890 per year	Ongoing / Ongoing

TABLE AP.12. SIGNATORIES

ENTITY	SIGNATORY	TITLE	DATE
ALLIANCE TO PROTECT WATER RESOURCES, INC.	Nancy H. Fullerton	Vice President	12/5/07
LAKE COUNTY	Welton Caldwell	Chairman	6/22/07
ORANGE COUNTY	Richard Crotty	Mayor	4/11/07
MARION COUNTY	James Payton	Chairman	8/1/06
POLK COUNTY	Michael Herr	County Manager	9/05/07
LAKE COUNTY WATER AUTHORITY	Larry Everly, Sr.	Chairman	6/28/06
CITY OF APOPKA	Pending		
CITY OF CLERMONT	Harold Turville	Mayor	7/25/06
CITY OF EUSTIS	Jonnie Hale	Mayor/Commissioner	7/6/06
CITY OF FRUITLAND PARK	Pending		
CITY OF GROVELAND	James Smith	Mayor	7/3/06
TOWN OF LADY LAKE	Max Pullen	Mayor	8/17/06
CITY OF LEESBURG	Bob Lovell	Mayor	4/24/06
CITY OF MINNEOLA	David Yeager	Mayor	8/22/06
CITY OF MOUNT DORA	James Yatsuk	Mayor	4/18/06
CITY OF TAVARES	Sandy Gamble	Mayor	4/18/07
CITY OF WINTER GARDEN	Jack Quesinberry	Mayor	9/13/07
CITY OF OCOEE	S. Scott Vandergrif	Mayor	1/16/07
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	Vivian Garfein	Director, Central District	8/27/07
FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 5	George S. Lovett	Director of Transportation Development	10/15/07
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION	Victor Heller	Assistant Executive Director	6/19/07
FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, OFFICE OF AGRICULTURAL WATER POLICY	Richard J. Budell	Director	10/04/07
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT	Kirby Green	Director	8/7/06

II. UPPER OCKLAWAHA BASIN MANAGEMENT ACTION PLAN SUPPORTING DOCUMENT

CHAPTER 1: CONTEXT, PURPOSE, AND SCOPE OF THE PLAN

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 purposes, such as drinking water, recreation, and agriculture **(Table 1.1).** Currently, most surface waters in Florida are categorized as Class III waters, meaning that they must be suitable for recreation and must support the propagation and maintenance of a healthy, well-balanced population of fish and wildlife. **Table 1.1** also shows other designated use categories.

Under Section 303(d) of the federal Clean Water Act, every two years each state must identify its impaired waters, including estuaries, lakes, rivers, and streams, that do not meet their designated uses and are not expected to improve within the subsequent two years. The Florida Department of Environmental Protection (DEP) is responsible for developing this "303(d) list" of impaired waters.

TABLE 1.1: DESIGNATED USE ATTAINMENT CATEGORIES FOR FLORIDA SURFACE WATERS

CATEGORY	DESCRIPTION
CLASS I*	Potable water supplies
CLASS II*	Shellfish propagation or harvesting
CLASS III	Recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife
CLASS IV	Agricultural water supplies
CLASS V	Navigation, utility, and industrial use (*no current Class V designations*)

* Class I and II waters include the uses of the classifications below them.

Florida's 303(d) list identifies hundreds of waterbody segments that fall short of water quality standards. The three most common water quality concerns are coliform, nutrients, and oxygen-demanding substances (see **Appendix G** for a list of target pollutants across Florida). These listed waterbody segments are candidates for more detailed assessments of water quality to determine whether they are impaired according to state statutory and rule criteria. DEP develops and adopts total maximum daily loads (TMDLs) for the waterbody segments it identifies as impaired. A TMDL is the maximum amount of a specific pollutant that a waterbody can assimilate while maintaining its designated uses.

The water quality evaluation and decision-making 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 contained in Florida's Identification of Impaired Surface Waters Rule (IWR), Rule 62-303, Florida Administrative Code (F.A.C.). The impaired waters in the Upper Ocklawaha River Basin addressed in this plan are all Class III waters. TMDLs have been established for these waters, identifying the amount of total phosphorus (TP) and other pollutants they can receive and still maintain their Class III designated uses.

TMDLs are developed and implemented as part of a watershed management cycle, based on the state's 52 river basins. This approach uses a schedule that rotates through these basins over a 5-year repeated cycle (see **Appendix A**) to evaluate

surface waters, determine impairments, and develop and implement management strategies to restore impaired waters to their designated uses. **Table 1.2** summarizes the 5 phases of the watershed management cycle.

TABLE 1.2. PHASES OF THE WATERSHED MANAGEMENT CYCLE

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 management actions to achieve the TMDL(s)
PHASE 5	Implementation of TMDL(s), including monitoring and assessment

1.2 TMDL Implementation

Rule-adopted TMDLs may be implemented through basin management action plans (BMAPs), which contain actions to reduce and prevent pollutant discharges through various cost-effective means. During Phase 4 of the TMDL process, BMAPs or other implementation approaches are developed jointly by DEP and the affected stakeholders in the various basins. A basin may have more than one BMAP, based on practical considerations. The FWRA contains provisions that guide the development of BMAPs and other TMDL implementation approaches. **Appendix B** summarizes the statutory provisions related to BMAP development.

Stakeholder involvement is critical to the success of the TMDL Program and varies with each phase of implementation to achieve different purposes. The BMAP development process is structured to achieve cooperation and consensus among a broad range of interested parties. Under statute, DEP invites stakeholders to participate in the BMAP development process and encourages public participation to the greatest practicable extent. DEP must hold at least one noticed public meeting in each basin to discuss and receive comments during the planning process. Stakeholder involvement is essential to develop, gain support for, and secure commitments to implement the BMAP.

1.3 Upper Ocklawaha River Basin Management Action Plan

1.3.1 Stakeholder Involvement

Upper Ocklawaha River Basin stakeholders chose unanimously to establish one Basin Working Group (BWG), with the option of creating small working groups to address specific concerns or issues. Members of the BWG comprise these subgroups, which meet separately from the BWG. For instance, the BWG formed a standing Technical Working Group (TWG), which provided information, recommendations, and products for BWG consideration on technical questions. These working groups present their findings to the BWG for consideration and consensus decision making. This process generated one BMAP that addresses the current TMDLs in the basin's four planning units (see **Section 1.3.3**).

The BWG, composed of stakeholder members representing a variety of entities, took a consensus-based collaborative approach when making decisions regarding the content of the BMAP. It was necessary to define what constitutes a consensus agreement for the BWG, short of unanimous agreement. However, the BWG concluded that accepting a proposal without full unanimity would be a default position, when necessary to move the process forward and to complete development of the BMAP on schedule. The BWG agreed to make every effort to develop proposals that all members could support.

Appendix C describes the Upper Ocklawaha River BWG organizational structure, process, membership, and citizen involvement efforts.

The Upper Ocklawaha BWG Process Goal Statement summarizes the manner in which the BMAP was developed:

> *The Upper Ocklawaha River Basin Working Group, using community support and input, will develop a comprehensive and sustainable BMAP. The BMAP will build upon existing efforts and will be equitable, environmentally effective, and economically feasible, while achieving Total Maximum Daily Load goals in compliance with state and federal laws.*

1.3.2 Plan Purpose

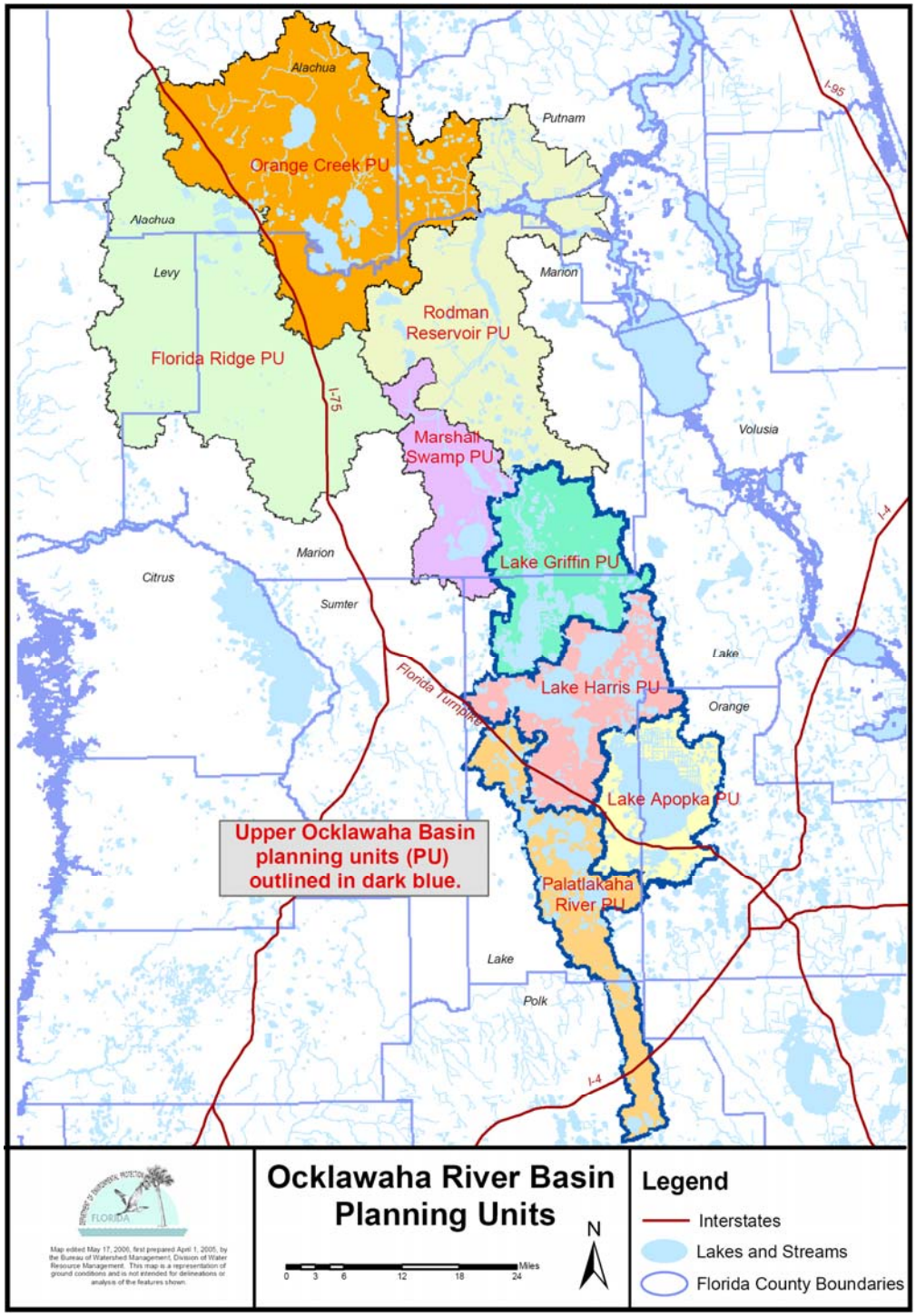
This BMAP identifies cost-effective actions that will be undertaken to achieve the TMDLs adopted by DEP for the Upper Ocklawaha River Basin. The BMAP also documents the BWG's endorsement of the management actions contained in the plan, and the BWG's commitment to its implementation.

1.3.3 Geographic Scope

The area addressed by the Upper Ocklawaha River BMAP comprises the following four planning units (see **Figure 1.1**), all of which include several smaller lakes and canals.

1. *The **Lake Apopka Planning Unit** drains 183 square miles in the southeast portion of the basin and primarily includes Lake Apopka and the areas that drain into it, as well as a portion of the Apopka-Beauclair Canal.*
2. *The **Palatlakaha Planning Unit** drains 223 square miles and contains the Clermont Chain of Lakes, which is connected by the Palatlakaha River. The Clermont Chain of Lakes includes Lakes Minneola, Minnehaha, and Louisa, along with 12 other smaller lakes.*
3. *The **Lake Harris Planning Unit** drains 240 square miles and includes Lakes Harris, Dora, Beauclair, Eustis, Little Harris, Ola, and Carlton, and the connecting canal systems. The Little Everglades Swamp connects to Lake Harris through the Little Everglades Tributary.*
4. *The **Lake Griffin Planning Unit** drains 232 square miles and includes Lake Griffin and Lake Yale along with their connecting canals, some tributaries to Lake Griffin and Emeralda Marsh, and portions of Haynes Creek.*

FIGURE 1.1. UPPER OCKLAWAHA RIVER BASIN PLANNING UNITS



These planning units were used in DEP's October 2003 *Water Quality Assessment Report: Ocklawaha*. Each planning unit has unique issues influencing its water quality, including the degree of existing and anticipated development, the number and type of point sources, and geographic considerations. Though there are recognized differences, there are also issues that are common to most, such as hydrologic alteration and loadings of sediment, TP, and total nitrogen (TN). Early in the process, the BWG decided to create only one BMAP because of the similar issues among the planning units. Also, one planning unit's outflow is often another's inflow.

The BMAP addresses these units together as one basin, with specific discussion and actions focused on the following 10 impaired waterbodies:

- *Lake Apopka*
- *Lake Beauclair*
- *Lake Carlton*
- *Lake Dora*
- *Lake Eustis*
- *Trout Lake*
- *Lake Harris/Little Lake Harris*
- *Palatlakaha River (north of State Road [SR] 50)*
- *Lake Griffin*
- *Lake Yale*

Overlap with the Wekiva Study Area

The Wekiva Study Area was established under Section 369.316, F.S., which is part of the Wekiva Parkway and Protection Act. As **Figure 2.1** shows, there is overlap between the Wekiva Study Area and the Upper Ocklawaha River Basin. Portions of Orange County, Lake County, and the cities of Winter Garden, Ocoee, Eustis, and Mount Dora lie within the Wekiva Study Area.

1.3.4 Plan Scope

The Upper Ocklawaha River BMAP addresses TMDLs adopted by DEP, specifically for TP. Other water quality concerns will benefit from the actions that address TMDLs. However, the BMAP does not tackle all the important water quality issues in the basin. This was a conscious decision by the BWG in order to focus on a critical aspect of water quality in the basin (TP reductions) and to expedite BMAP development and implementation.

1.3.5 TMDLs in the Upper Ocklawaha River Basin

All surface waters (including wetlands) in the Upper Ocklawaha River Basin are designated as Class III waters, in accordance with Rule 62-302, F.A.C. **(Table 1.1).** Ten waterbodies did not meet their designated uses and were verified by DEP as impaired. For all 10, **TP is the primary pollutant contributing to the impairment** (see **Section 1.4.1** for related discussion). In 2 of these waterbodies, TN contributes to the problem, and in 1 waterbody, biological oxygen demand (BOD) is also identified as a pollutant contributing to the impairment.

In 2003, DEP established TMDLs for the 10 impaired waters in the Upper Ocklawaha River Basin. It assessed each impaired waterbody, the pollutant(s) contributing to the impairment, and the amount of pollutant(s) entering the waterbody during a specified

period. DEP determined the level of pollutant(s) that each waterbody can receive and still maintain its Class III designated use (the TMDL) and identified the corresponding pollutant reduction needed to achieve the TMDL. **Figure 1.2** shows the waters for which TMDLs have been adopted in the basin.

The TMDLs for seven of the Upper Ocklawaha River Basin lakes (the Harris Chain of Lakes) were based on modeling conducted by the St. Johns River Water Management District (SJRWMD) to develop pollutant load reduction goals (PLRGs). **Appendix E** summarizes the PLRG methods and peer review process for these lakes, as well as the TMDL development methods for the remaining waterbodies. **Table 1.3** lists the TMDLs for the 10 impaired waterbodies in the basin. DEP is currently collecting data to further analyze the basin's water quality impairments and is working on additional TMDLs.

1.3.6 Pollutant Reduction and Discharge Allocations

- ***Categories for Rule Allocations****—The rules adopting TMDLs must establish reasonable and equitable allocations that will alone, or in conjunction with other management and restoration activities, attain the TMDL. Allocations may be to individual sources, source categories, or basins that discharge to the impaired waterbody. The rule allocations identify either how much pollutant discharge in pounds per year (lbs/yr) each source designation may continue to contribute (discharge allocation), or the lbs/yr or percent of its loading the source designation must reduce (reduction allocation). Currently, the TMDL allocation categories are as follows:*
  - **Wasteload Allocation**—The allocation to point sources permitted under the National Pollutant Discharge Elimination System (NPDES) Program, which includes the following:
    - ***Wastewater Allocation****—Allocation to industrial and domestic wastewater facilities.*
    - ***NPDES Stormwater Allocation****—Allocation to NPDES stormwater permittees that operate municipal separate storm sewer systems (MS4s) (see the discussion on MS4s in* ***Section 3.4.2****). These permittees are treated as point sources under the TMDL Program.*
  - **Load Allocation**—The allocation to nonpoint sources, which include agricultural runoff and stormwater from areas that are not covered by an MS4.

  Table 1.3 *lists the pollutant load allocations adopted by rule for each of the Upper Ocklawaha River Basin waterbodies with a TMDL. In Lake Beauclair, the NPDES stormwater* ***reduction allocation*** *(how much a pollutant must be reduced) is an 85 percent reduction in TP loading. The allocations for Lake Apopka are* ***discharge allocations*** *(how much of a pollutant can be discharged), including 2,668 lbs/yr for wastewater (point sources) and 31,216 lbs/yr for nonpoint sources. Whether an allocation is expressed as a needed reduction or an allowable discharge, the result is the same. The source must limit the amount of discharge for which it is responsible.*

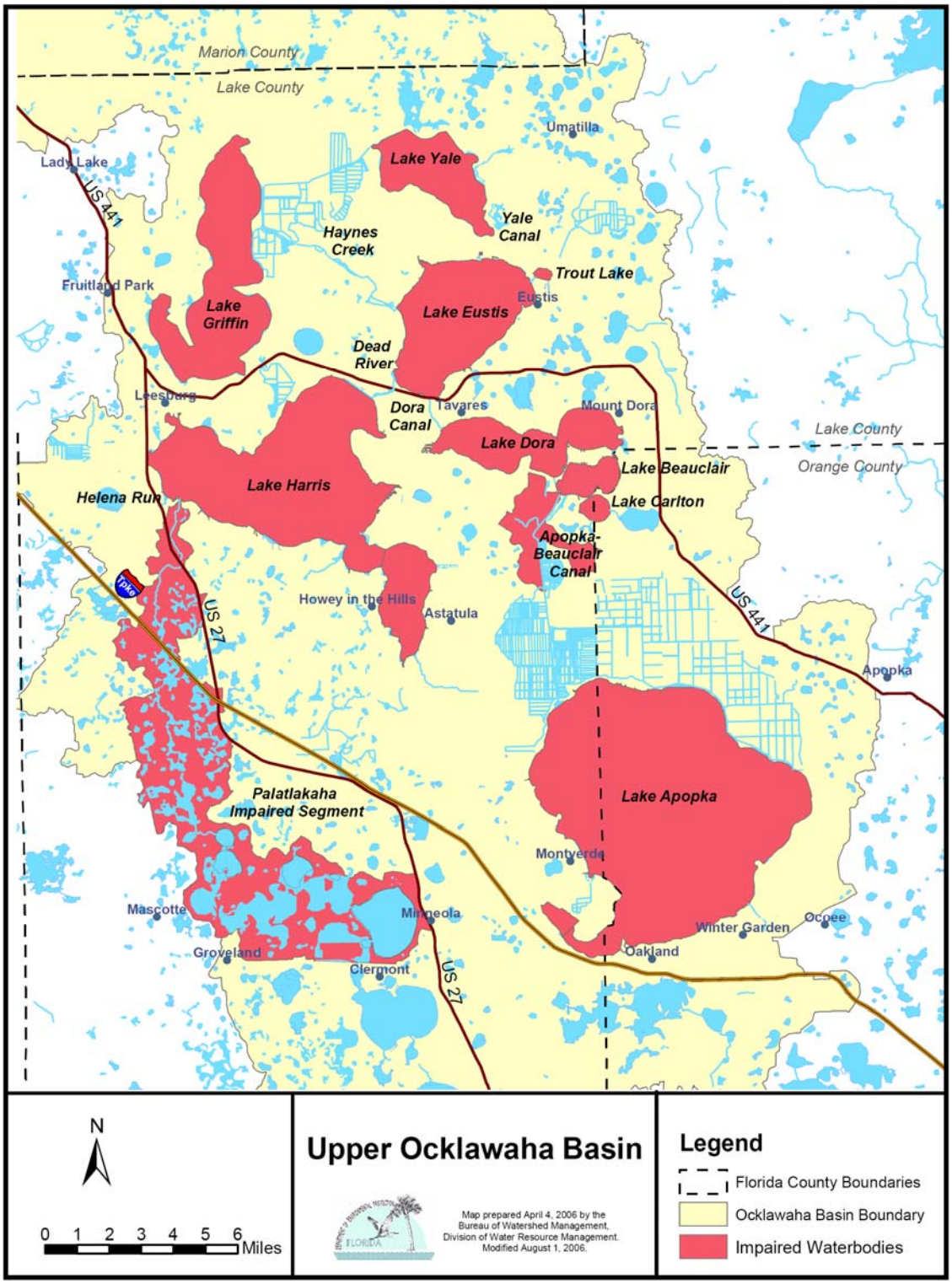
- ***Initial and Detailed Allocations****—Under the FWRA, the TMDL allocation may be an "initial" allocation among point and nonpoint sources. In such cases, the "detailed" allocation to specific point sources and specific categories of nonpoint sources must be established in the BMAP. The FWRA further states that the BMAP may make detailed allocations to individual "basins" (i.e., sub-basins) or to all basins as a whole, as appropriate. Both initial and detailed allocations must be determined based on a*

number of factors listed in the FWRA, including cost-benefit, technical and environmental feasibility, implementation time frames, and others (see ***Appendix B).***

The BWG agreed that, for the purposes of the initial BMAP, it would not be appropriate to try to calculate more specific allocations than those adopted as part of the TMDL. Therefore, the "detailed" allocation chosen was to all sub-basins as a whole, based on the following considerations:

- There are no significant point sources in the Upper Ocklawaha River Basin. The complexity of calculating more detailed allocations among nonpoint sources would demand time and effort that would delay plan development without benefiting the outcome.
- Major restoration projects by the SJRWMD and the Lake County Water Authority (LCWA) are projected to substantially reduce pollutant loadings. In addition, Lake County, Orange County, and various local governments are conducting and planning significant stormwater projects that will contribute to load reductions. Local governments in the basin are taking increasing responsibility for managing their discharges to surface waters.
- There is a wide range of experience, expertise, and resources among local governments and other entities in the basin responsible for stormwater management. The BMAP process is an opportunity for some to build on their beginning efforts and for others to share their knowledge and resources.

FIGURE 1.2. WATERBODIES IN THE UPPER OCKLAWAHA RIVER BASIN WITH DEP-ADOPTED TMDLS



(RED AREAS REPRESENT THE BOUNDARIES OF THE IMPAIRED WATERBODY SEGMENTS)

TABLE 1.3. TMDLS IN THE UPPER OCKLAWAHA RIVER BASIN

SUB-BASIN	WATERBODY IDENTIFICATIONS WBID(s)	TMDL	TARGET CONCENTRATION	TMDL BASELINE LOAD[1]	WASTELOAD ALLOCATIONS		LOAD ALLOCATION (NONPOINT)	OVERALL NEEDED REDUCTION
					WASTEWATER	NPDES STORMWATER[2]		
		(lbs/yr)	(ppb)	(lbs/yr)	(lbs/yr)	(% reduction)	(lbs/yr)	(lbs/yr)
LAKE APOPKA								
TOTAL PHOSPHORUS [3]	2835A,C,D	**35,052**	55	**137,451**	2,668	None	31,216	**102,399**
LAKE BEAUCLAIR								
TOTAL PHOSPHORUS	2834C	**7,056**	32	**46,672**	None	85	7,056	**39,616**
LAKE CARLTON								
TOTAL PHOSPHORUS	2837B	**195**	32	**477**	None	59	195	**282**
LAKE DORA	2831B							
TOTAL PHOSPHORUS	2831A	**13,230**	31	**39,646**	None	67	13,230	**26,416**
LAKE EUSTIS/ HAYNES CREEK	2817B							
TOTAL PHOSPHORUS	2817A	**20,286**	25	**35,503**	None	43	20,286	**15,217**
TROUT LAKE								
TOTAL PHOSPHORUS	2819A	**521**	28	**2,604**	None	80	521	**2,083**
TOTAL NITROGEN		9,733	780	24,165	None	60	9733	14,432
LAKE HARRIS/ LITTLE LAKE HARRIS	2838A/2838B							
TOTAL PHOSPHORUS	2832/2817C	**18,302**	26	**26,864**	None	32	18,302	**8,562**
PALATLAKAHA RIVER								
BOD	2839	43,042	None	49,351	None	12.8	43,042	6,309
TOTAL NITROGEN		16,696	None	17,604	None	5.2	16,696	908
TOTAL PHOSPHORUS		**2,207**	None	**2,350**	None	6.1	2,207	**143**
LAKE GRIFFIN								
TOTAL PHOSPHORUS	2814A	**26,901**	32	**77,881**	None	66	26,901	**50,980**
LAKE YALE/ LAKE YALE CANAL	2807A							
TOTAL PHOSPHORUS	2807	**2,844**	20	**3,158**	None	10	2,844	**314**

[1] TMDL baseline loads were taken from more recent estimates by the SJRWMD, except for the Palatlakaha River, Lake Carlton, and Trout Lake, whose loadings were estimated by DEP. Most of the baseline loading estimates developed by the SJRWMD were calculated for the period from 1991–2000; Lake Apopka loadings are calculated for the period from 1989–94. DEP estimated baseline loadings for Lake Carlton from 1991-2000 and Trout Lake from 1995-2000. The baseline loading year for the Palatlakaha River was 1991.
[2] NPDES Stormwater refers to discharges associated with MS4s, which are discussed in **Section 3.4.2.** The reduction required is a percent of the current MS4 discharge.
[3] Numbers for Lake Apopka were converted from metric tons per year. The TMDL includes an explicit margin of safety (MOS) of 1,168 lbs/yr.

Notes: See Appendix E for a description of the methods used to calculate PRLGs and TMDLs.
ppb – parts per billion.

1.4 Assumptions and Considerations Regarding TMDL Implementation

The water quality impacts of BMAP implementation are based on some fundamental assumptions about the pollutants targeted by the TMDLs, modeling approaches, waterbody response, and natural processes. There are also important considerations to keep in mind about the nature of the BMAP and its long-term implementation. These assumptions and considerations are discussed below.

1.4.1 Assumptions

- ***Primary Nutrient of Concern****—All the TMDL waterbodies in the Upper Ocklawaha River Basin have TMDLs for TP. The Palatlakaha River and Trout Lake also have TMDLs for TN, and the Palatlakaha River has a third TMDL for BOD. However, the management actions in the BMAP are directed at reducing the TP being discharged to surface waters.*

  The basin's lake waters naturally contain nutrients, but external loadings from agriculture and urban development add nutrients that promote excessive plant growth, especially algae. The algal blooms resulting from this eutrophic condition may reduce the dissolved oxygen (DO) content, which can kill fish and other organisms. Both TN and TP are required for most types of algae to grow. Levels of TN and TP in the basin's lakes indicate that algal growth is primarily controlled by TP availability; more TP generally means more algae (Fulton, 1995).

  In some of the lakes, excessive external loading has resulted in an oversupply of TP. When TP is present in excess, TN availability then tends to control algal growth (Schelske, Aldridge, and Carrick, 1992). One group of algae that commonly forms blooms in the basin lakes is a type of Cyanobacteria that is nitrogen-fixing. It does not need external supplies of TN because it can use atmospheric nitrogen gas, which is present in abundance. However, like other types of algae, nitrogen-fixing Cyanobacteria tend to grow strongly only when there are adequate supplies of TP. ***Therefore, the BWG considers TP to be the primary nutrient of concern for eutrophication of these lakes.***

- ***Modeling Pollutant Loadings****—For TP sources for which no specific information on external loading was available for the Upper Ocklawaha River Basin (e.g., stormwater runoff from some land uses), it was assumed that external loading (and future changes in external loading) can be estimated by general modeling approaches, using information gathered for similar land uses in other areas.*

- ***TP Concentrations****—It was assumed that TP concentrations in each TMDL waterbody are directly proportional to external TP loading. This assumption is supported by water quality modeling in the Upper Ocklawaha River Basin lakes and by the responses of other lakes to TP load reduction. This does not discount the potential significance of TP loadings from ground water or lake sediments.*

- ***Internal Recycling of Pollutants****—Most of the TP in lake waters is eventually lost to lake sediments. Releases of TP from storage in the bottom sediments (internal recycling) can delay the recovery of water quality. However, TP releases from the sediments gradually decrease with continued reductions in external TP loading. Case studies generally show improvements in water quality within a few to several years of*

external TP load reduction. Improvements have already been seen following a partial reduction in external TP loading to Lakes Apopka and Griffin. Therefore, the BWG assumes that water quality improvements will follow external nutrient reduction, although the time frames needed to achieve final water quality results may extend into future TMDL cycles.

1.4.2 Considerations

- ***Implementation Schedule****—BMAP implementation will be a long-term process. While many projects and activities listed in the BMAP are recently completed or currently ongoing, some key projects with significant estimated load reductions will extend well beyond the first five years of BMAP implementation (BMAPs must be reviewed every five years and revised as necessary). This means that the TMDLs established for the basin likely will not be achieved in the near term. Regular follow-up and continued coordination and communication by the BWG will be essential to ensure that management actions are carried out and that their incremental effects are assessed. Additional management actions to achieve TMDLs that are not projected to be met fully will be developed as part of BMAP follow-up.*

- ***Quantifying Project Impacts****—Not all of the projects and activities listed in the BMAP can be quantified with regard to the reductions in TP they might achieve (e.g., street sweeping, detention ponds, and environmental education). However, it is assumed that these actions will have varying effects on reducing TP loads. This is actually a bonus, in that the actions that can be quantified will achieve or nearly achieve most of the TMDLs in the basin. Consequently, the unknown reductions may compensate for any uncertainties associated with the estimated reductions. Studies are under way to try to quantify the load reduction value of some of these actions. Any new information derived from these studies will be factored into follow-up evaluations and future BMAP revisions.*

- ***Future Growth****—Through its TWG, the BWG evaluated future growth impacts on TP loadings through 2010 (see* ***Appendix F****). These estimated impacts are factored into the estimates of net loadings in each sub-basin. However, it is difficult to track the rapid growth occurring in the Upper Ocklawaha region and accurately account for its impacts on water quality, especially beyond 2010. 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, the adoption of ordinances, public education efforts, best management practices (BMPs), personal habits, and other means.*

CHAPTER 2: UPPER OCKLAWAHA RIVER BASIN SETTING

2.1 Basin Hydrology and Water Management

About half of the flow in the Upper Ocklawaha Chain of Lakes comes from two different upstream pathways: the Palatlakaha River and Lake Apopka sub-basins (see **Figure 2.1**). Most of the flow from the Lake Apopka sub-basin comes directly from Lake Apopka through the Apopka-Beauclair Canal. The total contributing drainage area to Lake Apopka is approximately 187 square miles. Lake Apopka's surface area alone is 48 square miles, making it the third largest lake in Florida.

The Palatlakaha River begins as an outflow of water from Lake Lowery, located at the southern end of the Green Swamp near Haines City. Water moves northward through the interconnected wetland sloughs and stream channels of Big and Little Creeks into Lake Louisa. The Palatlakaha River flows northward from Lake Louisa, connecting the Clermont Chain of Lakes before discharging to Lake Harris in the Upper Ocklawaha Chain of Lakes. The Clermont Chain of Lakes (designated as Outstanding Florida Waters [OFWs]) is defined by Rule 62-302, F.A.C., as a series of 15 lakes, and their connecting sections of waterway, that start at Lake Louisa and move northward to and include Lake Emma. A series of control structures is used to manage the flow of water from Lake Emma and the Palatlakaha River into Lake Harris.

The Upper Ocklawaha Chain of Lakes sub-basin contains the connected Lakes Beauclair, Dora, Eustis, Harris, Little Harris, Yale, Griffin, and associated wetlands. Water from Lake Beauclair flows directly into Lake Dora, which drains into Lake Eustis through the Dora Canal. Lake Harris is connected to Lake Eustis through the Dead River. Lake Eustis discharges to Lake Griffin through Haynes Creek, and Lake Yale discharges into Lake Griffin through the Lake Yale Canal. The Ocklawaha River then begins as a recognizable channel out of the north end of Lake Griffin.

Within a chain of lakes, water quality problems that occur in one lake can be easily transferred to the other lakes. For example, many of the problems experienced by Lakes Beauclair and Dora result from the discharge of degraded water from Lake Apopka through the Apopka-Beauclair Canal. **Table 2.1** shows the drainage patterns of surface water flows in the Upper Ocklawaha River Basin's impaired waters. The table also identifies the political jurisdictions in the Upper Ocklawaha River Basin and shows their hydrologic connections, direct and/or indirect, to other sub-basins.

FIGURE 2.1. MAP OF THE UPPER OCKLAWAHA RIVER BASIN

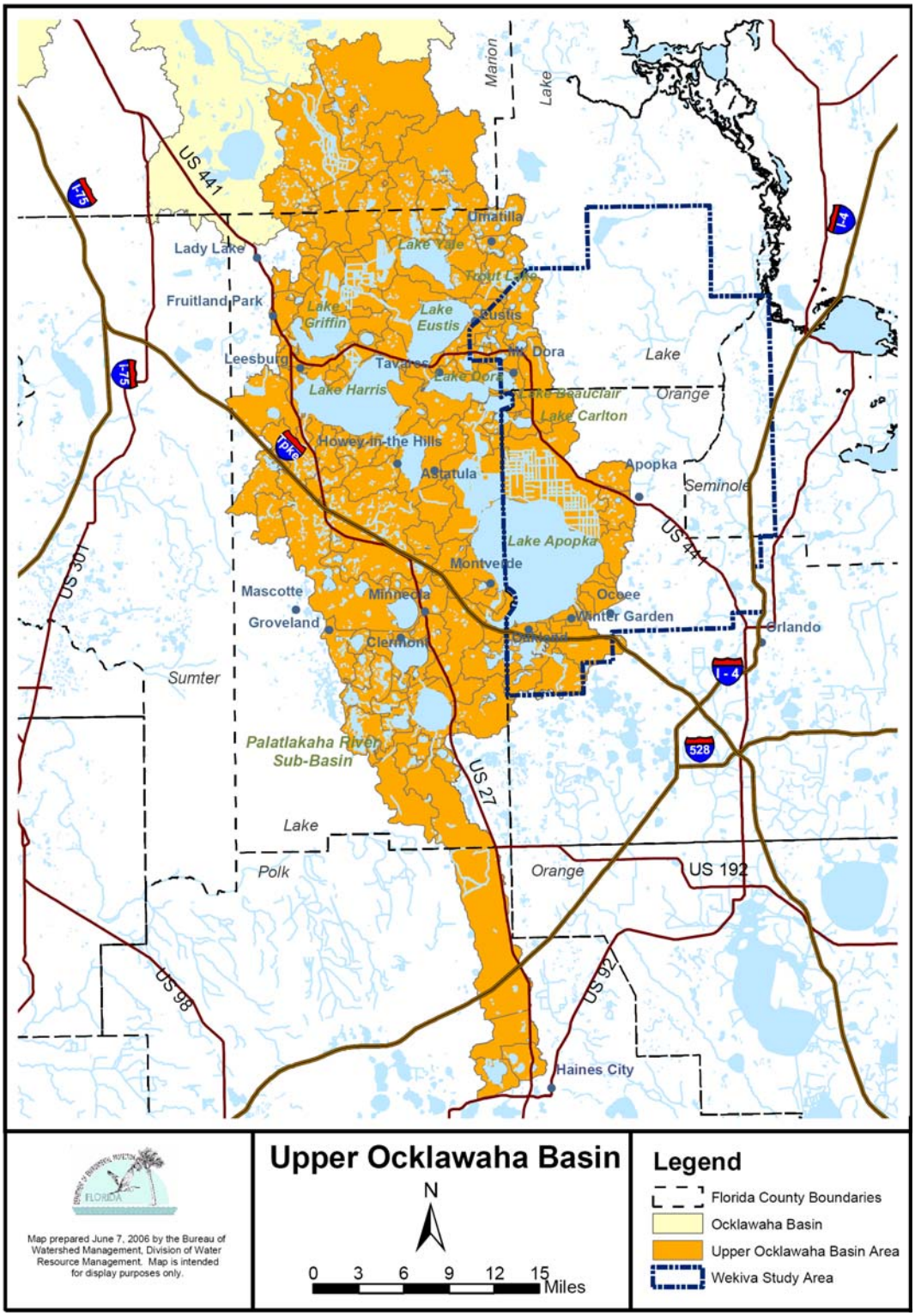


TABLE 2.1. OVERVIEW OF DRAINAGE PATTERNS IN IMPAIRED WATERS IN THE UPPER OCKLAWAHA RIVER BASIN

MUNICIPALITY / COUNTY	LAKE APOPKA	LAKE BEAUCLAIR	LAKE CARLTON	LAKE DORA	LAKE EUSTIS	TROUT LAKE	LAKE HARRIS/LITTLE LAKE HARRIS	PALATLAKAHA RIVER-NORTH OF SR50	LAKE GRIFFIN	LAKE YALE
LAKE COUNTY										
ASTATULA										
CLERMONT										
EUSTIS										
FRUITLAND PARK										
GROVELAND										
HOWEY-IN-THE-HILLS										
LADY LAKE *(closed basin)*										
LEESBURG										
MASCOTTE										
MINNEOLA										
MONTVERDE										
MOUNT DORA										
TAVARES										
UMATILLA										
ORANGE COUNTY										
APOPKA										
OAKLAND										
OCOEE										
WINTER GARDEN										
MARION COUNTY										
POLK COUNTY										
SUMTER COUNTY										
SJRWMD										
LCWA										
FWC										
DOT										
DEP										

Potential to discharge directly to the surface water
Potential to discharge indirectly to the surface water

Note: Lake Harris eventually will drain to Lake Griffin after SJRWMD construction of the Harris Bayou project.

2.2 Land Use Coverage

Land use coverage in the sub-basins of the Upper Ocklawaha River Basin is as follows:

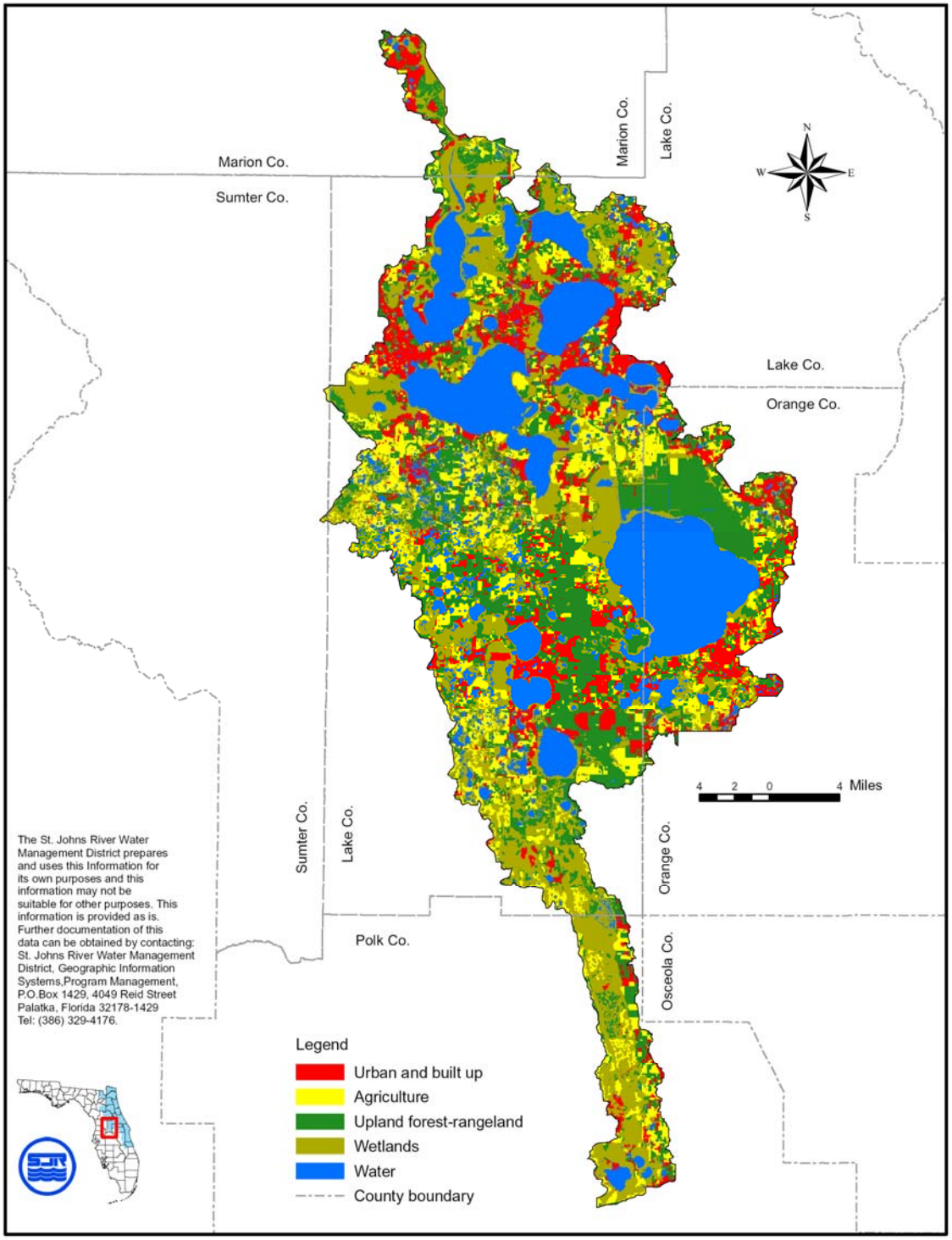
- ***Lake Apopka Sub-basin—****During the TMDL baseline period for Lake Apopka (1989–94), the most significant land use in the Lake Apopka Planning Unit was row crop farming. Since 1994, the SJRWMD has purchased the muck farms on the north shore of Lake Apopka and is restoring wetland habitat in this area. Currently, the largest land coverages in the planning unit are forest/rangeland, wetlands, and residential housing.*

- ***Palatlakaha River Sub-basin****—Over half of the land uses in the Palatlakaha Planning Unit are fairly evenly divided between agricultural activities and wetlands. The two agricultural land uses covering the greatest area are citrus groves and rangeland, both of which can be associated with the nonpoint discharges of pollutants (pesticides, nutrients, and coliform bacteria) and eroded sediments.*

- ***Upper Ocklawaha Chain of Lakes****—The largest use coverages in the Lake Griffin Planning Unit are water, wetlands, forest/rangeland, and agriculture. In the Lake Harris Planning Unit, the largest land use coverages are water, wetlands, forest/rangeland, and residential housing. While waters originating in wetlands and forests are sometimes highly tannic and low in DO, these are considered natural background conditions and not significant sources of pollution. Agriculture and residential housing can be associated with the nonpoint discharges of pollutants (pesticides, nutrients, and coliform bacteria) and eroded sediments.*

Figure 2.2 provides a land use map based on 2000 land uses. In all sub-basins of the Upper Ocklawaha, residential and commercial developments are increasing over the 2000 coverage, potentially leading to additional nonpoint discharges of pollutants and sediments in stormwater runoff.

FIGURE 2.2. ESTIMATED LAND USE COVERAGE IN THE UPPER OCKLAWAHA RIVER BASIN AT THE END OF THE TMDL BASELINE PERIOD (BASED ON YEAR 2000 LAND USES)



CHAPTER 3: BASINWIDE WATER QUALITY ISSUES, POLLUTANT SOURCES, AND MANAGEMENT ACTIONS

3.1 Water Quality Issues

The Upper Ocklawaha River BWG identified TMDL-related water quality issues, by sub-basin, for the purposes of BMAP development (see **Table 3.1**), placing them into the following three categories:

- ***Primary****—Issues directly linked to the TMDLs established for the Upper Ocklawaha, which need to be addressed in the BMAP during this TMDL/BMAP cycle. These are generally the causes of DEP-verified impairments. The primary issues identified across the basin are associated with sources that contribute nearly all the external nutrient loading to the impaired waterbodies. For many of these waterbodies, discharges from agricultural lands and restoration areas, and tributary flows from upstream waterbodies, contribute most of the nutrient load. This is especially true for lakes directly downstream of Lakes Apopka. For some basins, stormwater flows from several nonpoint sources contribute a higher proportion of the nutrient load. Septic tanks and future growth are relatively more important in basins where stormwater inflows contribute a higher proportion of the total nutrient load to the waterbody.* ***Table 3.2*** *lists the key sources related to the primary issues.*

- ***Secondary****—Issues that either result from the primary issues, or are not significant enough to be categorized as primary issues. They are likely to be addressed indirectly through BMAP strategies developed for the primary issues. The secondary issues listed in* ***Table 3.1*** *generally stem from the excess nutrient levels associated with the primary issues. For instance, the aquatic habitat in the basin's lakes currently is dominated by algal blooms that thrive on excess nutrients. Historically, the lakes are characterized by clearer water and a greater occurrence of aquatic macrophytes (larger aquatic plants). This shift has resulted in more flocculent sediments, which can lead to depressed levels of DO and higher TP levels in sediments. The loss of aquatic habitat has reduced sportfish populations in the lakes and has allowed rough fish, such as gizzard shad, to become dominant. The control of nuisance vegetation can create pockets of decomposing aquatic plants, which release more nutrients into the lakes. The stabilization of lake levels and flows, which limits natural fluctuations, has contributed to the loss of aquatic habitat throughout the basin. Secondary issues are difficult to measure and are indirectly related to the nutrient sources in* ***Table 3.2****.*

- ***Other****—Issues that do not have a substantiated link to the current TMDLs. These might be addressed indirectly through BMAP strategies or other (concurrent or future) broad-based efforts in a community, such as growth management and pollution prevention.*

TABLE 3.1. UPPER OCKLAWAHA RIVER BASIN WATER QUALITY ISSUES, BY SUB-BASIN

	UPPER OCKLAWAHA RIVER BASIN TMDL SUB-BASINS									
PROBLEMS AND ISSUES (HISTORICAL THROUGH 2000)	**LAKE APOPKA**	**LAKE BEAUCLAIR**	**LAKE CARLTON**	**LAKE DORA**	**LAKE EUSTIS**	**TROUT LAKE**	**LAKE HARRIS**	**PALATLA-KAHA**	**LAKE GRIFFIN**	**LAKE YALE**
WBID SUB-BASIN	Lake Apopka–2835D	Lake Beauclair–2834C	Lake Carlton–2837B	Lake Dora–2831B	Lake Eustis–2817B	Trout Lake–2819	Lake Harris–2838A	Palatlakaha River–2839	Lake Griffin—2814A	Lake Yale–2807A
	Gourd Neck Spring–2835C			Dora Canal–2831A	Haynes Creek–2817A		Little Lake Harris–2838B			Yale-Griffin Canal–2807
	Lake Apopka Outlet–2835A						Dead River–2817C			
							Helena Run–2832			
PRIMARY ISSUES										
Stormwater runoff to lakes*	●	●	●	●	●	●	●	●	●	●
Significant inflows from upstream sources		●	●	●	●	●	●	●	●	
Wetland conversion to farmland	●	●			●	●	●		●	
Discharges from agricultural lands/ restoration areas	●	●			●	●	●		●	
Septic tank sources	●	●	●	●	●	●	●	●	●	●
Increased loading from future growth	●	●	●	●	●	●	●	●	●	●
SECONDARY ISSUES										
Alteration of natural water levels and flows	●	●	●	●	●	●	●	●	●	●
Point source discharges	●						●		●	●
Soil subsidence from oxidation	●	●			●	●	●		●	
TP storage in lake sediments	●	●	●	●	●	●	●		●	●
More flocculent sediments	●	●	●	●	●	●	●	◊	●	●
Algae shifts/more blooms	●	●	●	●	●	●	●	◊	●	●
Depressed DO levels								●		
Decomposition of rooted and floating vegetation	●	●	●	●	●	●	●	◊	●	●
Fishery shift to rough fish	●	●	●	●	●	●	●		●	◊
Loss of aquatic/wetland habitat	●	●	●	●	●	●	●		●	●
OTHER ISSUES										
Elevated nitrates in springs	●					◊	●			
Health issues in alligator population	◊					◊			●	
Ground water contamination	◊					◊		●		
Potential toxin-producing algae	●	●	●	●	●	●	●	◊	●	●

● Indicates that this issue is a concern in the sub-basin.
◊ Indicates that the significance of this issue in the sub-basin is unknown.
* Stormwater runoff includes nutrients such as TP and also includes pollutants not addressed in the BMAP.

TABLE 3.2. SUMMARY OF TP SOURCES RELATED TO TMDLS IN THE UPPER OCKLAWAHA RIVER BASIN

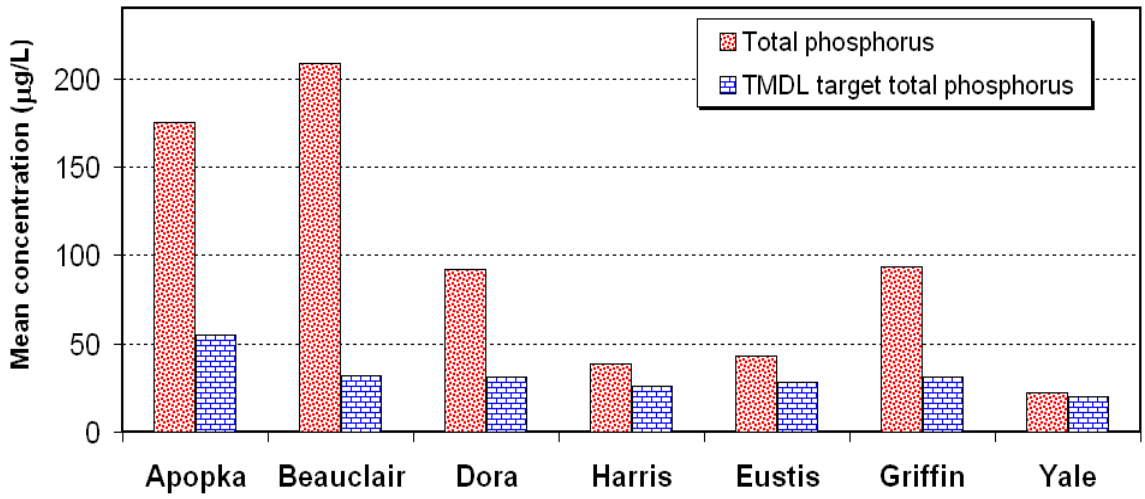
	BASELINE TP LOADINGS FOR TMDL DEVELOPMENT PERIOD, BY SUB-BASIN									
	LAKE APOPKA	LAKE BEAUCLAIR	LAKE CARLTON	LAKE DORA	LAKE EUSTIS	TROUT LAKE	LAKE HARRIS	PALATLAKAHA RIVER	LAKE GRIFFIN	LAKE YALE
SOURCES OF TP (baseline loading in lbs/yr)	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING	BASELINE LOADING
Spring discharge	2,204						2,046			
Muck farm discharges	117,015						174		22,703	
Muck Farm 1 (active)		1,701								
Muck Farm 2 (inactive)					746					
Muck Farm 3 (inactive)					633	222				
Muck Farm 4 (active)							1,826			
Restoration area discharges										
Apopka Restoration Areas										
Pine Meadows Restoration Area					1,217	1,279				
Harris Bayou							6,906			
Emeralda Marsh Restoration Area									23,410	
Atmospheric deposition (wet/dry)	11,089	311	118	1,266	2,250	55	5,421		3,815	1,442
Tributary inflows	3,197									
Discharge from Lake Apopka		43,526								
Discharge from Lake Beauclair				36,007						
Discharge from Lake Dora		15			19,089					
Discharge from Lake Eustis				13			183		22,326	
Discharge from Lake Harris					6,284					
Discharge from Palatlakaha River							3,891			
Discharge from Lake Yale									2	
Point sources	617						39		27	109
Peat mine (inactive)	794									
Stormwater runoff	1,323									
Natural areas runoff		361	76	325	957	139	2,202	1,293	1,089	547
Developed land uses		565	216	1,623	2,802	877	2,945	1,057	2,619	768
Seepage/ground water	1,212									
Septic tanks		193	67	412	1,525	32	1,231		1,890	292
Loading information										
Total baseline TP loading and percent (lbs/yr)	137,451	46,672	477	39,646	35,503	2,604	26,864	2,350	77,881	3,158
TMDL (lbs/yr)	35,052	7,056	195	13,230	20,286	521	18,302	2,207	26,901	2,844
Reduction needed in TP loading (lbs/yr)	102,399	39,616	282	26,416	15,217	2,083	8,562	143	50,980	314

Note: TMDL baseline loads were taken from estimates by the SJRWMD with the exception of the Palatlakaha River, Lake Carlton, and Trout Lake, whose loadings were estimated by DEP. Most of the baseline loading estimates developed by the SJRWMD were calculated for the period from 1991–2000; Lake Apopka loadings are calculated for the period from 1989–94. DEP estimated baseline loadings for Lake Carlton from 1991-2000 and Trout Lake from 1995-2000. The baseline loading year for the Palatlakaha River was 1991.

3.2 Total Phosphorus Sources, by Source Category

The data for establishing most of the TMDLs in the Upper Ocklawaha River Basin were taken from the period from 1991–2000. **Figure 3.1** shows the average TP concentrations in seven Upper Ocklawaha River Basin lakes, based on the 1991–2000 data, compared with TMDL target concentrations.

FIGURE 3.1. AVERAGE TP CONCENTRATIONS IN SEVEN UPPER OCKLAWAHA RIVER BASIN LAKES, 1991–2000, AND TMDL TARGET CONCENTRATIONS



ug/L – Micrograms per liter

As part of the PLRG and TMDL development processes, the TP contributed by different sources (e.g., stormwater and agricultural operations) was estimated. **Table 3.2** presents the major categories of sources that contribute TP to one or more of the sub-basins in the Upper Ocklawaha River Basin. These sources were identified for the baseline data period (the period of time used to determine impairments).

The TP loading from muck farm discharges ranges from 0 lbs/yr in half the basins to 117,015 lbs/yr of loading to Lake Apopka. Certain restoration projects were under way during the baseline period, and loadings caused by discharges from those properties are also presented as sources. Atmospheric deposition is the amount of TP that falls directly on the surface of a waterbody. For several lakes, tributary inflows contribute a very large proportion of the TP loading during the baseline period. Other sources that have been quantified include spring discharges, point sources, stormwater runoff, septic tanks, and seepage and ground water. **Table 3.2** represents the starting point from which the net estimated TP loads were calculated for each waterbody, factoring in estimated load reductions from current and planned projects and estimated load increases from future land use changes. **Appendix F** describes the methods used to calculate the starting loads.

3.2.1 Mining Operations

During the BMAP development process, the BWG discussed potential water quality impacts from active and inactive mining operations in the basin. Mining in Lake County historically consisted, and currently consists, of hydraulic dredge sand and peat mining. The BWG reviewed how impacts from mining operations were addressed in the TMDLs for the Upper Ocklawaha River Basin, as follows:

- *In the Palatlakaha River sub-basin, the TMDL accounted for mines as one of the land uses; however, the land use analysis combined many industrial and commercial land uses into one category: "urban/open." Loading estimates from this category are included in the source category "runoff from developed uses," shown in* ***Table D-8*** *(and other tables).*
- *In the Lake Harris and Lake Griffin Planning Units, a mining land use literature value based on a stormwater loading rate study by Harper (1994) was used in the initial PLRG analysis on which the TMDL is based. This literature value also was applied to mining land uses designated on the future land use maps that the BWG used to develop current and future TP loading estimates for the BMAP.*
- *The Lake Apopka sub-basin PLRG and TP load estimates for current and future land uses were based on a different method of analysis, as follows:*
    - TP discharges from a peat mine operating during the baseline period were taken from DEP Industrial Waste Operating Reports provided by the mine operator. This mine is no longer in operation. The former mine discharges were incorporated into the explicit MOS in the TMDL.
    - Two mines operate near the western edge of Johns Lake, which is in the Lake Apopka sub-basin and potentially discharges to Lake Apopka. The PLRG baseline period was very dry, and Johns Lake was not discharging to Lake Apopka during that time. Therefore, the PLRG analysis did not include potential mining impacts to Lake Apopka through Johns Lake.
    - In the Lake Apopka sub-basin, there are additional restrictions on new development that require no increase in the TP load. Therefore, it was assumed that there would be no further increase in stormwater loads from mines (or any other land use) over the baseline period estimate.

Based on the following considerations, the BWG determined that the BMAP need not contain management actions specific to mining impacts:

- *Many mines have recently reached the end of their productive operation, and the land is being considered for other uses such as residential housing.*
- *Mines that are in operation have permits that prohibit discharges from their water storage ponds or pits. Occasionally, spills can occur; however, many of the activities that resulted in these spills (e.g., the above-ground storage of mine tailings) are no longer permitted.*
- *Most of the mines in operation have ponds or pits that are below grade, and there is a limited risk of a discharge to the Upper Ocklawaha River Basin, especially a discharge that would contribute TP loading to the basin.*

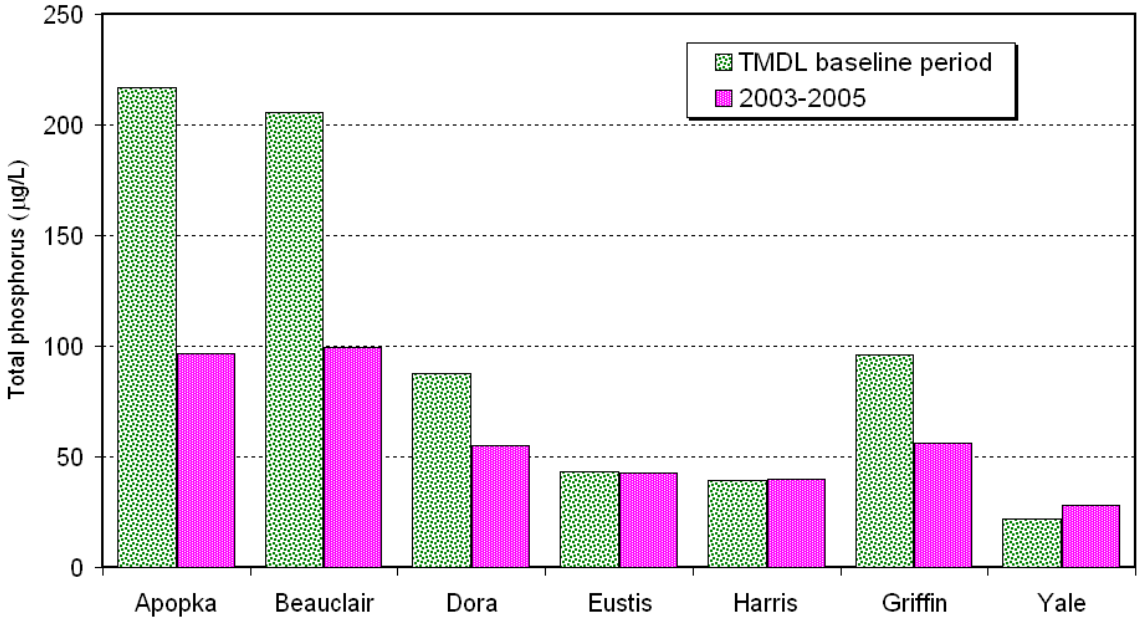
3.3 Water Quality Trends

Since 2000, encouraging water quality improvements have been noted in the basin. The likely causes include reduced nutrient discharges from agricultural areas following their purchase and partial restoration, and gizzard shad harvests in Lakes Apopka and Griffin. The greatest improvements were seen in lakes directly or indirectly affected by these actions (Apopka, Beauclair, Dora, and Griffin).

In a 2006 analysis by the SJRWMD, the Ocklawaha Basin (which includes the Upper Ocklawaha and Orange Creek sub-basins) had the highest percentage of improving sites and the lowest percentage of degrading sites among the basins assessed, for both lakes and streams. These improving trends likely reflect the effects of SJRWMD restoration programs. The only degrading lake site in the Upper Ocklawaha River Basin, Lake Yale, is not affected by these programs. Several waterbodies affected by SJRWMD restoration projects in the Lake Apopka and Lake Griffin sub-basins now show significant improving trends, including Lake Apopka, the Apopka-Beauclair Canal, Lake Beauclair, the downstream end of Haynes Creek, Lake Griffin, and the Yale-Griffin Canal.

Figure 3.2 shows the average TP concentrations in seven Upper Ocklawaha River Basin lakes for the TMDL baseline period (1989–94 for Lake Apopka; 1991–2000 for the other lakes), alongside the lakes' average concentrations for 2003–05. Decreases are apparent in the lakes most affected by SJRWMD wetland restoration and gizzard shad harvest projects (Apopka, Beauclair, Dora, and Griffin), while there is little change in the other lakes. The actions described in the BMAP are intended to continue this trend and to maintain water quality improvements in the basin.

FIGURE 3.2. RECENT TP TRENDS IN SEVEN UPPER OCKLAWAHA RIVER BASIN LAKES, TMDL BASELINE PERIOD AND 2003–05



3.4 Regulatory Links to BMAP Implementation

3.4.1 Environmental Resource Permitting

Within the area addressed by the Upper Ocklawaha River BMAP, activities that exceed SJRWMD permitting thresholds must be authorized by an Environmental Resource Permit (ERP). To obtain an ERP where existing ambient water quality does not meet state water quality standards, an applicant must demonstrate that the proposed activity will result in a net improvement in the parameters that do not meet water quality standards.

3.4.2 National Pollutant Discharge Elimination System Stormwater Program

Many of the municipalities across the basin are regulated by the Florida NPDES Stormwater Program. The basic requirements of this program serve as a foundation for the stormwater management efforts of these communities. The U.S. Environmental Protection Agency (EPA) developed the federal NPDES permitting program in two phases. Phase I, which began in 1990, addresses MS4s located in incorporated areas and counties with populations of 100,000 or more, as well as specific industrial activities. Phase II, which was started in 1999, addresses MS4s designated according to different thresholds.

In October 2000, the EPA authorized DEP to implement the NPDES Program in the state. This permitting has remained separate from state stormwater /environmental resource permitting programs and local stormwater/water quality programs, which have their own regulations and permitting requirements. Florida's rules for MS4s can be found in Rules 62-621 and 62-624, F.A.C.

- ***NPDES MS4 Phase I Permit Requirements—****Phase I MS4s were subject to a two-part permit application process requiring the development of a proposed stormwater management program (SWMP) that would meet the standard of reducing (discharged) pollutants to the maximum extent practicable (MEP), and the incorporation of the SWMP into an individual permit issued to the MS4 operator. The SWMPs for Phase I MS4s are required to address the following:*
  - Structural and source control from commercial and residential areas,
  - Detection and removal of illicit discharges to the system,
  - Monitoring and control of pollutants from landfills, hazardous waste sites, and other high-risk industrial facilities, and
  - BMPs for construction runoff.

  Phase I MS4s must also conduct a monitoring program to assess the controls implemented under the SWMP, and estimate reductions in pollutant loadings from the MS4 as a result of the SWMP. The estimate must include the known impacts of stormwater controls on ground water.

  *MS4 Phase I permits contain a "reopener" clause, which states, in part: "*The permit may be reopened and revised during the life of the permit to adjust effluent limitations or monitoring requirements should future adopted total maximum daily load, water quality studies, DEP and EPA-approved changes in water quality standards, or other information show a need for a different limitation or monitoring requirement."

- ***NPDES MS4 Phase II Stormwater Permit Requirements—****Under a generic permit, operators of regulated Phase II MS4s must develop a SWMP 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 nonstormwater discharges to the MS4 and create a system map showing outfall locations. Subsection 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 under an NPDES permit, or those listed in rule that do not cause a violation of water quality standards. Illicit discharges can include septic/sanitary sewer discharges, car wash wastewater, laundry wastewater, the 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 postconstruction stormwater runoff from areas of new development and redevelopment. (**Note**: This minimum control is 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 property and train staff in pollution prevention.*

The generic permit (Subsection 62-621.300[7][a], F.A.C.) also states: "If a TMDL is approved for any waterbody 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."

Table 3.3 *lists governmental entities currently designated as MS4s (regulated by the NPDES Program) that are part of the Upper Ocklawaha River Basin. Other municipalities in the basin may be designated as regulated MS4s in the next few years. The designation is based on a combination of factors, including population, the operation of a storm sewer system, discharge to TMDL waters, interconnection to another jurisdiction's system, and others. The Florida Department of Transportation (DOT) (listed) is also a regulated MS4.*

TABLE 3.3. GOVERNMENTAL ENTITIES IN THE UPPER OCKLAWAHA RIVER BASIN DESIGNATED AS REGULATED MS4S

PERMITTEE	PERMIT COVERAGE DATES	REPORT DUE DATE
PHASE I MS4S (REPORTS DUE ANNUALLY)		
APOPKA[1]	07/29/02 – 07/28/07	January 29
DOT–*ORANGE COUNTY* [1]	07/29/02 – 07/28/07	January 29
DOT–*POLK COUNTY* [2]	10/31/02 – 10/30/07	May 1
POLK COUNTY [2]	10/31/02 – 10/30/07	May 1
OCOEE[1]	07/29/02 – 07/28/07	January 29
ORANGE COUNTY[1]	07/29/02 – 07/28/07	January 29
WINTER GARDEN[1]	07/29/02 – 07/28/07	January 29
PHASE II MS4S [3]		
EUSTIS	02/17/04 – 02/16/09	August 16
DOT–*DISTRICT 5*	6/30/03 – 6/29/08	December 29
FRUITLAND PARK	09/28/04 – 09/27/09	March 27
LADY LAKE	07/08/04 – 07/07/09	January 7
LAKE COUNTY	09/20/04 – 09/19/09	March 19
LEESBURG	09/20/04 – 09/19/09	March 19
MARION COUNTY	07/28/03 – 07/27/08	January 27
MINNEOLA	08/04/04 – 08/03/09	February 3
MOUNT DORA	08/02/04 – 08/01/09	February 1
TAVARES	09/20/04 – 09/19/09	March 19
UMATILLA	09/28/04 – 09/27/09	March 27

[1] Co-permittees in the basin.
[2] Co-permittees in the basin.
[3] Reports are due annually during the first permit term. In subsequent permit terms, reports are due for Years 2 and 4 only, unless otherwise specified by DEP.

- ***Phase I MS4 Permits in the Upper Ocklawaha River Basin***

  Phase I Permit in Orange County

  In the Upper Ocklawaha River Basin, most of the Phase I NPDES MS4 permit holders are located in Orange County and comprise some of the copermittees under NPDES MS4 Permit # FLS000011. They include Orange County, Apopka, Winter Garden, and Ocoee.

  Under the SWMP for this permit, the copermittees are required and committed to perform a number of activities to reduce the pollutants that are allowed to enter the stormwater system. These activities are evaluated annually, and the components found to be effective are continued and made an ongoing part of the SWMP. Specific components of the Orange County SWMP include the following:

  - Public education programs that address the following:
    - *The proper design, construction, operation, maintenance, and inspection of stormwater management systems, and*
    - *Pollution prevention, including the proper disposal of waste oil and household hazardous waste, and the application and disposal of fertilizers and pesticides.*
  - Increasing the effectiveness of or maintaining effective programs to reduce erosion and sedimentation from construction activities,

- Increasing the effectiveness of or maintaining effective programs to reduce pollution and other adverse ecological effects of stormwater discharges associated with new development or redevelopment activities,
- Retrofitting the existing MS4 to reduce pollutants,
- Increasing the effectiveness of or maintaining effective inspections of stormwater management and treatment systems,
- Coordinating and participating with adjacent MS4s and stormwater-related agencies,
- Coordinating and participating with state and local agencies and groups;
- Detecting and eliminating nonstormwater discharges to the MS4, and
- Inspecting priority high-risk industrial stormwater dischargers to the MS4 to ensure that they have implemented pollution prevention plans that minimize the discharge of pollutants to the MS4.

Other tasks that Orange County copermittees must perform include the following:

- An inventory of all known major outfalls covered by the permit and a map that is updated frequently depicting the location of major outfalls,
- An estimate of seasonal pollutant loadings and event mean concentrations (EMCs) for each major outfall or each major watershed covered by the permit and recalculated every five years, and
- A summary providing an assessment of water quality trends based on data gathered as a result of the monitoring program as required in each permit annually.

The Orange County NPDES copermittees have been performing water quality control projects, inspections, and education since the mid-1990s. These activities include water quality monitoring and trend analysis for a large number of waterbodies, stormwater system evaluation and monitoring, compliance inspections of all industries with the potential to create stormwater pollution, education and inspections of internal county activities at maintenance yards and municipal waste treatment facilities, an annual meeting of the local sanitary utilities to review and refine sanitary sewer overflow activities to effectively control overflows and minimize environmental impacts, and construction site compliance inspections for erosion and sedimentation control. Each copermittee maintains legal authority to control discharges to and from those portions of the MS4 over which it has jurisdiction. This legal authority may be a combination of statute, ordinance, permit, contract, order, or interjurisdictional agreements between permittees.

Phase I Permit in Polk County

In compliance with its NPDES MS4 Phase I permit, Polk County conducts the DEP sediment and erosion certification class for inspectors and site contractors. The county publishes information quarterly on the impacts of illicit discharge of materials to the MS4, and sponsors broadcasts of a stormwater management BMP video and public service announcements on local television stations. County staff provide instruction at schools and participate in environmental education events throughout the community. The county also sponsors a Lakes Atlas (see ***Appendix K*** *for the Web site link), which provides water quality*

information on more than 100 lakes and 12 rivers and streams in the county. Polk County is a copermittee with DOT.

3.5 Broad-based Programs and Management Actions Contributing to Reductions in Total Phosphorus Loadings

Numerous regulatory, nonregulatory, structural, and nonstructural management projects and activities have been identified to help achieve the load reductions required to meet the TMDLs for the basin. Some of these measures are currently being implemented or are scheduled for near-term implementation in an existing plan or budget.

This section discusses projects and programs that span two or more sub-basins. Also included is a discussion of some types of "end-of-pipe" treatment mechanisms used across the basin to mitigate the impacts of direct stormwater discharges to surface waters. Chapter 4 describes projects and activities specific to the various sub-basins.

Table 3.4 lists some of the countywide activities that contribute directly or indirectly toward TP reductions or that support TP reduction projects (see **Appendix H** for more details). The text following the table discusses the broad-based programs and activities that help reduce TP loadings to the Upper Ocklawaha River Basin.

3.5.1 Agricultural Industry Contributions to Pollutant Load Reductions

Agriculture is an important land use in the basin. In 1995, the total agricultural acreage in the Upper Ocklawaha was 52,623 acres; the 2005 acreage declined by 10 percent, to 47,581 acres. The most significant loss in acreage was a 50 percent decrease in cropland, mostly due to public land acquisitions near Lakes Apopka, Yale, and Griffin. Citrus acreage has decreased by about 15 percent.

To address current agricultural activities in the basin, the Florida Department of Agriculture and Consumer Services (DACS) through its Division of Forestry and Office of Agricultural Water Policy (OAWP) is developing, and adopting by rule, suitable interim measures, BMPs, and other measures for commodity groups across the state. The applicable measures will help achieve the necessary levels of pollutant reductions in the basin. Although the DACS BMP program is nonregulatory, Subsection 403.067(7)(b), F.S., requires nonpoint pollutant sources included in a BMAP to demonstrate compliance with pollutant reductions established to meet a TMDL, either by implementing BMPs or conducting water quality monitoring prescribed by DEP or a water management district.

BMPs have not yet been adopted by rule for some commodity groups in the basin; however, all the agricultural groups use BMPs to some extent. For example, the vegetable and sod farms (muck farms) in the basin have been implementing various agricultural BMPs since the TMDL baseline loads were calculated, including detention ponds, filter strips, irrigation scheduling and maintenance, and reduced fertilization rates. According to the SJRWMD, the discharge TP concentrations for the two operating muck farms in the basin for 2001–05 are about 87 percent (Muck Farm 1) and 62 percent (Muck Farm 2) of their discharge concentrations for the TMDL baseline period of 1991–2000. According to DACS, several vegetable farms have reduced their discharges significantly, and some are operating near, or at, organic-farming standards.

TABLE 3.4. COUNTYWIDE MANAGEMENT ACTIONS

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
ORANGE02	Orange County - countywide / Unincorporated Orange County	Orange County Clean Lakes Initiative Program (CLIP)	Orange County Environmental Protection Department (OCEPD)	Unknown
ORANGE03	Orange County / Unincorporated Orange County	Orange County Surface Water Protection Code	Orange County	Unknown
ORANGE01/ORANGE04	Lakes Apopka, Carlton, and Beauclair Sub-basins within Orange County/county-maintained roads in sub-basins	Street sweeping in the Lakes Apopka, Carlton, and Beauclair Basins	OCEPD / Orange County	Unknown
ORANGE05	Orange County / countywide	Orange County Water Quality Monitoring Program	OCEPD	N/A
ORANGE06	Orange County / countywide	Support of Watershed Action Volunteers (WAV) Program	OCEPD	N/A
ORANGE07	Orange County / countywide	Orange County Water Resource Atlas	OCEPD / City of Winter Garden and City of Apopka	N/A
ORANGE08	Orange County / Orange County Parks, including Trimble, Roosevelt, Nichols, Magnolia Park, Chapin Station,Winter Garden Station, and County Line Station	ORANGE08 - Orange County Parks Phosphorus (measured as phosphate) Fertilizer Use Reduction	OCEPD/ Orange County Parks Department	Unknown
LC01	Lake County / unincorporated area countywide	Golf Course Resource Management Plan	Lake County Environmental Services	N/A
LC02	Lake County / countywide	Lake County Shoreline Protection Guide	Lake County Environmental Services	N/A
LC03	Lake County / countywide	Lake County Water Resource Atlas	Lake County Environmental Services	N/A
LC04	Lake County / countywide	Lake County Water Quality Monitoring Program	Lake County Environmental Services	N/A
LC05	Lake County / countywide	Support of WAV Program	Lake County Public Works / LCWA	N/A
MARION01	Marion County / Rainbow and Silver Springs springsheds	Springshed Protection Program	Marion County Planning Department / Clean Water Program / SWFWMD**	Unknown
MARION02	Marion County / countywide	Clean Farms Initiative	Marion County Clean Water Program / Marion County Planning Department / Marion County Extension Service / SWFWMD	Unknown
MARION03	Marion County / countywide	Watershed Management Plans	Marion County Clean Water Program / SWFWMD	Unknown
MARION04	Marion County / countywide	Marion County Aquifer Vulnerability Assessment (MCAVA)	Marion County Clean Water Program / DEP / SWFWMD / SJRWMD / University of Florida	Unknown
MARION05	Marion County / countywide	Marion County Low-impact Development (LID) Practices	Marion County Clean Water Program	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
** SWFWMD = Southwest Florida Water Management District.
N/A = Not applicable.

The OAWP assists agricultural producers in selecting, funding, and maintaining BMPs. It employs field staff and contracts with service providers to work with producers to conduct BMP assessments and submit notices of intent (NOIs) to implement the suite of BMPs appropriate for their operations. These providers include the Soil and Water Conservation Districts, University of Florida–Institute of Food and Agricultural Sciences (UF–IFAS), and Natural Resource Development and Conservation Councils. They also provide technical assistance to producers and help implement cost-share programs that leverage regional, state, and federal funds. DACS and the Lake County Soil and Water Conservation District have entered into a contract to provide BMP assessments through a Mobile Irrigation Lab, at no cost to the producer. The lab currently gives top priority to growers who are required to have a Consumptive Use Permit by the SJRWMD. DACS continues to support the Mobile Irrigation Lab as it expands its activities to provide more services.

The two major categories of commonly used BMPs, nutrient management and irrigation management, will reduce TP loadings in the basin. Nutrient management is the amount, timing, placement, and type (source) of fertilizer. It includes practices such as UF–IFAS fertilizer rate recommendations, soil tests, fertigation, split applications, foliar applications, controlled-release fertilizer, fertilizer spreader shutoff valves, and variable-rate fertilizer spreaders. Irrigation management is the maintenance, scheduling, and overall efficiency rating of irrigation systems to avoid generating field runoff. 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. DACS uses a Mobile Irrigation Lab to demonstrate irrigation efficiency techniques to growers.

DACS has adopted by rule suites of nutrient and irrigation BMPs that target the following operations in the basin:

- *Ridge citrus (Rule 5E-1.023, F.A.C),*
- *Leatherleaf fern (Rule 5E-1.023, F.A.C.),*
- *Interim measure for container-grown plants (Rule 5E-1.023, F.A.C.), and*
- *Vegetable and agronomic crops (Rule 5M-8, F.A.C., and*
- *Silviculture (Rule 51-6.002, F.A.C.).*

DACS is also currently developing and will be adopting BMP manuals of statewide application for the following operations in the basin:

- *Cow/calf,*
- *Equine,*
- *Container-grown plants (will replace the current interim measure),*
- *In-ground Nurseries and*
- *Sod.*

Commodity-specific BMPs should have a continued positive effect on water quality in the basin. For instance, cow/calf BMPs include livestock exclusion from sensitive areas,

appropriate stocking rates, filter strips, nutrient management, grassed waterways, sediment basins, and waste utilization. Interim measures have been adopted for container-grown plants and forage grass production. Equine BMPs, which are currently under development, may include pasture and hayland management, planned grazing systems, waste utilization, waste storage structures, composting, and roof runoff management. Vegetable BMPs include nutrient management, irrigation management, crop rotation, cover and green manure crops, and filter strips.

To date, more than 100 producers in the Upper Ocklawaha River Basin from the Ridge citrus, container-grown plant, and fern industries have submitted NOIs (covering about 13,500 acres) to implement rule-adopted BMPs. DACS adopted the Water Quality/Quantity BMPs for Florida Vegetable and Agronomic Crops in February 2006, and DACS field staff will be assisting growers in submitting their NOIs to implement the BMPs and in developing BMP implementation schedules.

To meet the intent of the FWRA with regard to agriculture, from 2007 to 2011 the OAWP will, as practical and feasible, do the following:

- *Adopt BMP manuals for cow/calf, equine, container-grown plant, in-ground nurseries, and sod operations.*
- *Intensify its efforts to sign up producers for BMP implementation in the Upper Ocklawaha River Basin. Field staff will meet with growers and grower organizations to inform them of existing and new BMP programs and opportunities for cost-sharing, and to assist them with BMP selection and NOI submittal.*
- *Work with UF–IFAS and DEP to identify priority citrus BMPs and verify their effectiveness.*
- *Develop a BMP implementation assurance program to follow up with a sample of citrus producers on whether they are implementing BMPs and keeping records according to their submitted NOIs.*
- *Evaluate the need for implementation assurance programs for other commodities in the basin and develop them on a priority basis, as needed and feasible.*
- *By April 2008, and annually thereafter, provide to the Upper Ocklawaha BWG an inventory of NOIs in the basin by BMP program, showing acreages, or other applicable reporting metrics, and key BMPs being implemented.*
- *By the end of 2011, report to the BWG on the following:*
    - The findings of any citrus or other BMP effectiveness projects relevant to the basin being conducted by or in partnership with the OAWP, and
    - The results and progress of any BMP implementation assurance programs being conducted by the OAWP in the basin.

3.5.2 St. Johns River Water Management District Programs

The projects implemented by the SJRWMD through the Lake Apopka and Upper Ocklawaha Surface Water Improvement and Management (SWIM) Plans have provided significant reductions in TP loading to impaired waters in the basin. In addition to improved water quality, improvements to aquatic habitat have occurred throughout the basin. The Lake Apopka and Upper Ocklawaha SWIM Plans were first adopted in 1987

and 1989, respectively, in compliance with the 1987 SWIM Act (Sections 373.451–373.4596, F.S.). Further reductions in TP loadings resulting from restoration projects in these SWIM plans are a major component of the strategy to meet TMDL goals in the basin.

Surface Water Improvement and Management Program

The TMDL effort in the Upper Ocklawaha River Basin benefits from having two SJRWMD-designated SWIM sub-basins located within its boundaries. The designations encompass several TMDL waterbodies. These integrated SWIM programs are responsible for much of the improvement in water quality and habitat in the basin in the past 10 years.

Restoration efforts of both the Lake Apopka and Upper Ocklawaha SWIM Plans focus on reducing nutrients and other pollutants in stormwater that flows into SWIM waterbodies from former agricultural areas (muck farms). The Upper Ocklawaha River Basin SWIM area includes the Harris Chain of Lakes north of Lake Apopka and the Upper Ocklawaha River to the confluence of the Silver River near SR 40 in Marion County. Efforts include in-lake treatment to reduce the recycling of nutrients by harvesting gizzard shad, re-establishing more natural water level fluctuations and flows, and restoring aquatic and wetland habitats at former muck farms.

The SWIM restoration projects at Lake Apopka include the filtration of lake water through a marsh flow-way, annual harvests of gizzard shad to reduce the TP concentration in the lake, the adoption and implementation of a waste allocation rule to control TP loading to the lake, the planting of native emergent plants to stabilize sediments and improve shoreline habitat, and the restoration of the former muck farms to aquatic and wetland habitats.

Through the SWIM Program, PLRGs were developed for Lakes Apopka, Beauclair, Dora, Eustis, Harris/Little Harris, Griffin, and Yale. As discussed in **Section 1.3.5**, these PLRGs provided the foundation for the TMDLs subsequently developed by DEP.

Other St. Johns River Water Management District Programs

LAND ACQUISITION

The SJRWMD's land acquisition program provides important support for water resource protection efforts in the basin. The district has acquired over 35,000 acres of former muck farm lands at a cost of over $140 million. Many of these acquisitions involved multiple funding partners.

As the SJRWMD implements its water resource restoration, land acquisition, and regulatory programs, the activities described in this plan to achieve TMDLs will enhance and help sustain the improvements in water quality and habitat observed in the basin. The SJRWMD expects to continue its SWIM efforts, including water quality monitoring, additional restoration projects, and continued support of the PLRG and TMDL programs.

3.5.3 Lake County Management Actions

Lake County Watershed Atlas

Lake County has an existing Web-based water atlas that provides water quality data and lake levels to the public and other agencies. The county's partners are the LCWA and the University of South Florida. Lake County is further enhancing the Water Atlas capabilities to include basin mapping and a stormwater library.

Lake County Major Basin Evaluations

Lake County has taken a proactive approach toward TMDLs by focusing its basin studies and concentrating immediate stormwater retrofit efforts on the Upper Ocklawaha River Basin. Studies for two sub-basins are completed and five are currently in progress. These studies will help in the design of cost-effective projects to manage stormwater and reduce TP loads to TMDL waters. Chapter 4 provides details on specific sub-basin studies.

3.5.4 Orange County Management Actions

Orange County Watershed Atlas

The Watershed Atlas is a Web-based program that integrates basin information from various sources in Orange County. The site provides water quality data, lake levels, weather information, basin project reports, stormwater reports, historical photos, and cultural narratives surrounding lake and river systems within the county boundary. The purpose of the site is to provide information to the general public, scientific community, and government. The site is a cooperative effort of the University of South Florida, Orange County, Orlando, Apopka, Maitland, Winter Garden, Belle Isle, Winter Park, and the Valencia Water Control District.

Orange County Clean Lakes Initiative Program

Orange County's CLIP is a collection of programs that provides educational and financial incentives to help citizens take individual ownership of their lakefront and watershed. CLIP includes financial rebates of up to $1,000 for the removal of upland exotic plants for all residents, and the installation of berms and swales and the planting of littoral zones for lakefront property owners. It also requires residents to participate in educational programs that cover multiple aspects of watershed protection, including storm drain labeling, environmentally friendly landscaping activities, and basic water quality and erosion control information. Residents must document participation in one or more of these programs before receiving reimbursements. In 2005, approximately 100 citizens attended an educational program.

Parks Phosphorus (measured as phosphate) Fertilizer Use Reduction

There are six Orange County parks in the Upper Ocklawaha River Basin: Trimble, Roosevelt Nichols, Magnolia Park, Chapin Station, Winter Garden Station, and County Line Station. In 2005, the OCEPD and Orange County Parks Department agreed to reduce the use of phosphorus from fertilizer with the issuance of each new contract for lawn care and maintenance on all of park facilities. This agreement includes use of reduced phosporus (measured as phosphate) between 0 - 5 percent on turf areas (athletic fields, recreational and waterfront park). Higher percentages of phosphorus are allowable in localized areas (i.e. flower beds, trees and shrubs) needing greater amounts on an as needed basis. It prohibits the use of fertilizers, pesticides, and herbicides within 10 feet of shorelines; applying weed controls directly instead of broadcast applications of dry material; and limiting nitrogen (measured as water soluble organic nitrogen) to less than 0.5 lbs per 1,000 square feet. The parks fertilizer program (contracts with landscape companies) will be adjusted for 2008 to reflect the implementation of DACS Urban Turf Fertilizer Rule (5E-1.003, F.A.C.) on December 31, 2007.

Lawn Maintenance BMPs

Orange County has begun working with the city of Orlando, the UF–IFAS Cooperative Extension Office, and the University of Central Florida's Stormwater Academy on a training and certification program for stormwater protection from yard waste. The program's purpose is to educate lawncare workers on what happens to yard wastes that enter stormwater and surface water systems, and to explain why it is important to reduce pollutants to surface waters by protecting the stormwater system. The program as proposed will start with required training for all lawncare contractors who work for Orange County, and then, in conjunction with the Orange County Occupational License Office, potentially lead to the certification of all lawn care–related business owners.

3.5.5 Marion County Management Actions

Only a small portion of Marion County is located in the Upper Ocklawaha River Basin, including portions of the Lake Yale and Lake Griffin sub-basins. Future TMDLs will have a more significant impact on the county. County staff and officials are paying close attention to current BMAP processes and marshalling resources and ideas to address upcoming TMDLs. The Lake Weir sub-basin, which is to the west of the Lake Griffin and Yale sub-basins, is scheduled for Phase 1 of the TMDL process in 2007. However, Marion County has met with DEP and is coordinating the initiation of TMDL development in 2006. Load reduction activities for the Lake Griffin and Yale sub-basins will occur in association with the Lake Weir TMDL process.

Marion County has initiated several programs and resource assessment activities that currently contribute, or are projected to contribute, to the protection of water resources. Through its Clean Water Program, and with assistance from the SWFWMD, Marion County is implementing a countywide Watershed Management Plan (over a two- to three-year cycle), which will be used to identify water quality and flooding problems and determine corrective actions. Marion County has also conducted a Water Resource Assessment and Management Study to anticipate impacts to the county's water resources through 2055, based on projected population, water supply demands, and land use.

As a result of the Water Resource Assessment and Management Study, a Springshed Protection Program was launched, under which the county's Planning Department is identifying the most vulnerable areas in the Rainbow Springs and Silver Springs springsheds, and drafting land development codes to prevent further impacts to the springs. Within the spring protection zones, the use of LID and Florida-friendly landscaping will be encouraged. Primary and secondary protection zones have been tentatively identified for both springs. The secondary protection zone for Silver Springs encompasses most of the Lake Weir sub-basin and a portion of the Lake Griffin sub-basin. Certain activities identified in association with the Springshed Protection Program are anticipated to benefit the Lake Griffin sub-basin.

In an effort to promote LID for the treatment of stormwater, the Clean Water Program is partnering with the University of Florida's Program for Resource Efficient Communities to develop and conduct seminars on LID options and results for water resources for developers, engineers, landscape architects, and professionals in the construction industry. The focus of LID seminars is countywide. The first workshop was held in March 2007.

The MCAVA will facilitate the planning of development activities to minimize adverse impacts on ground water quality. Aquifer vulnerability maps benefit local governments,

planners, and developers in guiding growth into more appropriate areas. The protection of ground water quality also helps to protect water resources in areas of karst topography or other environmentally sensitive areas.

The Clean Farms Initiative started as a resolution (Resolution 04-R-384)—passed by the Marion County Board of County Commissioners—that acknowledges the important historical role of agriculture in Marion County and the need to protect the county's water resources. The initiative outlines farm BMPs specific to animal waste and nutrient management for agricultural activities in Marion County. The purpose of the initiative is to adopt and promote the application of farm BMPs that minimize nuisances and hazards to public health, welfare, and safety, and to protect water resources. Important agricultural activities in the county include horse farms, improved pasture, and row crops—all of which can contribute nutrient loadings if not managed properly. The results of surveys of agricultural interests' current manure management and fertilizer practices, along with input from focus groups, will be used to direct the future implementation of the program.

3.5.6 Polk County Management Actions

The Polk County MS4 area within the Upper Ocklawaha River Basin is not heavily developed and consists primarily of rural roads with no stormwater collection system. Maintenance is limited to the removal of vegetation along the shoulders of the pavement to allow for drainage, as no stormwater treatment facilities have been constructed for these roads. There are no county-owned outfalls mapped within the basin, and therefore no point source discharges from the MS4.

The Big Creek Reach sub-basin, which is approximately 20,908 acres, discharges to the Upper Ocklawaha River Basin via the Palatlakaha River. The future land use plan for this sub-basin shows that 73 percent of the land is part of the Green Swamp Area of Critical State Concern (GSACSC), where development is limited to 1 residential structure per 20 acres. The remaining acreage, most of it former citrus groves, will be developed as commercial, residential, or institutional. Essentially, all of this area (about 5,536 acres) will be converted to residential use (4,238 acres) and commercial use (1,298 acres). Development has already occurred on approximately 65 percent of the former groves. The conversion from agriculture to development could reduce nutrient loads, as some of the land previously in citrus production may have been permitted for the disposal of wastewater residuals that no longer occurs. County central sewer service is available in the Big Creek Reach, and essentially all the sanitary sewage generated from development in this sub-basin is treated. The county also provides reuse water to customers in the basin for irrigation.

3.5.7 Septic Tanks

Septic tanks are a potential issue needing further investigation in the Upper Ocklawaha River Basin. The BWG and its associated TWG will be exploring options for collecting more information on septic tank impacts in targeted areas, and will be considering strategies for septic tank use/restrictions that are already in place in other parts of the state. Other ongoing efforts include the following:

- ***Lake County.*** *Lake County is currently revising its Comprehensive Plan. The Sanitary Sewer Subelement provides stricter regulation of septic tanks and discusses the feasibility of new development connecting to municipal central sewer systems.*

- ***Orange County.*** *Orange County is aware of the negative impact that septic tanks can have on surface water and ground water quality. The county also recognizes that*

future state legislation may require the replacement of existing septic tanks with high-performance septic systems. Because of these factors, the county has considered requiring residents of new homes to use high-efficiency septic systems, particularly new systems on lakefront lots. These systems require stringent inspection schedules, and their maintenance can be costly to the homeowner. Currently, this approach appears to be cost-prohibitive.

- ***Marion County.*** *Marion County is concerned about the water quality impacts of septic systems, particularly their potential effects on springs. One of the county's proposed measures is to require an impact analysis for proposed development, redevelopment, or change to an existing development that increases density or intensity of use within the primary and secondary spring protection zones. This analysis would include a review of pre- and postdevelopment nutrient loading and recharge rates, and discharge rates and volumes.*

  For domestic waste treatment and disposal, the county is considering, where practical, requiring central system connections in all new urban development and limiting nutrient discharge concentrations. When on-site septic systems are used in new construction, the discharge from those systems would have to meet a TN concentration of 10 milligrams per liter (mg/L). The county may also decide to require an annual operating permit for new on-site septic systems, with routine monitoring and inspection requirements. The county is also discussing requirements for maintenance, repairs, and upgrades of existing septic systems.

3.5.8 Comprehensive Plan Updates

Many of the other jurisdictions across the basin have been updating their comprehensive plans concurrently with their participation in the Upper Ocklawaha TMDL process. The plans address activities that may be related to each jurisdiction's contribution of, and responsibility for, TP loadings in the basin, such as the recent annexations of unincorporated land by towns and cities, and zoning changes. These updated plans are currently in the review and approval process and cannot be summarized or incorporated into this document.

3.5.9 Related Water Resource Protection Initiatives—Wekiva Springs

Another environmental protection initiative that affects some local governments in the Upper Ocklawaha River Basin is the Wekiva Springs Protection Effort, which addresses the Wekiva Study Area (shown previously in **Figure 2.1)**.

Portions of the following jurisdictions are included in the Wekiva Study Area: Lake County, Mount Dora, Eustis, Orange County, Apopka, Ocoee, and Winter Garden. The Wekiva Springs Protection Effort implements the Wekiva Parkway and Protection Act (Chapter 369, F.S.). The act, which was based on the recommendations of the Wekiva Coordinating Committee, requires that water quantity and quality in the Wekiva River and associated spring systems be protected from the impacts of development.

Ground water withdrawals, stormwater, agricultural sources, wastewater treatment through centralized facilities, and on-site septic systems will all be addressed to reduce the impacts to the springs and river system. Local governments are required to amend their local comprehensive plans to establish land use strategies that optimize open space and promote a pattern of development that protects the most effective recharge and karst areas and sensitive natural habitats as a means to encourage "smart growth" and LID

practices. The Wekiva Springs Protection Effort will benefit the implementation of TMDLs for Lake Apopka, Lake Carlton, Lake Dora, and Lake Beauclair in the Upper Ocklawaha River Basin. The Wekiva Parkway and Protection Act Master Stormwater Management Plan Support was completed in November 2005 and updated in March 2006.

3.5.10 Stormwater Reuse

Lake County Draft Comp Plan Policy

Lake County will continue to seek ways to expand its efforts to reuse stormwater for irrigation, aquifer recharge, and other nonpotable uses. The county will evaluate and establish, as appropriate, a threshold requiring a project that generates sufficient quantities of runoff to reuse that stormwater.

Wekiva Master Stormwater Plan Stormwater Reuse Feasibility Evaluation

The Wekiva Parkway and Protection Act required an evaluation of the feasibility of reusing stormwater as a water supply for irrigation purposes. The analysis was included as part of the Wekiva Master Stormwater Plan, Section 6: Feasibility of Stormwater Reuse. The use of stormwater as a supplement to reclaimed wastewater reduces the adverse impacts of potable water supplementation for reuse. A conceptual analysis indicated that stormwater reuse may be feasible, but additional detailed study is needed to address concerns such as soils, recharge capacity, rainfall distribution, and irrigation demand. Some of the advantages of reuse include a reduction in potable water usage, a reduction in peak flows, and an increased public awareness of stormwater. Some disadvantages include the following: widespread use may negatively affect environmentally sensitive areas; it is a relatively new concept; water supply is not always available; and there may be resistance from water users.

3.5.11 Management Action Summaries

Table 3.5 summarizes the types of management actions being implemented across the different sub-basins of the Upper Ocklawaha River Basin that are expected to reduce TP in impaired waters. The table includes activities such as stormwater retrofit projects, urban stormwater BMPs, and habitat restoration for which TP reductions have been estimated. It identifies the organization or jurisdiction responsible and the sub-basin that should benefit from its efforts, and also incorporates projects and programs for which the TP load reduction cannot currently be quantified (e.g., baffle box installation, land development regulations [LDRs], education/outreach), and activities that reduce internal recycling and accelerate lake recovery but do not reduce external TP loads (e.g., gizzard shad harvesting).

Table 3.6, a variation of **Table 2.1** (previously shown), lists impaired waters in which BMAP load reduction activities are being conducted and identifies local governments that are currently designated as MS4s. **Appendix H** provides additional information on these projects and programs. Where possible, the estimated TP load reduction is included for individual projects and programs. The appendix also contains information on quantifying load reductions.

TABLE 3.5. TYPES OF MANAGEMENT ACTIONS BEING IMPLEMENTED OR PLANNED IN THE UPPER OCKLAWAHA RIVER BASIN

MANAGEMENTACTIONS*	APOPKA	BEAUCLAIR	CARLTON	DORA	EUSTIS	TROUT	HARRIS / LITTLE LAKE HARRIS	PALATLAKAHA – NORTHOF SR 50	GRIFFIN	YALE
STORMWATER RETROFITS										
ORANGE COUNTY	●									
LAKE COUNTY	●	●	●	●	●		●		●	
TAVARES				●						
TAVARES / LCWA					●					
EUSTIS					●	●				
EUSTIS / LCWA					●					
LEESBURG							●		●	
CLERMONT								●		
GROVELAND								●		
APOPKA	●									
DEP									●	
URBAN STRUCTURAL BMPS										
LCWA		●								
SJRWMD	●									
LAKE COUNTY				●	●				●	
DOT	●			●	●		●	●	●	
EUSTIS					●					
EUSTIS / LCWA										
LEESBURG									●	
CLERMONT								●		
APOPKA	●									
DEP									●	
URBAN NONSTRUCTURAL BMPS										
ORANGE COUNTY	●		●							
LAKE COUNTY	●							●	●	
LAKE COUNTY / ORANGE COUNTY / LCWA	●									
CLERMONT								●		
AGRICULTURAL BMPS										
Applied to varying degrees across the basin. DACS is working with farmers to increase and track BMP implementation.										
LAND ACQUISITION										
SJRWMD	●	●			●	●	●		●	
LAKE COUNTY	●						●			
DEP									●	
HABITAT / OTHER RESTORATION										
ORANGE COUNTY	●									
SJRWMD	●	●		●	●	●	●		●	
FWC / LCWA / SJRWMD		●								
CLERMONT								●		
ORDINANCES AND LDRS										
LAKE COUNTY	●									
LAKE COUNTY / GROVELAND								●		

MANAGEMENTACTIONS*	APOPKA	BEAUCLAIR	CARLTON	DORA	EUSTIS	TROUT	HARRIS / LITTLE LAKE HARRIS	PALATLAKAHA – NORTHOF SR 50	GRIFFIN	YALE
GROVELAND								•		
ORANGE COUNTY	•		•							
EDUCATION / OUTREACH / COMMUNITY INVOLVEMENT										
Most of the local governments in the basin, as part of their MS4 permit requirements, conduct public education and outreach on the harmful impacts of polluted stormwater runoff and ways to prevent such impacts.										

FWC – Florida Fish and Wildlife Conservation Commission

*** Examples of Management Actions in Each Category (not all-inclusive):**

- **Stormwater Retrofits**
  - Paving and drainage upgrades
  - Failing infrastructure replacement and improvement
  - Sediment and debris collection boxes (baffle boxes)
- **Urban Structural BMPs**
  - Regional wet detention stormwater ponds
  - Dry retention stormwater ponds
- **Urban Nonstructural BMPs**
  - Street sweeping
  - Cleaning up pet waste
- **Agricultural BMPs**
  - Crop rotation
  - Filter strips
  - Exclusion of livestock from sensitive areas
- **Habitat Restoration and Water Quality Improvement Projects**
  - Land acquisition for conservation or restoration projects
  - Marsh construction
  - Wetland restoration
  - Gizzard shad harvesting
- **Ordinances and LDRs**
  - Development guidelines
  - Septic tank ordinances
  - Local stormwater rules more stringent than state or water management district rules
- **Education and Outreach**
  - WAV Program
  - Lakefront property owners' guides
  - Water atlases

TABLE 3.6. OVERVIEW OF CURRENT AND PLANNED LOAD REDUCTION PROJECTS, ACTIVITIES, AND STUDIES IN TMDL WATERS IN THE UPPER OCKLAWAHA RIVER BASIN

MUNICIPALITY / COUNTY	LAKE APOPKA	LAKE* BEAUCLAIR	LAKE* CARLTON	LAKE DORA	LAKE EUSTIS	TROUT LAKE	LAKE HARRIS/LITTLE LAKE HARRIS	PALATLAKAHA RIVER-NORTH OF SR 50	LAKE GRIFFIN	LAKE YALE
LAKE COUNTY	• (•)	•	•	• (••)	• (••)		•	• • (•)	• (••)	
ASTATULA										
CLERMONT								• • • •		
EUSTIS					(••••)	•				
FRUITLAND PARK										
GROVELAND								• (•)		
HOWEY-IN-THE-HILLS										
LADY LAKE *(closed basin)***										
LEESBURG							•		•	
MASCOTTE										
MINNEOLA										
MONTVERDE										
MOUNT DORA										
TAVARES				•	(•)					
UMATILLA										
ORANGE COUNTY	• • (••)		•							
APOPKA	• •									
OAKLAND										
OCOEE										
WINTER GARDEN										
MARION COUNTY										
POLK COUNTY										
SUMTER COUNTY										
SJRWMD	•• (••••)	• (••)		•	• (••)	•	• •	(•)	• •	
LCWA	(•)	(••)			(•••)				(•)	
FWC		(•)							(•)	
DOT	•			•	•		•	•	(•)	
DEP									• (••)	

MS4 entity

Potential to discharge directly to the surface water

Potential to discharge indirectly to the surface water

• Individual projects (•) Joint projects

* For purposes of the BMAP, Lakes Beauclair and Carlton are treated as a single waterbody.

** Lady Lake is reducing loadings to the closed lake systems within the town, minimizing any potential load contributions to ground water, and, indirectly, to the Lake Griffin sub-basin.

3.5.12 Estimates of Future Loadings from Growth and Future Management Actions

The TP loadings considered as part of the BMAP include those associated with future growth across the basin. The management actions considered by stakeholders also include a number of activities that proactively address TP loadings from new development (or redevelopment) through regulations, ordinances, or guidelines. In addition, the BMAP includes many management actions aimed at educating representatives of the public or businesses.

Proactive management actions are considered "Lake- and Stream-Friendly Activities." These activities can include low-impact development (LID) planning and engineering, education, and local ordinances or LDRs that promote water quality improvements by maintaining and enhancing predevelopment water flow and reducing pollutant loads in developing and urban watersheds.

Tables AP.4 through **AP.10** present current Lake- and Stream-Friendly Activities implemented by the BWG. These proactive activities are predominantly found in **Table AP.6** (regulations, ordinances, and guidelines) and **Table AP.8** (education and outreach efforts). In addition to the actions listed in **Tables AP.4** through **AP.10**, the BWG will also consider additional Lake- and Stream-Friendly Activities during the implementation phase of the BMAP. The BWG will take additional steps during BMAP implementation, including the following:

1. *Carry out data collection/inventory of Lake- and Stream-friendly Activities across the Upper Ocklawaha River Basin, including an inventory of what each community is currently doing and/or has planned and an assessment of the lessons learned from implementing those efforts (i.e., level of activity, success of activity in helping protect and/or improve water quality).*
2. *Distribute a summary of the Lake- and Stream-friendly Activity inventory and the lessons learned by BWG members during the implementation of those activities. The summary will identify incentives for and obstacles to implementation and success.*
3. *Plan for future Lake- and Stream-friendly management actions in the basin, consider existing and new ideas, and identify the most effective techniques that jurisdictions and entities in the Upper Ocklawaha River Basin should consider to improve and/or expand the implementation of key/successful approaches.*
4. *Create proposals for improved, expanded, and/or new activities by individual jurisdictions and entities, or collectively by the BWG. Proposals will also include incentives to be used to promote the use of LID planning techniques, educational opportunities, and/or ordinance and policy changes.*

DACs also plans to address future agricultural loadings. To meet the intent of the FWRA Act with regard to agriculture, from 2007 to 2011 the OAWP will do the following:

- *Adopt BMP manuals for cow/calf, equine, container-grown plant, and sod operations.*
- *Intensify its efforts to sign up producers for BMP implementation in the Upper Ocklawaha River Basin. Field staff will meet with growers and grower organizations to*

inform them of existing and new BMP programs and opportunities for cost-share, and to assist them with BMP selection and NOI submittal.

- *Work with DEP to identify priority citrus BMPs and verify their effectiveness.*
- *Develop a BMP implementation assurance program to follow up with a representative sample of citrus producers on whether they are implementing BMPs and keeping records according to their submitted NOIs.*
- *Evaluate the need for implementation assurance programs for other commodities in the basin and develop them on a priority basis, as needed and feasible.*
- *By April 2008, and annually thereafter, provide the BWG with an inventory of NOIs in the basin by BMP program, showing acreages or other applicable reporting metrics, and key BMPs being implemented.*
- *By the end of 2011, report to the BWG on the following:*
  - The findings of any citrus or other BMP effectiveness projects relevant to the basin being conducted by or in partnership with the OAWP, and
  - The results and progress of any BMP implementation assurance programs being conducted by the OAWP in the basin.

3.6 Anticipated Total Phosphorus Loading Reductions and Resource Responses

3.6.1 Meeting the TMDL Goals

Most of the lakes in the Harris Chain are expected to meet or be near to their TMDLs after BMAP implementation. This projection includes estimated increases in loading associated with land use changes through 2010. Achieving or progressing toward the TMDL goals for TP reduction is expected to improve water and habitat quality in the basin's waterbodies. As noted in **Section 1.4.1,** available evidence indicates that TP is the primary nutrient controlling algal growth in the basin's lakes, which is commonly the case in fresh waters. The anticipated effects of achieving the target TP concentrations in the Harris Chain of Lakes (Beauclair, Dora, Harris, Eustis, Griffin, and Yale) are described in **Section 3.6.2** below.

Table 3.7 presents the net estimated TP loadings to the TMDL waterbodies after factoring in anticipated TP load reductions from management actions and load increases associated with future land use changes. **Figure 3.3** is a corresponding bar chart comparing baseline TP loads, the net estimated TP reductions, and the TMDL goal for each sub-basin. The figure shows that some basins are close to or are anticipated to meet the TMDL by relying on current and planned management actions. However, some sub-basins (Lakes Harris and Trout) may need to make a significant additional effort to achieve the TMDL goal.

Figure 3.4 shows the location of load reduction projects that have been quantified and illustrates the anticipated outcome of BMAP implementation. The waterbodies shown in blue are projected to meet their TMDLs, on an annual average basis, after BMAP implementation. The waterbodies shown in pink (Lakes Carlton, Yale, and Griffin) are estimated to be close to their TMDLs, but may need management actions beyond those currently contained in the BMAP to meet the targets. Lakes Harris and Trout are dark red,

indicating that significantly more effort may be needed to achieve the additional TP load reductions necessary to meet their TMDLs.

Appendix D contains a series of tables for each sub-basin, with the loadings by source category for the TMDL baseline period, estimated load reductions, and estimated loadings associated with growth from 2001 through 2010. **Appendix E** contains a discussion of the land use mapping effort used to estimate future TP loadings associated with growth.

Chapter 4 discusses each sub-basin and the estimated net reductions.

TABLE 3.7. SUMMARY OF NET ESTIMATED LOADINGS OF TP TO TMDL WATERS IN THE UPPER OCKLAWAHA RIVER BASIN AFTER BMAP IMPLEMENTATION

SUB-BASINS	Lake Apopka	Lake Beauclair	Lake Carlton (trib. to Lake Beauclair)	Lake Dora	Lake Eustis	Trout Lake (trib. to Lake Eustis)	Lake Harris/Little Lake Harris	Palatlakaha-north of SR50 (trib. to Lake Harris)	Lake Griffin	Lake Yale (trib. to Lake Griffin)
SOURCES OF TP (loading in lbs/yr)	**NET ESTIMATED LOADS**									
Spring discharge	2,204						2,046			
Muck farm discharges										
Muck Farm 1 (active)		1,701								
Muck Farm 2 (inactive)										
Muck Farm 3 (inactive)					175	203				
Muck Farm 4 (active)							1,826			
Restoration area discharges										
Apopka Restoration Areas	11,246									
Pine Meadows Restoration Area					476	553				
Harris Bayou									415	
Emeralda Marsh Restoration Area									4,663	
Atmospheric deposition (wet/dry)	11,089	311	118	1,266	2,250	55	5,421		3,815	1,442
Tributary inflows	3,063									
Discharge from Lake Apopka		2,774								
Discharge from Lake Beauclair				5,200						
Discharge from Lake Dora		6			4,559					
Discharge from Lake Eustis				11			84		12,115	
Discharge from Lake Harris					5,219					
Discharge from Palatlakaha River							4,442[2]			
Discharge from Lake Yale									2	
Point sources	2,667						39		27	
Peat mine (inactive)										
Stormwater runoff	1,288									
Natural areas runoff		313	51	235	641	84	2,218	1,243	1,057	500
Developed land uses[1]		1,410	470	2,261	3,533	1,524	4,662	1,440	2,759	1,066
Seepage/ground water	1,212									
Septic tanks		227	78	494	2,411	32	1,573		2,177	647
MOS[3]	1,168									
LOADING INFORMATION										
TMDL Baseline TP loading (lbs/yr)	137,451	46,672	477	39,646	35,503	2,604	26,864	2,350[2]	77,881	3,158
Estimated change from current and future projects (TP loading lbs/yr)	-103,514	-40,761	0	-31,442	-19,279	-745	-7,427	-13	-53,545	-109
Estimated change from growth (TP loading lbs/yr–2001-2010)	0	831	240	1,263	3,040	592	2,874	346	2,694	606
Total estimated change from projects and growth (TP loading lbs/yr)	-103,514	-39,930	240	-30,179	-16,239	-153	-4,553	333	-50,851	497
Net estimated TP loading (lbs/yr)	**33,937**	**6,742**	**717**	**9,467**	**19,264**	**2,451**	**22,311**	**2,683**	**27,030**	**3,655**
TMDL (lbs/yr)	35,052	7,056	195	13,230	20,286	521	18,302	2,207	26,901	2,844
Additional TP load reduction needed	**0**	**0**	**522**	**0**	**0**	**1,930**	**4,009**	**476**	**129**	**811**

Note: Baseline loading is generally calculated for the period from 1991–2000. The Trout Lake baseline loading period is 1995–2000. Lake Apopka loadings are calculated for the period from 1989–94. Baseline loading year for the Palatlakaha River is 1991.

[1] Includes estimated load increases associated with future growth.

[2] Discharge to Lake Harris from the Palatlakaha River includes the loading from the entire river. The baseline loading to the Palatlakaha is only that within the impaired segment of the river north of SR 50.

[3] The MOS for most of the TMDLs is implicit in the conservative assumptions used in modeling. For Lake Apopka, there is also an explicit MOS, which includes discontinued loadings from former mining and agricultural operations in the sub-basin.

FIGURE 3.3. COMPARISON OF TP LOADINGS BEFORE AND AFTER BMAP IMPLEMENTATION IN UPPER OCKLAWAHA RIVER BASIN TMDL WATERS

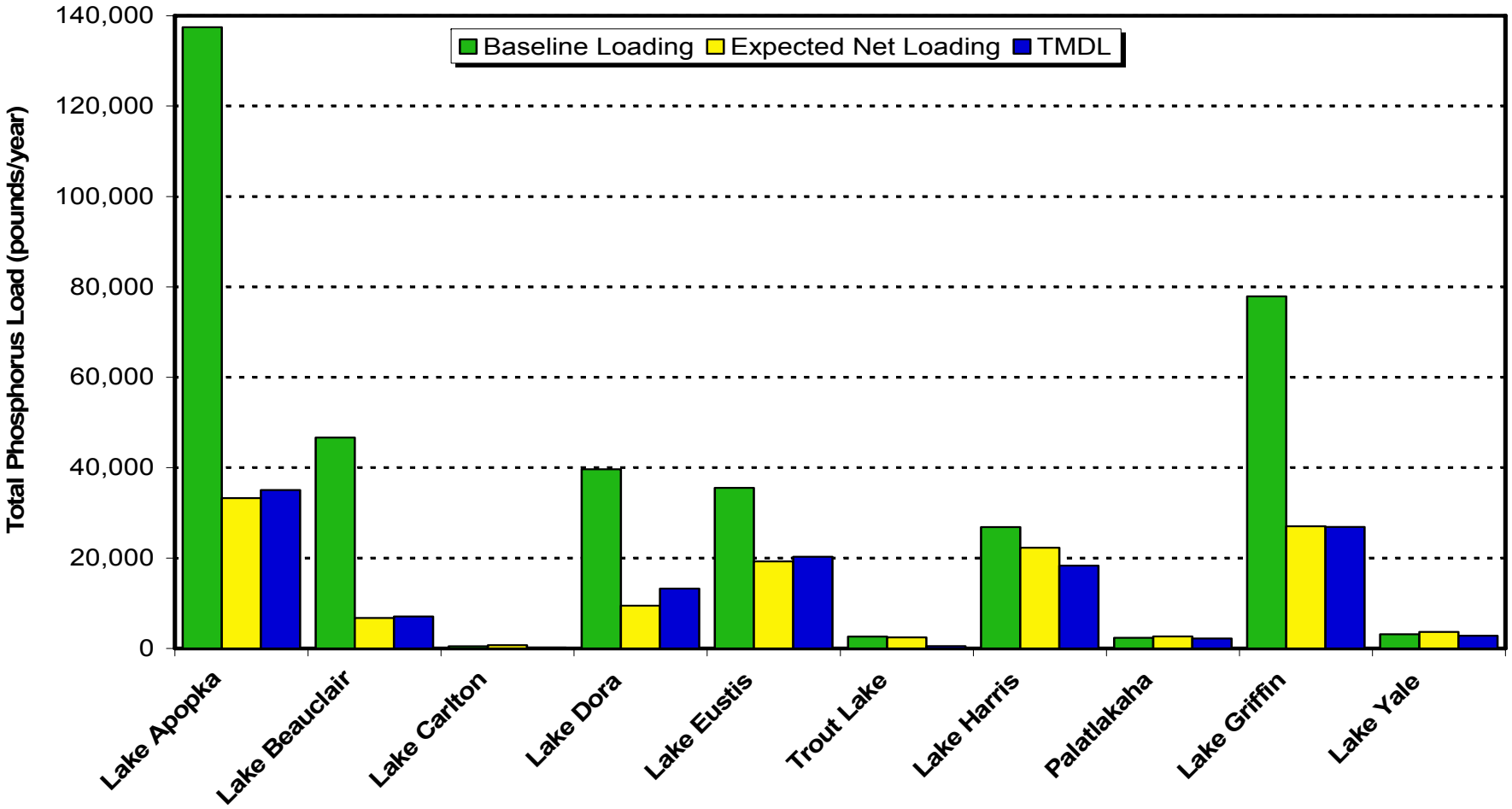
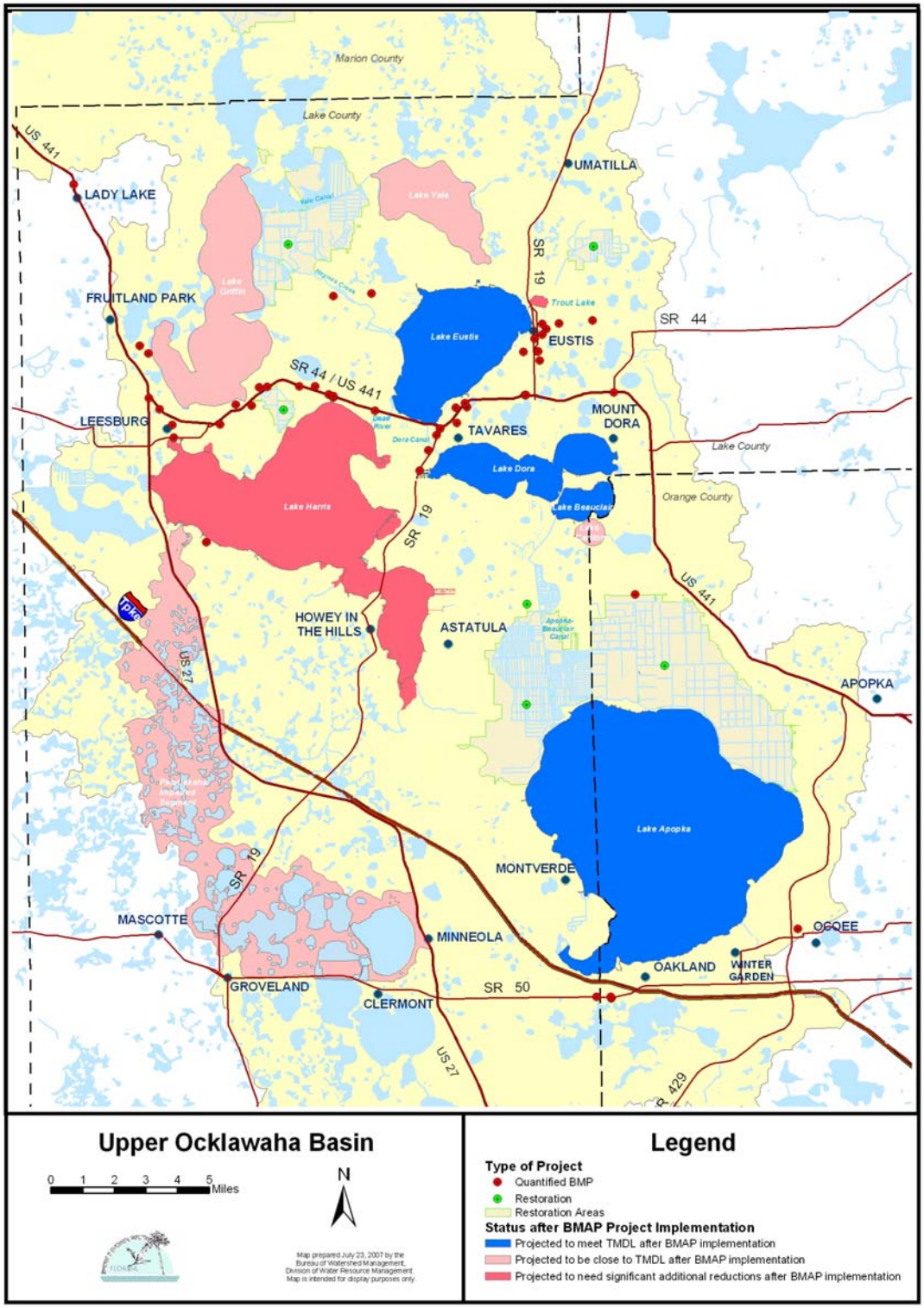


FIGURE 3.4. ANTICIPATED OUTCOMES OF BMAP IMPLEMENTATION IN UPPER OCKLAWAHA RIVER BASIN TMDL WATERS



3.6.2 Anticipated Resource Responses

As reductions in TP occur over time, the impaired waters will respond visibly to water quality improvements. Based on available information, the BWG expects to see the following changes in the lakes with projected net reductions in TP loadings:

- ***A reduction in the frequency and magnitude of algal blooms should occur****. It should be noted that the Upper Ocklawaha lakes are naturally productive enough that occasional algal blooms are expected to occur even if the TMDL targets are met:*
  - For the Harris Chain of Lakes, average chlorophyll *a* concentrations are expected to be below 30 ppb, a reduction from averages as high as 160 ppb during the 1991–2000 baseline period.
  - Severe algal blooms (chlorophyll *a* concentrations greater than 60 ppb) are expected to be reduced from over 90 percent of the time in some of the lakes, to no more than 11 percent of the time at the TMDL target TP concentrations.
  - Reductions in algal blooms will lead to increased water transparency, which is expected to more than double in the lakes with relatively poor water quality (Beauclair, Dora, and Griffin).

- ***The increased water transparency from the reduction of algal blooms should allow the re-establishment of beneficial aquatic plants*** *(some increases in aquatic plant growth have already been noted in Lakes Apopka and Griffin):*
  - Lake areas capable of supporting submersed aquatic plants (littoral zones) are expected to increase two- to fivefold in Lakes Beauclair, Dora, and Griffin, with smaller increases in the other lakes.
  - Aquatic plant growth should contribute to further improvements in water quality, by using TP that would otherwise be available to fuel algal growth.
  - Plant cover also reduces the resuspension of bottom sediments, reducing the release of TP from the lake bottom and further improving water clarity. Increased aquatic plant cover should improve habitat quality for sport fish, resulting in increased sportfish populations and catch yields.

- ***Reducing TP loading should lead to reductions in other water quality parameters of concern:***
  - Some stormwater treatment systems are effective in removing TN as well as TP.
  - Lowered TP levels in the lakes should contribute indirectly to reduced TN levels by limiting nitrogen-fixing Cyanobacteria (a type of blue-green algae).
  - Reducing TP will also lead to reductions in unionized ammonia, a form of nitrogen found in aquatic systems that is particularly toxic to aquatic animals. Ammonia is formed primarily by the decomposition of organic compounds containing nitrogen. The amount of ammonia that takes the form of unionized ammonia depends primarily on the pH of the water, with higher pH leading to a greater proportion of unionized ammonia. Unionized ammonia is a naturally occurring compound, but several different factors can contribute to elevated concentrations. Human activities on land that contribute excess TP can contribute to waterbody eutrophication. The result can be the extensive growth of algae or algal blooms. Elevated ammonia levels result from the decomposition of algal biomass. Photosynthesis by the algae also elevates pH, resulting in a greater proportion of ammonia present in the water in an unionized form.

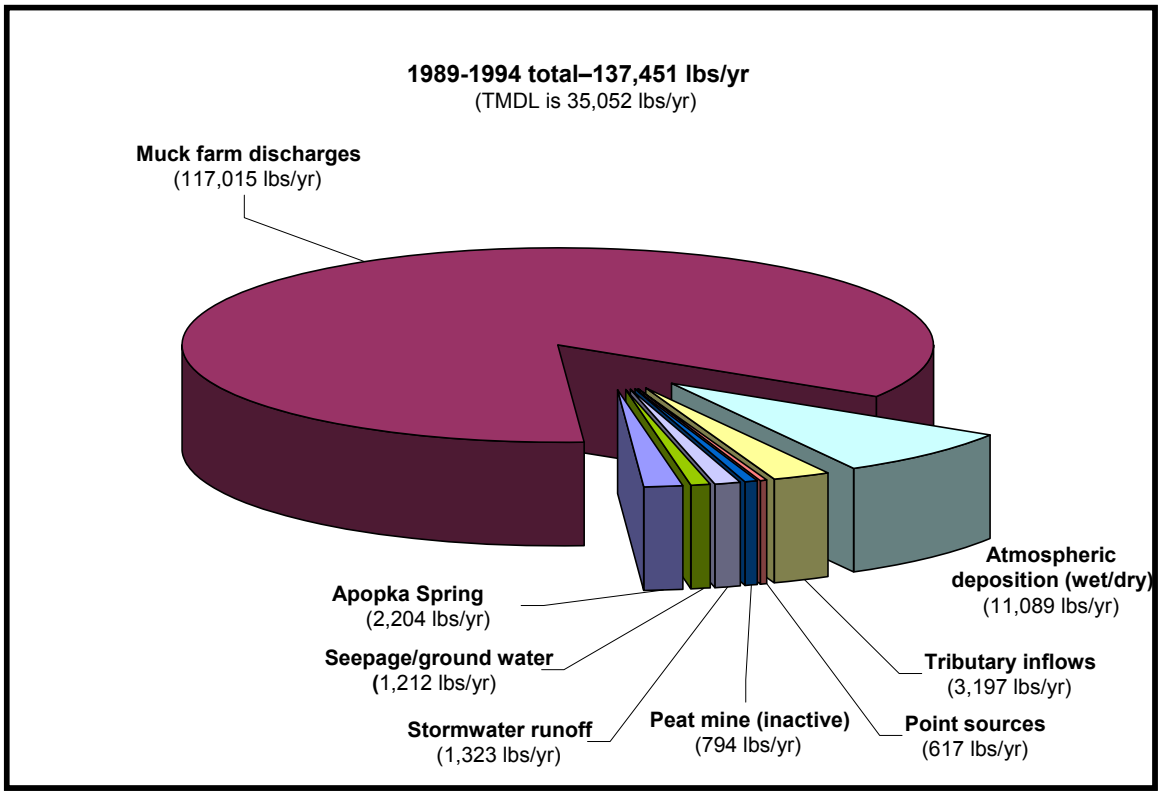
CHAPTER 4: POLLUTANT SOURCES AND MANAGEMENT ACTIONS, BY SUB-BASIN

4.1 Lake Apopka Sub-basin

4.1.1 Pollutant Sources by Source Category

The baseline TP loading of 137,451 lbs/yr to the Lake Apopka sub-basin was primarily caused by muck farm discharges averaging 117,015 lbs/yr, or 85 percent of the baseline load. Direct loadings to the surface of the lake from atmospheric deposition represented the next largest baseline load of 11,089 lbs/yr, or about 8 percent of the total load. This was a result of the large size of the lake, compared with the small size of the drainage sub-basin. All of the remaining loading totals 9,347 lbs/yr, or about 7 percent of the total baseline load. These other loads include tributary inflows, spring discharges, point sources, stormwater runoff, and seepage/ground water. **Figure 4.1** shows the relative significance of these sources.

FIGURE 4.1. BASELINE TP LOADING TO LAKE APOPKA



4.1.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.1 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). Descriptions of some pollutant reduction efforts by municipal governments in the Lake Apopka sub-basin follow the table.

St. Johns River Water Management District

The primary reduction in TP loading to Lake Apopka has occurred through the SJRWMD's implementation of the SWIM Program, with the primary focus on the acquisition of the muck farms and cessation of agricultural stormwater discharges from the farms (a reduction of 117,015 lbs/yr). While agricultural discharges have ceased, the SJRWMD still discharges some water from the North Shore Restoration Area (NSRA), primarily to keep portions dry until it determines how best to deal with residual pesticides in the soil and which fields are safe for flooding. When flooding is complete, the NSRA will contribute a greatly reduced load of 12,191 lbs/yr, about 10 percent of the former load from farming.

Since November 2003, the SJRWMD has operated the Marsh Flow-Way Project, which increases the rate at which the lake's water quality improves by filtering lake water through an emergent marsh. The construction of the flow-way was completed with the financial support of the project's partners: Lake County, the LCWA, and the EPA. The filtering of lake water removes suspended solids and associated nutrients from the water. Since start-up to the end of 2006, the project has removed 700,000 pounds of TN, 29 million pounds of total suspended solids (TSS), and 17,000 pounds of TP. Treated water is returned to the Apopka-Beauclair Canal and, except in unusual rain events, comprises the entire downstream discharge to Lake Beauclair. The balance between discharge from the Lake Apopka Lock and Dam and the Marsh Flow-Way is returned to Lake Apopka. The SJRWMD has adopted special sub-basin stormwater criteria for the Lake Apopka sub-basin, requiring that new development discharge no additional TP compared with the predevelopment condition.

The SJRWMD is also removing rough fish (primarily gizzard shad) from the lake, which directly removes nutrients (fish tissues) and helps reduce the internal recycling of nutrients in the lake. Lake County and the LCWA provided financial assistance to the SJRWMD for this project. Over 4 million pounds of shad have been harvested during the past 4 years. It is estimated that 1 million pounds of shad may recycle up to 25,000 pounds of TP in a year. A portion of that recycled TP may come from bottom sediments, and limiting that recycling will reduce algal growth. In the 14 years that gizzard shad have been harvested from Lake Apopka (1993–2006), about 93,000 pounds of TP have been removed in the shad bodies. For comparison, the estimated average annual TP removal (about 6,600 pounds) equals about 5 percent of the baseline annual external load to the lake (see **Figure 4.1**) and about 19 percent of the adopted TMDL. However, shad harvest is a temporary measure to accelerate the lake's recovery and reduce the initial baseline loading. It does not reduce the external TP load and is not incorporated into the estimated load reductions.

TABLE 4.1. MANAGEMENT ACTIONS IN THE LAKE APOPKA SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
LAP01	Lake Apopka / Apopka Spring** / Johns Lake	Apopka Sub-basin Development Guidelines	Lake County Environmental Services	N/A
LAP02	Apopka Spring** / Lake Apopka Basin	Lake Apopka Sub-basin Drainage Inventory	Lake County Public Works / Orange County Public Works / SJRWMD	N/A
LAP04	Lake Apopka / Johns Lake sub-basin	Johns Lake Stormwater Master Plan	Lake County Public Works / Orange County Public Works / LCWA	N/A
LAP05	Lake Apopka / northwest shore	Lake Apopka Constructed Marsh Flow-way Phase 1	SJRWMD / LCWA / Lake County / EPA	External reduction: 4,864 *Flow-way: 17,640 – 22,050****
LAP06	Lake Apopka / north shore	North Shore Restoration Area	SJRWMD / U.S. Department of Agriculture (USDA)	99,960
LAP07	Lake Apopka	In-lake Habitat Restoration	SJRWMD	Unknown
LAP08**	Lake Apopka	Removal of Gizzard Shad	SJRWMD / Lake County / LCWA	Unknown
LAP09	Lake Apopka / city of Apopka / northern part of north shore area	Jones Ave. Regional Stormwater Management Project	Orange County / SJRWMD Lands Division	945
LAP14	Johns Lake	SR 50–Basin G	DOT	-2.8
LAP15	Johns Lake	SR 50–Basin H	DOT	13.46
LAP16	Johns Lake	SR 50–Basin I	DOT	-0.02
LAP18	Lake Apopka	Berg Dr.	Orange County Public Works	1.9
LAP19	Lake Apopka	Water St.	Orange County Public Works	22.8
LAP20	Lake Apopka	Lake Apopka Master Plan–Orange County	Orange County Public Works	N/A
LAP21	Lake Apopka / Apopka sub-basin	Burch's Quarters Community Development	Orange County Public Works	Unknown
LAP22	Lake Apopka / Apopka sub-basin	East Bay St. Community Development Project	Orange County Public Works	Unknown
LAP25	Lake Apopka/ Pioneer Key Mobile Home Park	Pioneer Key Regional Stormwater Project	Ocoee Public Works / Orange County CDBG / DEP	134
LAP27	Lake Apopka / Montverde boat ramp	Montverde Boat Ramp Swale Improvement	Lake County Public Works	Unknown
LAP28	Johns Lake / Shore Dr. and Lake Blvd.	Johns Lake Retrofit	Lake County Public Works	Unknown
LAP29	Lake Apopka / Lake Fuller watershed	Lake Fuller Retention Pond	City of Apopka	N/A
APOPKA 01	Lake Apopka / city of Apopka	Street Sweeping	City of Apopka	Unknown
APOPKA 02	Lake Apopka / city of Apopka	Educational Outreach	City of Apopka	Unknown
APOPKA 03	Lake Apopka/city of Apopka	Stormwater System Maintenance	City of Apopka	Unknown
ORANGE	Lake Apopka sub-basin /	Street Sweeping in the	OCEPD / Public Works /	Unknown

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
01	unincorporated Orange County	Lake Apopka Basin	Orange County	
OCOEE01	Lake Apopka sub-basin / Ocoee city limits	Street Sweeping	City of Ocoee Stormwater Department / City of Ocoee	Unknown
WNTRGA R01 -	Lake Apopka sub-basin / 'Winter Garden city limits	Street Sweeping	Winter Garden Public Works Department / City of Winter Garden	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
** Also referred to as Gourd Neck Spring
*** Removes nutrients and reduces internal recycling, but does not reduce external loads.
N/A = Not applicable.

Local Government Stormwater Management Efforts

The total contributing drainage area to Lake Apopka is approximately 187 square miles. The majority of the watershed lies within the jurisdiction of unincorporated Orange and Lake Counties. However, portions of the sub-basin overlap a number of jurisdictions: Apopka, Winter Garden, Ocoee, Oakland, the Florida Turnpike, DOT, and the Orlando-Orange County Expressway Authority.

Current and planned stormwater projects identified by the BWG will further reduce TP loading by an estimated 1,114 lbs/yr. The most substantial TP reduction will be achieved through the implementation of Orange County's Jones Ave. Stormwater Project (945 lbs/yr). The effect of reducing stormwater nutrient loadings will not necessarily be accomplished as direct reductions in loading to Lake Apopka. Several of the proposed stormwater projects reduce loadings into Lake Apopka's tributaries. DOT projects associated with roadway improvements in the Johns Lake watershed will reduce TP loadings by an estimated 10 lbs/yr. Street sweeping and the maintenance of MS4 stormwater collection systems performed by DOT, Orange County, Winter Garden, Ocoee, and Apopka also potentially reduce loadings of TP into Lake Apopka, though the reduction is currently unquantified.

ORANGE AND LAKE COUNTIES

Several actions by both Lake and Orange County will aid in the restoration of Lake Apopka. The Lake County Board of County Commissioners approved the Apopka Sub-basin Development Guidelines, which require no net increase in stormwater quantity or nutrient loading. Improvements to swales and other planned stormwater projects within Lake Apopka's tributary basins will further reduce TP loadings into Lake Apopka.

When completed, Orange County's Jones Ave. stormwater retrofit will reduce stormwater runoff by 945 lbs/yr. However, drainage from the project area discharges to the Lake-Level Canal, where it mixes with runoff from restoration areas. The reduction achieved by the retrofit is included as a reduction in runoff from the restoration areas in **Figure 4.2.** Additional reductions in loadings of TP per year will be accomplished with the implementation of the Berg St., Water St., Burch's Quarter, and East Bay St. stormwater projects.

Orange County increased the number of water quality monitoring locations within Lake Apopka to support the implementation of the BMAP. Orange County has also undertaken, in partnership with Lake County, the development of two master plans that will influence the Lake Apopka sub-basin: one for Johns Lake* and one for Lake Apopka.

- ***Lake Apopka Master Plan***

  Orange County has completed Phase 1 of the Lake Apopka Master Plan, which includes an inventory of existing stormwater management systems. Phase II, which is in draft form, includes an engineering analysis of the existing stormwater system and the identification of problem areas. It includes a characterization of existing water quality data for lakes in the watershed and estimates of existing and future pollutant loading to the major lake systems. Phase III will be worked on in the near future; it will contain an engineering analysis to develop alternatives to alleviate flooding in problem areas. Watershed improvements will address both water quantity and quality problems and may result in regional solutions.

  Lake County participated in Phase 1 of the Lake Apopka Master Plan and completed the Lake Apopka Basin Drainage Inventory in 2002 (BCI Engineers and Scientists, Inc., June 2002). That inventory identified stormwater drainage structures and assessed the potential for land use to contribute pollutant loadings. The county's focus was water quality, as flooding was not identified as an issue within the Lake County portion of the Lake Apopka sub-basin.

- ***Johns Lake Stormwater Master Plan***

  The total contributing drainage area to Johns Lake is approximately 26 square miles, while the lake proper has a surface area of 2,932 acres. Surface flow moves generally from east to west through interconnected lake systems and associated wetland sloughs. Johns Lake discharges north to Lake Apopka through a series of cross-culverts and open ditch segments. The majority of the watershed lies within the jurisdiction of unincorporated Orange and Lake Counties. However, portions of the sub-basin overlap the following jurisdictions: Winter Garden, Ocoee, Clermont, Oakland, the Florida Turnpike, DOT, and the Orlando-Orange County Expressway Authority.

  To help alleviate flooding and improve water quality in Johns Lake, Orange County completed a master plan that identified flooding problems, characterized existing water quality data for lakes in the watershed, estimated existing and future pollutant loading to the major lake systems, and proposed watershed improvements to address both water quantity and quality problems. Lake County participated in the development of that plan.

  Orange County has identified the following issues, solutions, and/or future prevention opportunities as recommendations of the Johns Lake master plan:

  - Obtain drainage easements for all primary flow-ways,
  - Expand the current water quality monitoring program to include all major lakes in the watershed,
  - Investigate the feasibility of providing central sewer for older developments currently on septic systems located adjacent to lakes/wetlands that have documented instances of flooding, and
  - Investigate the actual lowest floor elevation for structures (homes, offices) that are located within the mapped 1 percent chance of flood.

Lake County is finalizing the design of two small retrofit projects that will reduce the amount of pollutants entering Johns Lake.

CITY OF OCOEE

The completion of the Pioneer Key Regional Stormwater Project by the city of Ocoee will remove an additional 134 lbs/yr of TP loading from a tributary that discharges into Lake Apopka. Funding for the project is provided by an Orange County Community Development Block Grant.

TOWN OF MONTVERDE

The town of Montverde is working in with Lake County to conduct a planning and engineering design study to address roads and stormwater runoff. The focus of planning efforts is Lake Florence, a tributary watershed of Lake Apopka. Montverde initiated the project by removing cattails that were flourishing from the fertilizers being carried to Lake Florence via stormwater runoff. Another area of concern was the stormwater retention areas, which have been enlarged. Rocks have been added to slow the water flow and create a natural filtering system. Montverde is looking into purchasing additional land for more retention areas; stormwater runoff from the downtown corridor can be piped to these areas to prevent irreversible damage to Lake Florence.

CITY OF APOPKA

The city of Apopka recognizes the importance of maintaining water quality and has implemented proactive projects, programs, and ordinances in an effort to protect and enhance water quality in waterways within and around the city. Current city activities include the following:

- *Conducting routine street sweeping to reduce the potential amount of pollutants entering waterways. Stormwater inlets, ditches, swales, and ponds are also maintained on a regular basis.*
- *Providing various educational activities to inform and provide guidance to citizens on the importance of water as a resource. These include presentations, local newspaper articles, handouts, and mailings to residents, businesses, and schoolchildren on stormwater runoff and water conservation. The city also has incorporated a program using local volunteers to label city storm drains, informing residents of discharge into local waterways.*
- *Constructing a stormwater collection pond to capture and treat stormwater runoff. After treatment, the water will then be used to augment the city's reclaimed water distribution system.*

Completed retrofits in the city's downtown area include the following:

- *Redirecting the southern portion's runoff, which once discharged directly into Lake Fuller, into a city-constructed 10-acre retention pond, and*
- *Redirecting the northern portion's runoff, which directly discharged into Lake McCoy, into a constructed stormwater detention area before it enters the lake.*

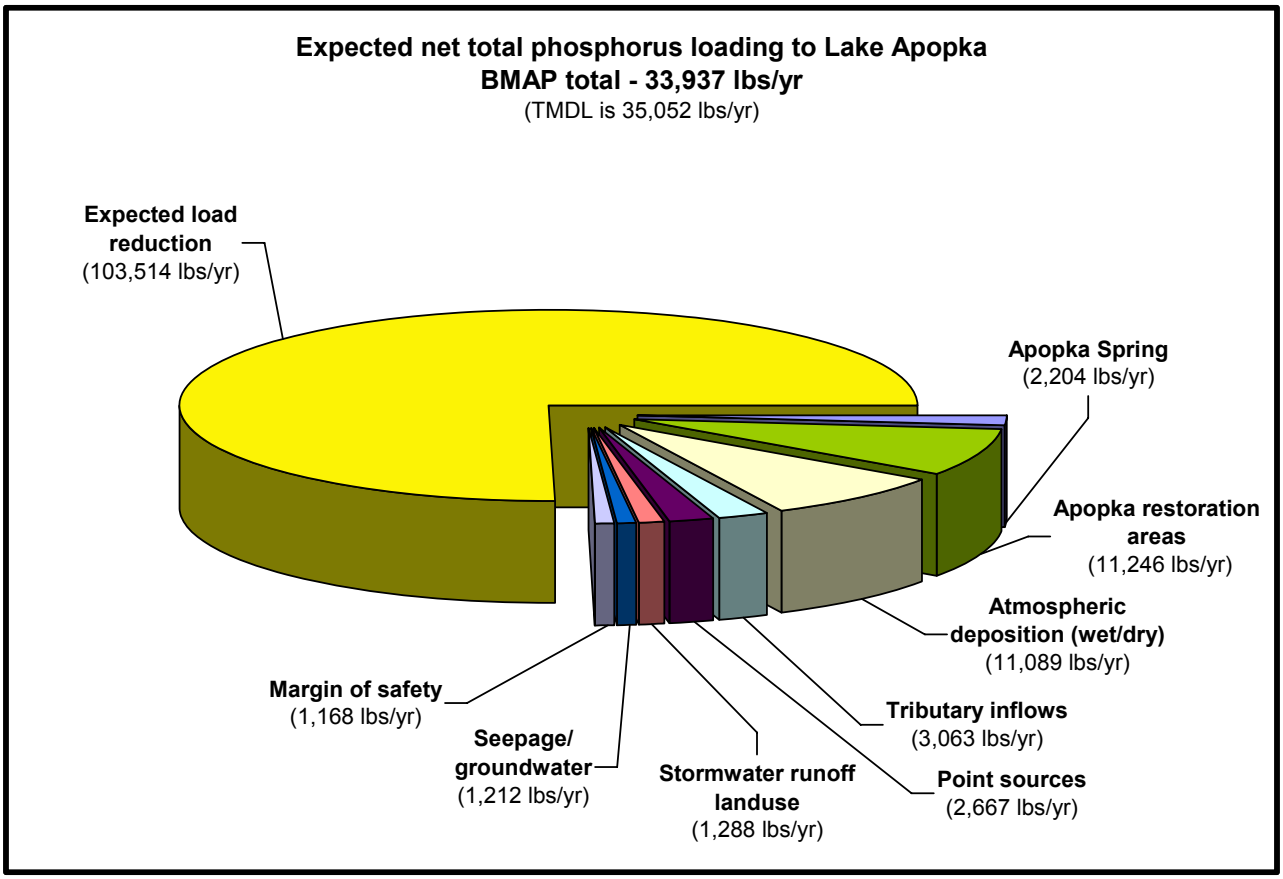
The runoff from a majority of the development in the city occurs in closed sub-basins that do not drain to Lake Apopka.

4.1.3 Anticipated Reductions in Total Phosphorus

Increases from future growth were not estimated for the sub-basin because of the special sub-basin criteria previously mentioned. Overall, the net reduction in TP loading to Lake Apopka is estimated to be 103,514 lbs/yr (a reduction of about 75 percent), which reduces loading enough to meet the TMDL for Lake Apopka. However, the time frames needed to achieve final water quality results may extend into future TMDL cycles.

Figure 4.2 presents the expected net TP loading to Lake Apopka. Based on ongoing and planned management actions, TP load reductions after BMAP implementation are expected to be sufficient to meet the TMDL (35,052 lbs/yr). This reduction is extremely important for downstream lakes, which will receive significantly less nutrient loading from Lake Apopka.

FIGURE 4.2. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO LAKE APOPKA



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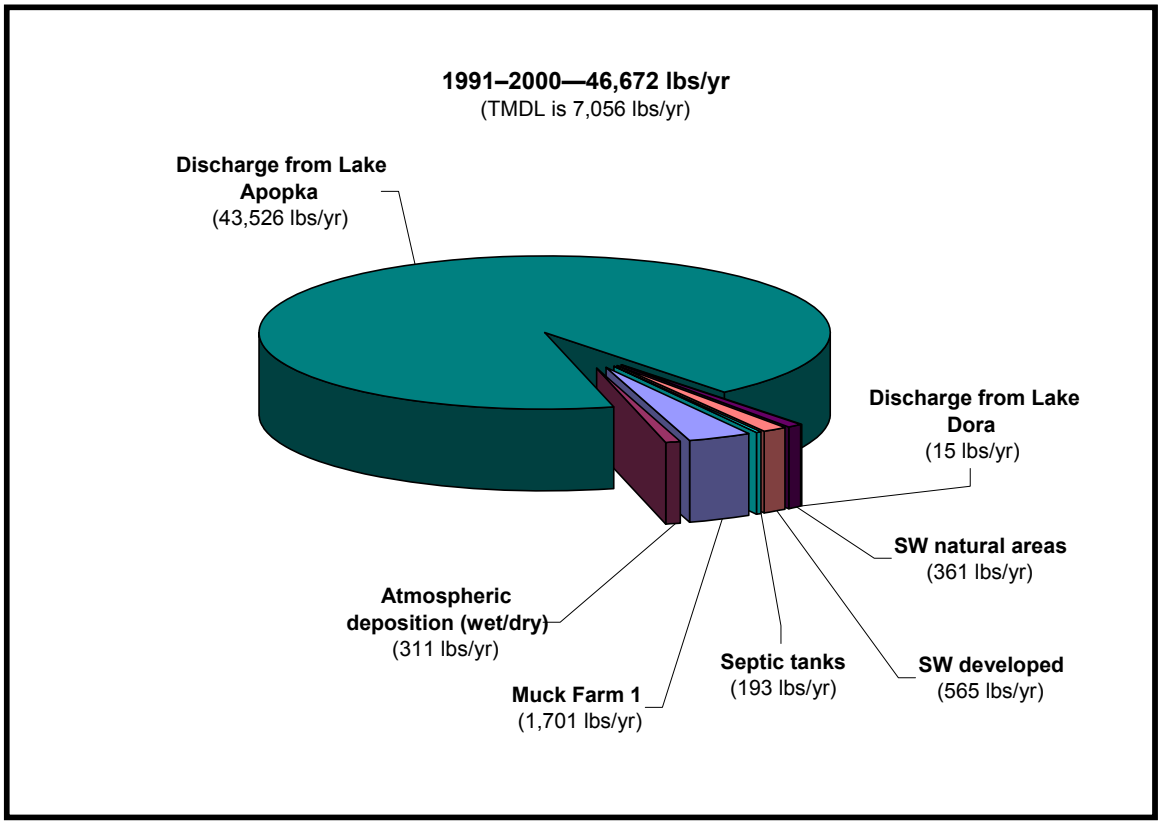
4.2 Lake Beauclair Sub-basin

4.2.1 Pollutant Sources by Source Category

The baseline TP loading to Lake Beauclair averaged 46,672 lbs/yr and was primarily caused by tributary flows from Lake Apopka averaging 43,526 lbs/yr, or 93 percent of the baseline load. The muck farm represented the next largest baseline load of 1,701 lbs/yr, or nearly 4 percent of the total load. All the remaining loading totals 1,445 lbs/yr, or about 3 percent of the total baseline load. These other loads include atmospheric deposition, stormwater runoff, and loading from septic tanks. **Figure 4.3** shows the relative significance of these sources.

FIGURE 4.3. BASELINE TP LOADING TO LAKE BEAUCLAIR



4.2.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.2 provides a list of implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). When completed, the Nutrient Reduction Facility (NuRF) Project will provide an estimated reduction in TP loading of 5,000 lbs/yr. Additional potential reductions in TP loading are possible through street sweeping performed by Orange County. The text following the table provides further details on some of these management actions.

TABLE 4.2. MANAGEMENT ACTIONS AFFECTING LAKE BEAUCLAIR

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY / PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
ABC01	Lake Apopka Outlet / ABC / CC Ranch	NuRF	LCWA / SJRWMD / DEP	5,000
ABC02	Apopka-Beauclair Canal / Lois Dr.–unincorporated Lake County	Lois Dr. Baffle Box	Lake County Public Works	TP reduction of 30% for amount treated
BCL02	Lake Beauclair / western end of Lake Beauclair	Suction Dredging of Western Lake Beauclair	FWC / LCWA/ SJRWMD	Unknown
BCL03**	Lake Beauclair	Gizzard Shad Harvest	SJRWMD	Unknown
ORANGE04	Orange County maintained roads in the sub-basins that contribute to Lake Carlton and Lake Beauclair, consisting primarily of roads around Lake Ola and areas to the north of that lake	Street Sweeping in the Lake Carlton and Lake Beauclair Basins	OCEPD	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
** Removes nutrients and reduces internal recycling, but does not reduce external loads.

Lake County

Lake County installed a baffle box on Lois Dr. in unincorporated Lake County. Though a loading reduction is not quantified, the baffle box is expected to provide some removal of TP.

St. Johns River Water Management District

The primary reduction in TP loading to Lake Beauclair will stem from improved water quality in Lake Apopka, as a result of the Lake Apopka SWIM Program. The anticipated improvements in Lake Apopka's water quality are estimated to reduce TP loadings to Lake Beauclair by 35,752 lbs/yr. Other SJRWMD projects that are projected to accelerate the recovery of Lake Beauclair include gizzard shad harvesting and a planned project to dredge sediments from the Apopka-Beauclair Canal and the western end of Lake Beauclair. Gizzard shad harvesting was started in Lakes Beauclair and Dora in 2005, and through the end of 2006 about 4,000 pounds of TP had been removed in the harvested fish. The planned dredging is a joint effort of the SJRWMD, FWC, and LCWA.

Lake County Water Authority

The LCWA is proposing to construct a NuRF to further treat water released from Lake Apopka and provide the timely achievement of TMDL goals for Lakes Beauclair, Dora, Eustis, and Griffin. The NuRF will eliminate an additional 65 percent of the TP load to Lake Beauclair. This reduction will positively affect Lakes Dora, Eustis, and Griffin as well, since the Lake Apopka discharge represents a significant portion of their hydrologic budget. Additional TP reduction is important because Lake Apopka's TMDL target concentration is almost twice as high as the targets for the lakes downstream. The project's estimated load reduction to Lake Beauclair is 5,000 lbs/yr, based on the remaining load to Lake Beauclair after projected improvements to Lake Apopka by current restoration efforts.

The NuRF will use off-line alum injection, a treatment method commonly used in the drinking water and wastewater industries, to treat flows up to 300 cubic feet per second (cfs). This will allow the NuRF to treat between 80 and 90 percent of the discharge from Lake Apopka. Flow in excess of 300 cfs will discharge directly through the existing Apopka-Beauclair Canal dam and will not be diverted through the NuRF. Total average annual water treatment volume is expected to be between 8 and 18 billion gallons, depending on rainfall.

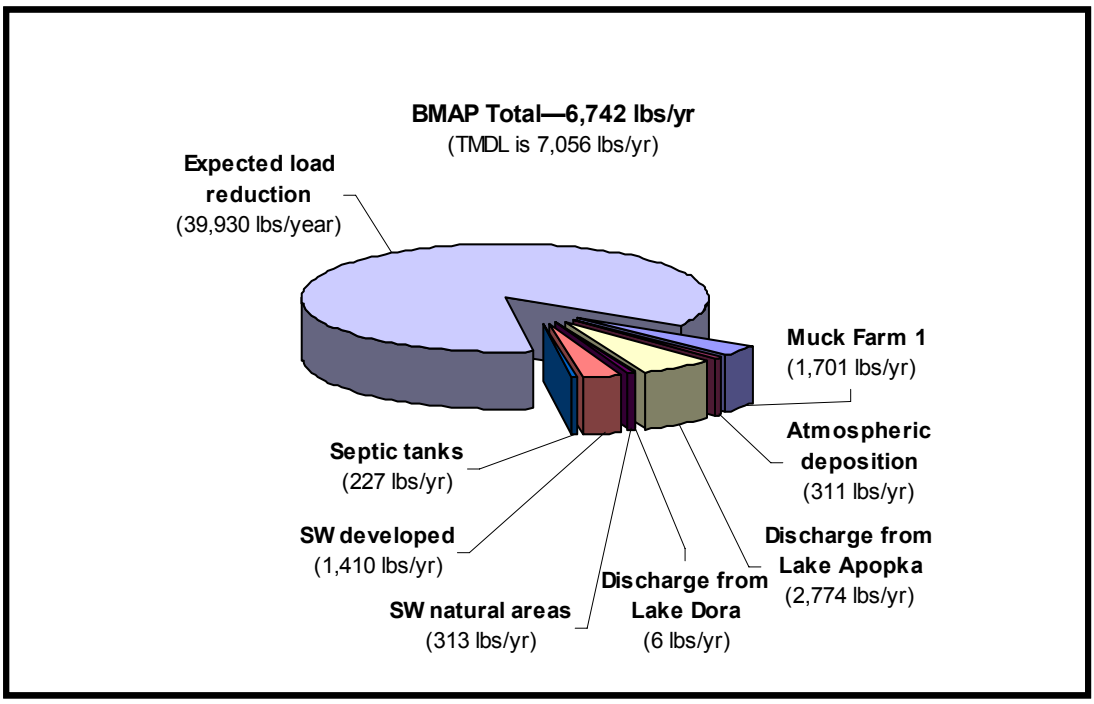
The net TP reduction by the NuRF is expected to be far greater than that of any conventional stormwater treatment method such as retention. Based on current potential load reductions, the average cost per pound of TP removed is estimated at about half that of stormwater retention. Once complete, the NuRF will have the distinct advantage of operating at variable capacities, depending on the desired water quality and budget constraints.

4.2.3 Anticipated Reductions in Total Phosphorus

Figure 4.4 presents the expected net TP loading to Lake Beauclair, after reductions from the projects described above and increases from estimates of future growth are factored in. Overall, the net reduction in TP loading to Lake Beauclair is estimated to be 39,930 lbs/yr (about an 86 percent reduction). This reduces loading enough to meet the TMDL for Lake Beauclair (7,056 lbs/yr). However, the time frames needed to achieve final water quality results may extend into future TMDL cycles.

Because these lakes lie in a chain, the improvement in the upstream lake is directly linked to improvements in some downstream lakes. Thus the expected improvement in Lake Beauclair is the key reason that Lake Dora should meet its TMDL.

FIGURE 4.4. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO LAKE BEAUCLAIR



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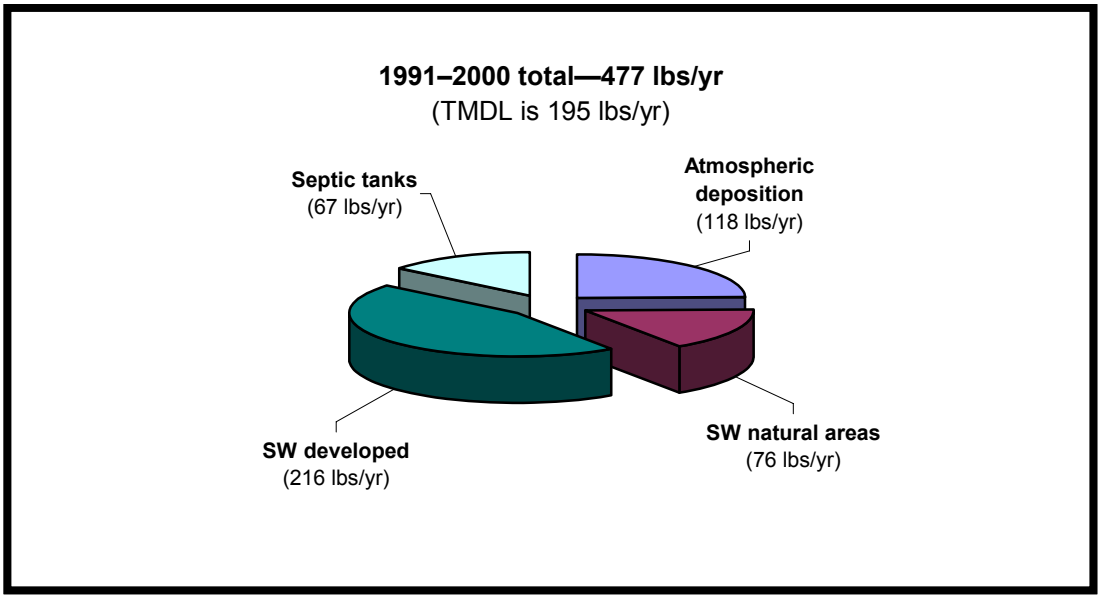
4.3 Lake Carlton Sub-basin

4.3.1 Pollutant Sources by Source Category

The baseline TP loading to Lake Carlton averaged 477 lbs/yr and came primarily from stormwater runoff from developed sources that totaled 216 lbs/yr, or 45 percent of the average TP loading. Loading from atmospheric deposition, stormwater runoff from natural areas, and septic tanks contributed 118 lbs/yr, 76 lbs/yr, and 67 lbs/yr, respectively. **Figure 4.5** shows the relative significance of these sources. Available evidence indicates that Lake Carlton may receive significant loading from Lake Beauclair. The TMDL baseline TP loading estimate for Lake Carlton does not include loading from water exchanges with Lake Beauclair; this loading is believed to be large.

FIGURE 4.5. BASELINE TP LOADING TO LAKE CARLTON



SW – Stormwater

4.3.2 Management Actions to Reduce Total Phosphorus Loading

Currently, only two projects are identified that could contribute to reduced TP loadings into Lake Carlton **(Table 4.3).**

TABLE 4.3. MANAGEMENT ACTIONS IN THE LAKE CARLTON SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY / PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION
DORA14	Lakes Dora, Carlton, Beauclair drainage sub-basins	Lakes Dora, Beauclair, Carlton Basin Study	Lake County Public Works	N/A
ORANGE04	Unincorporated Orange County / Lake Carlton and Lake Beauclair sub-basin	Street Sweeping in Lake Carlton and Lake Beauclair Sub-basin	OCEPD / Orange County Public Works	Unknown

N/A = Not applicable.

To address the reductions in TP needed for Lake Carlton, the BWG recommends the following actions:

- ***Improve water quality in Lake Beauclair*** *(see* ***Section 4.2****). A small canal connecting Lakes Carlton and Beauclair is thought to act as an equalizer between the lakes, allowing the exchange of water. Therefore, water quality in one lake would be similar to water quality in the other, and reducing TP loadings into Lake Beauclair is expected to reduce TP loadings to Lake Carlton. However, the relationship between the lakes is not well understood and needs further evaluation.*
- ***Increase the frequency of water quality monitoring for nutrients to better assess the condition of Lake Carlton****. The SJRWMD has added water quality sampling stations in Lake Carlton. Orange County has a long history of data collection from this lake and will continue to monitor. The regular collection of water quality data will help in assessing the trophic condition of the lake and in following water quality trends.*
- ***Evaluate stormwater retrofit opportunities****. Orange County proposes to evaluate stormwater inputs into Lake Carlton. Lake County, through its Lakes Dora, Beauclair, and Carlton Basin Study (DORA14) could also identify potential opportunities for retrofits in the Lake Carlton watershed.*
- ***Evaluate the potential for implementing nonstructural BMPs.*** *Currently only Orange County provides limited street sweeping on county-maintained roads. Other opportunities may exist for street sweeping or other educational outreach activities.*
- ***If the data support it, treat Lake Carlton and Lake Beauclair as one waterbody in future TMDL modeling.*** *Water quality models used for TMDL development were not able to distinguish between Lake Carlton and Lake Beauclair.*

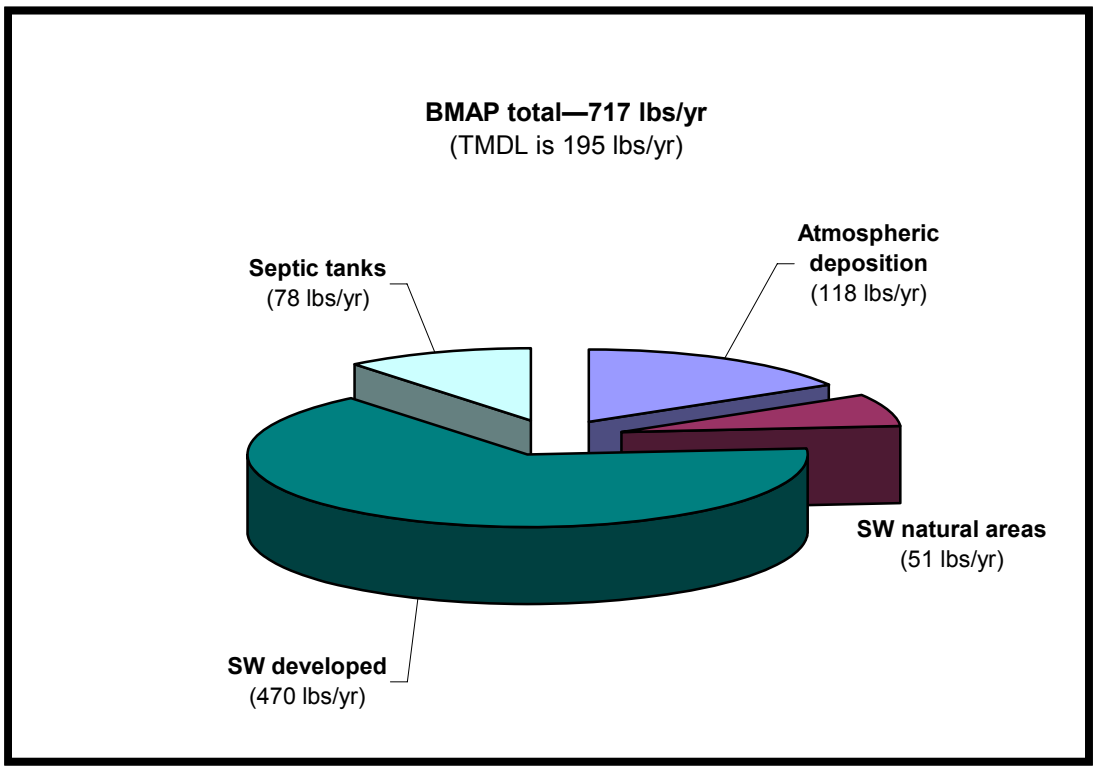
4.3.3 Anticipated Reductions in Total Phosphorus

Figure 4.6 presents the estimated net TP loading to Lake Carlton. The projected loading calculation indicates that Lake Carlton will not meet its TMDL. (A reduction in TP loading of 522 lbs/yr is needed to meet the TMDL for the lake.)

However, because of the apparent close connection and exchange of water between Lakes Carlton and Beauclair, reducing loadings into Lake Beauclair is expected to benefit Lake Carlton, possibly allowing it to achieve the TMDL. Anderson and Hughes (1976) note that

there are frequent reversals in net flow between the two lakes. Based on this observation, the parallel trends in TP concentrations in the two lakes, and the absence of other major TP sources for Carlton, it is assumed that flows from Beauclair are a significant TP source for Carlton.

FIGURE 4.6. ESTIMATED NET TP LOADING TO LAKE CARLTON



SW – Stormwater

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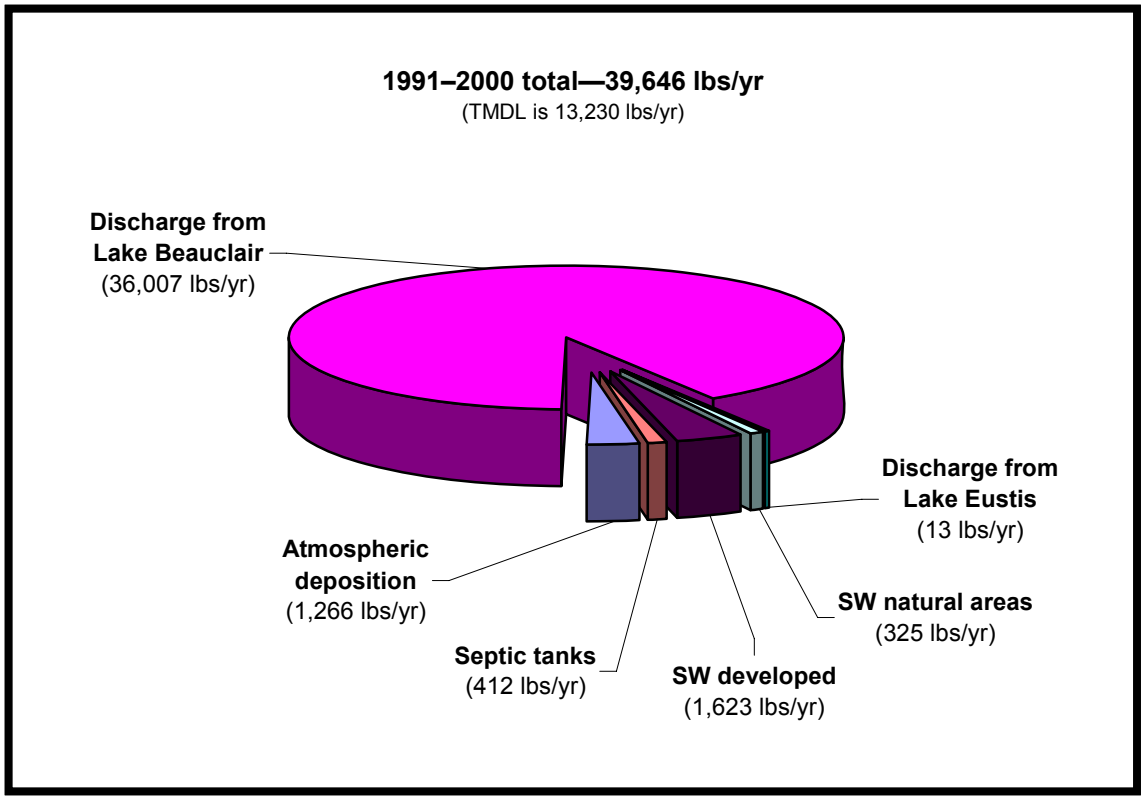
4.4 Lake Dora Sub-basin

4.4.1 Pollutant Sources by Source Category

Baseline TP loading to Lake Dora averaged 39,646 lbs/yr, and was primarily caused by tributary flows from Lake Beauclair averaging 36,007 lbs/yr, or 91 percent of the baseline load. Loadings from stormwater runoff (developed land uses) represented the next largest baseline load of 1,623 lbs/yr, or nearly 4 percent of the total. Atmospheric deposition added 1,266 lbs/yr, or about 3 percent of the total load. All the remaining loading totals 750 lbs/yr, or about 2 percent of the total baseline load. These other loads include stormwater runoff (natural areas) and loading from septic tanks. **Figure 4.7** shows the relative significance of these sources.

FIGURE 4.7. BASELINE TP LOADING TO LAKE DORA



SW – Stormwater

4.4.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.4 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table provides further details on some of these management actions.

Reductions in TP loadings from upstream sources and the efforts of many jurisdictions in the Lake Dora sub-basin are expected to reduce TP loading sufficiently to meet the TMDL goal. The impacts from upstream sources and some of the local efforts are as follows:

Impacts from Lake Beauclair Projects

The primary reduction in TP loading to Lake Dora is expected to occur through net improved water quality in Lake Beauclair, which is estimated to reduce loading to Lake Dora by 30,807 lbs/yr.

To accelerate the recovery of water quality in Lake Dora, SJRWMD began harvesting of rough fish (primarily gizzard shad) in Lakes Beauclair and Dora in 2005. Through the end of 2006, about 4,000 pounds of TP were removed through the harvest of fish from both lakes.

Lake County

The 2006 Lake Dora Basin Study includes Lakes Beauclair, Carlton, and Gertrude. The sub-basins have been delineated, and field review is being conducted to determine priority

projects. Priority projects for Lake Saunders and Lake Gertrude have been identified. The Lake Saunders flooding study is under way. Improvements to the Lake Gertrude outfall are a joint project between the city of Mt. Dora and Lake County, with the county providing funding to Mt. Dora.

TABLE 4.4. MANAGEMENT ACTIONS IN THE LAKE DORA SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY / PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
DORA01	Lake Dora / Lake Dora Ave. in Mount Dora	Lake Dora Ave. Improvement Project	Lake County Public Works	Unknown–removes sediments/particulates
DORA02	Lake Dora / downtown Tavares	Tavares Stormwater Retrofit	City of Tavares / LCWA / DEP	Sediment collection only
DORA03	Lake Dora / north side of Lakeshore Dr.	Old Hwy. 441 and Lake Dora	Lake County Public Works	Unknown
DORA04	Lake Saunders	SR 500 US 441–Basin 300A	DOT	3.04
DORA05	Lakes Saunders and Woodward	SR 500 US 441–Basin 300A,B,C,D	DOT	-10.51
DORA13**	Lake Dora	Gizzard Shad Harvest	SJRWMD	Unknown
DORA14	Lakes Dora, Carlton, Beauclair drainage sub-basins	Lakes Dora, Beauclair, Carlton Basin Study	Lake County Public Works	N/A
DORA15	Lake Saunders / Lake Dora Basin	Lake Saunders Flood Study	Lake County Public Works	Unknown
DORA16	Lake Gertrude / Lake Dora Basin	Lake Gertrude Outfall Improvements	City of Mt. Dora/ Lake County Public Works	Unknown
MTDORA01	Lake Dora / within Mount Dora city limits	Street Sweeping	Mount Dora Public Works Division	Unknown
TAVARES 01	Lake Dora and Lake Eustis / Tavares	Street Sweeping	City of Tavares	Unknown
TAVARES 02	Lake Dora and Lake Eustis / Tavares	Baffle Boxes	City of Tavares	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
**Removes nutrients and reduces internal recycling, but does not reduce external loads.
N/A = Not applicable.

City of Tavares

The city of Tavares has focused significant resources on improving water quality in Lake Dora and Lake Eustis. Although the city is adjacent to Lake Harris and Little Lake Harris, only a very small portion actually abuts those lakes.

The city of Tavares has pursued the construction of stormwater baffle boxes for many of the direct discharge points into both Lakes Dora and Eustis. It has built more than 10 boxes in the past 5 years with funding assistance from the LCWA and DEP, and expects to install additional boxes as funding becomes available. In addition to the baffle box construction, the city has implemented an aggressive street-sweeping program. City staff collect several tons of debris per week off the streets that would normally run off into the lakes.

As for new growth, the city continues to implement the SJRWMD stormwater rules. In 2005, it received its required NPDES permit from DEP. This program will ensure maximum stormwater pretreatment and erosion control.

City of Mount Dora

The city of Mount Dora has submitted a proposal to the LCWA for grant funding assistance on a water quality improvement project. The project, the Lake John Stormwater Improvements, will address surface water quality in Lake John, Lake Gertrude, and the associated drainage sub-basin, and will correct current drainage flow patterns and some minor flooding issues. These lakes ultimately drain into Lake Dora.

Project components include piping an outfall, constructing an outfall structure on Lake John, adding a continuous deflective separation (CDS) unit, dredging the bottom of Lake John, planting wetland species, and installing sod. The estimated cost is $2.6 million. The city is requesting funding assistance for 50 percent of the costs from the LCWA.

This drainage sub-basin is being reviewed by Lake County for additional projects or funding assistance to the city, as noted under the Lake County section. The county is currently drafting an interlocal agreement to share the design cost for the Lake John project with the city of Mount Dora. Mount Dora is also looking into obtaining funding assistance from DEP for this project. Mt. Dora is partnering with Lake County to improve a stormwater outfall into Lake Gertrude.

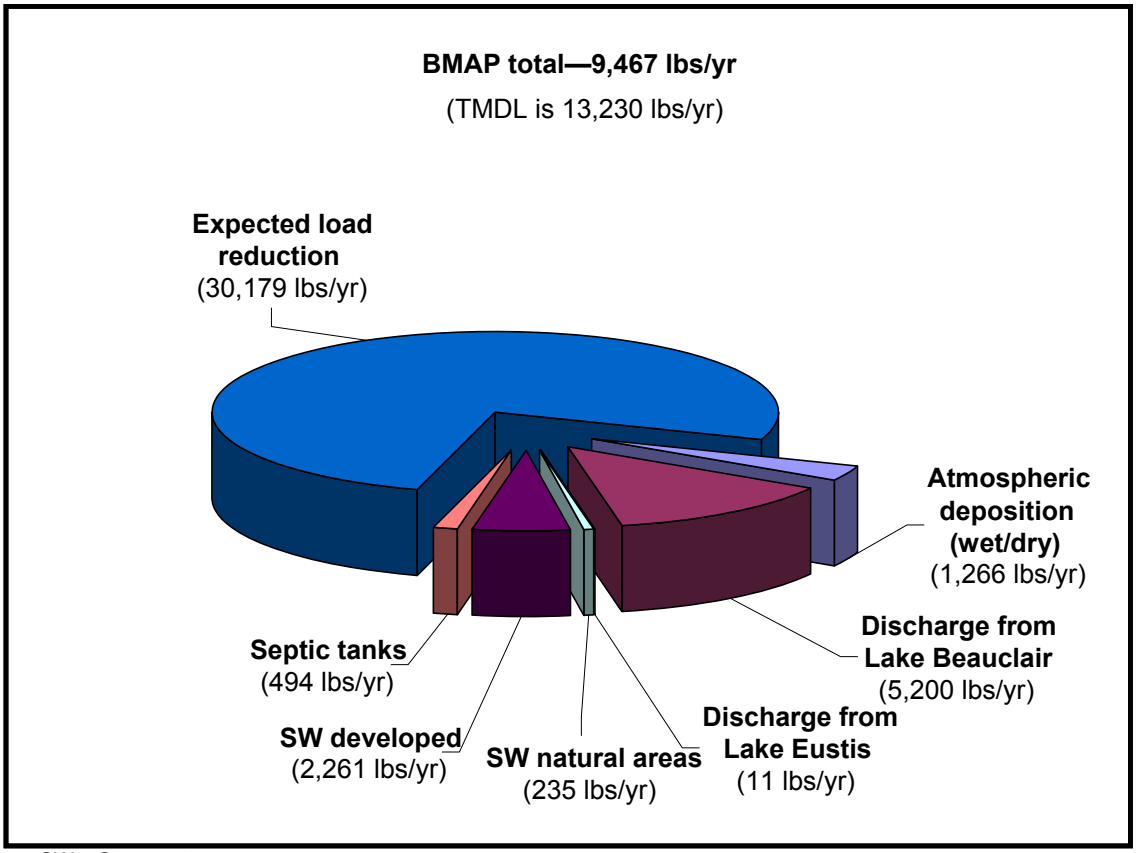
Mt. Dora also has an active street-sweeping program to remove sediment and debris from roadways. Street-sweeping activities are included as part of the city's MS4 permit.

4.4.3 Anticipated Reductions of Total Phosphorus

Figure 4.8 presents the expected net TP loading to Lake Dora. After factoring in reductions from the projects described above and increases from estimates of future growth, the net reduction in TP loading to Lake Dora is estimated to be 30,179 lbs/yr (about a 76 percent reduction), which would be enough to meet the TMDL for Lake Dora (13,230 lbs/yr). However, the time frames needed to achieve final water quality results may extend into future TMDL cycles.

Because these lakes lie in a chain, an improvement in the upstream lake is directly linked to an improvement in the lake downstream. Thus the expected improvement in Lake Dora will have a similar effect on lakes downstream.

FIGURE 4.8. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO LAKE DORA



SW – Stormwater

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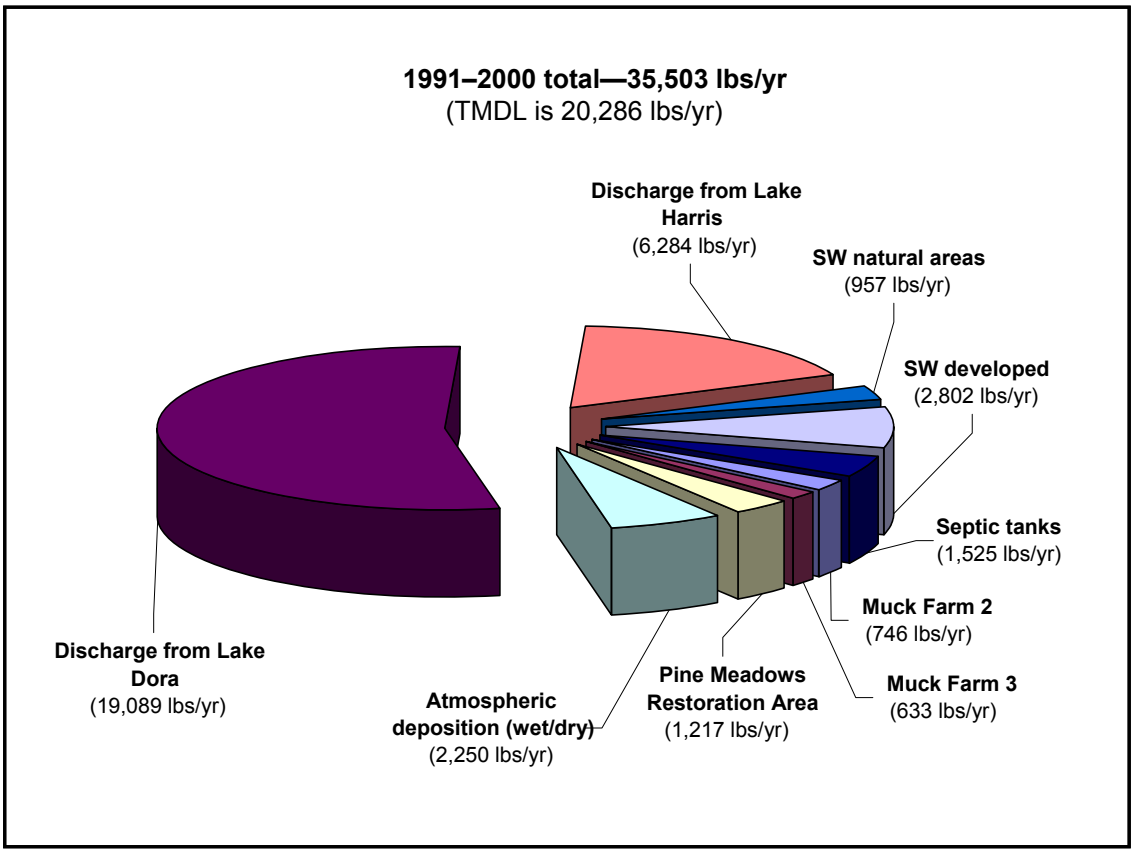
4.5 Lake Eustis Sub-basin

4.5.1 Pollutant Sources by Source Category

The baseline TP loading to Lake Eustis averaged 35,503 lbs/yr and was primarily caused by tributary flows from Lakes Dora and Harris that averaged 19,089 lbs/yr and 6,284 lbs/yr, respectively. Loadings from stormwater runoff (developed land uses) represented the next largest baseline load of 2,802 lbs/yr, or nearly 8 percent of the total load. Atmospheric deposition added 2,250 lbs/yr, or about 6 percent of the total load. All of the remaining loading totals 5,078 lbs/yr, or about 14 percent of the total baseline load. These other loads include stormwater runoff (natural areas), muck farm discharges, and loading from septic tanks. **Figure 4.9** shows the relative significance of these sources.

FIGURE 4.9. BASELINE TP LOADING TO LAKE EUSTIS



SW – Stormwater

4.5.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.5 lists current and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table provides further details on some of these management actions.

TABLE 4.5. MANAGEMENT ACTIONS IN THE LAKE EUSTIS SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
DORA09	Lake Eustis	SR 19 in Tavares–System I	DOT	-2
DORA10	Lake Eustis / Dora Canal	SR 19 in Tavares–System II	DOT	1
DORA11	Lake Eustis / Dora Canal	SR 19 in Tavares–System III	DOT	8
EUS02 *(see GRIF 05,06,07)*	Haynes Creek Reach / Haynes Creek Park on South Haynes Creek Rd.	Haynes Creek Park Retrofit	Lake County Public Works	6
EUS04	Lake Eustis / Lake Eustis and Silver Lake sub-basins	Lake Eustis / Silver Lake Drainage Evaluation	Lake County Public Works	N/A
EUS05	Lake Eustis / north Tavares	Stormwater Retrofit	City of Tavares / LCWA / DEP	Sediment collection only
EUS06	Lake Eustis / Eustis St. and Ward Ave.	Eustis St./ Ward Ave. Stormwater Facility	City of Eustis / LCWA / DEP	36
EUS07	Lake Eustis / Salem St. and Magnolia Ave.	Salem St. and Magnolia Ave. Retrofit	City of Eustis / DOT	63
EUS08	Lake Eustis / South Grove St.	South Grove St./ Palm Ave. Stormwater Facility	City of Eustis / LCWA	32
EUS09	Lake Eustis / Barnes Ave. and Center St.	Barnes Ave. and Center St. Retrofit	City of Eustis	5
EUS10	Lake Eustis / Stevens Ave. and Donnelly St.	Stevens Ave. Retrofit	City of Eustis / DOT	41
EUS11	Lake Eustis / Russell Ave.	Russell Ave. Retrofit	City of Eustis / LCWA	31
EUS12	Lake Eustis / Hazzard Ave.	Hazzard Ave. Retrofit	City of Eustis / LCWA	14
EUS13	Lake Eustis / South Grove St. / Stevens Ave. in Eustis	South Grove St. and Stevens Ave. Retrofit	City of Eustis	14
EUS14	Lake Eustis	SR 500 US 441–Basin A	DOT	26
EUS15	Lake Eustis	SR 500 US 441–Basin C	DOT	4
EUS16	Lake Eustis	SR 500 US 441–Basin D	DOT	-1
EUS17	Lake Eustis	SR 500 US 441–Basin E	DOT	15
EUS18	Lake Eustis	SR 500 US 441—System C	DOT	21
EUS19	Lake Eustis	SR 19 in Tavares–System IV	DOT	10
EUS20	Lake Juanita	SR 500 US 441	DOT	2
EUS21	Lake Juanita	SR 500 US 441	DOT	3
EUS22	Lake Eustis	SR 500 US 441–System D	DOT	-2
EUS23	Lake Eustis / intersection South Bay St. / Eustis St. in Eustis	South Bay St. and Eustis St. Retrofit	City of Eustis / LCWA / DEP / SJRWMD	80
EUS24	Lake Eustis / intersection North Bay St. / Clifford Ave. in Eustis	North Bay St. and Clifford Ave. Retrofit	City of Eustis / LCWA / DEP / SJRWMD	51
TROUT01/ EUS25	Trout Lake / muck farm and restoration area east of Trout Lake	Pine Meadows Restoration Area	SJRWMD	1,487
EUSTIS01	Lake Eustis / throughout city of Eustis	Street Sweeping	City of Eustis	Unknown—1,587 cubic yds/yr of material removed
EUSTIS02	Lake Eustis / within city of Eustis	Support of WAV Program	City of Eustis / Lake County / LCWA	Unknown
EUSTIS03	Lake Eustis / within city of Eustis	Stormwater Design Rules	City of Eustis	Unknown
TAVARES 01	Lake Dora and Lake Eustis / Tavares	Street Sweeping	City of Tavares	Unknown
TAVARES 02	Lake Dora and Lake Eustis / Tavares	Baffle Boxes	City of Tavares	30% TP reduction for amount treated

* Load reductions are in lbs/yr, unless otherwise indicated.
N/A = Not applicable.

SJRWMD Muck Farm Restoration

The SJRWMD's restoration of the former muck farms is estimated to reduce TP loading to Lake Eustis by 1,487 lbs/yr. Muck Farm 3 is privately owned, and there is the potential for a TP reduction of 458 lbs/yr through private restoration for wetland mitigation.

Stormwater Improvement Projects

Stormwater improvement projects completed by the end of 2005 are expected to reduce TP loading by 313 lbs/yr. Future stormwater projects completed after 2005 should reduce loading by an additional 145 lbs/yr. The city of Eustis and Lake County continue to plan and evaluate the need for additional projects.

FLORIDA DEPARTMENT OF TRANSPORTATION

DOT road improvement projects for U.S. Highways 19 and 441 will provide new stormwater treatment for runoff from these roads. Stormwater treatment will remove 85 lbs/yr of the total TP removed from Lake Eustis by implemented and future projects.

LAKE COUNTY

Lake County's Lake Eustis Basin Study, including Silver Lake, is currently under way. The basin has been inventoried, and a list of potential projects has been generated. A final ranking of the feasibility of constructing the potential projects is pending.

CITY OF EUSTIS

The city of Eustis has been active in providing stormwater infrastructure, either as retrofit or expansion projects. Projects implemented, planned, or under construction reduce TP loadings to Lake Eustis by 367 lbs/yr of the projected total TP that will be removed from Lake Eustis.

A new project at Clifford Ave. and North Bay St. is being planned to provide stormwater treatment prior to direct discharge to Lake Eustis. Two other projects are currently under construction, as follows:

- Diverting existing storm sewers along Bay St. prior to direct discharge to Lake Eustis by constructing a new storm sewer and detention pond at Stevens Ave. west end, funded by DOT and Eustis, and
- Diverting existing storm sewers along Citrus Ave. prior to direct discharge to Lake Eustis by constructing a new storm sewer and detention pond at Bay St., funded by the LCWA, DEP, and SJRWMD.

The city of Eustis requires new development to meet stricter stormwater design standards than those required under water management district or state stormwater rules. The city can require new development to meet 50- or 100-year design criteria, depending on soil and geotechnical conditions. All new developments must provide stormwater treatment and are subject to technical staff reviews. Frequent field inspections by technical staff will be conducted for all new construction to ensure that construction activities meet the rules. The city also implements the NPDES Program and provides public education through fliers, a Web page, and support of the WAV Program.

CITY OF TAVARES

Street sweeping and baffle boxes installed by the city of Tavares should also contribute to load reductions in Lake Eustis (see **Section 4.5.2**).

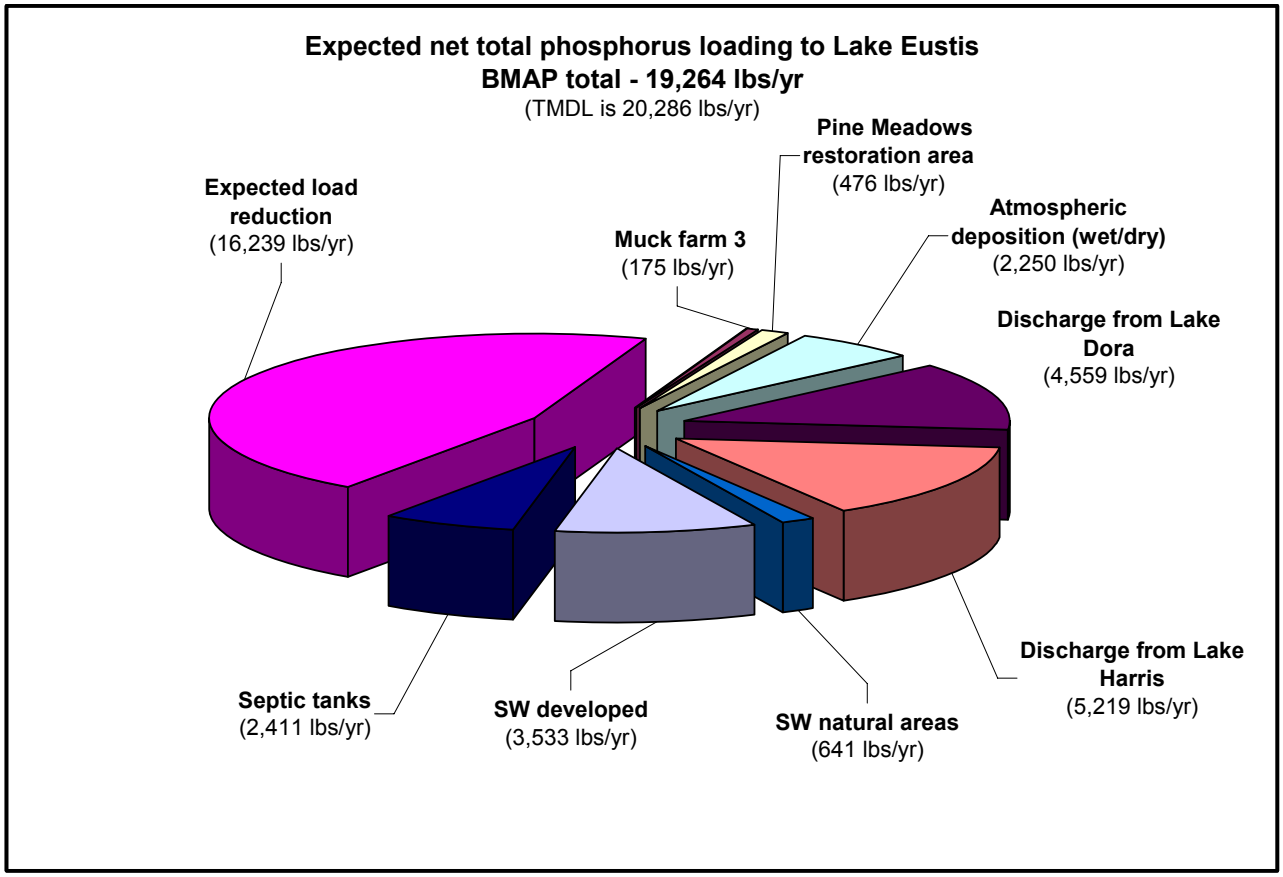
4.5.3 Anticipated Reductions in Total Phosphorus

Reductions in TP loadings from upstream sources and the efforts of jurisdictions in the Lake Eustis sub-basin are estimated to reduce TP loading in Lake Eustis enough to meet the TMDL goal. The primary reduction in loading is anticipated to occur through improved water quality in Lake Dora, and to a lesser extent in Lake Harris. Improved water quality in Lake Dora, taking into account future loadings, is estimated to reduce TP loading to Lake Eustis by 14,530 lbs/yr. Improved water quality in Lake Harris, also accounting for future loadings, is estimated to reduce TP loading to Lake Eustis by 1,065 lbs/yr.

Figure 4.10 presents the expected net TP loading to Lake Eustis. After factoring in reductions from the projects and sources described above and increases for estimates of future growth, the net reduction in TP loading to Lake Eustis is estimated at 16,239 lbs/yr (about a 46 percent reduction), which should achieve the TMDL for Lake Eustis (20,286 lbs/yr). However, the time frames needed to achieve final water quality results may extend into future TMDL cycles.

Because these lakes lie in a chain, an improvement in the upstream lake is directly linked to an improvement in the lake downstream. The expected improvement in Lake Eustis will help improve Lake Griffin, downstream.

FIGURE 4.10. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO LAKE EUSTIS



SW – Stormwater

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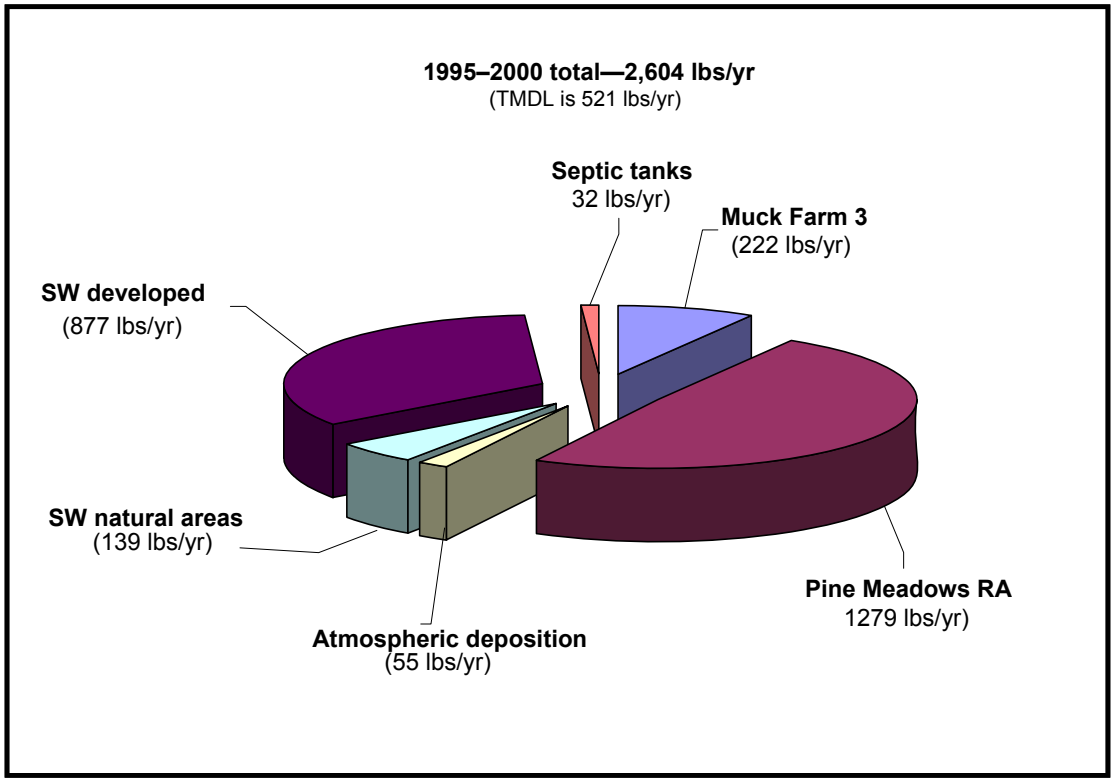
4.6 Trout Lake Sub-basin

4.6.1 Pollutant Sources by Source Category

The baseline TP loading to Trout Lake averaged 2,604 lbs/yr, and was primarily caused by loading from the Pine Meadows muck farm/restoration area totaling 1,279 lbs/yr, or 49 percent of the average TP loading. Loading from stormwater runoff in developed areas was 877 lbs/yr, and loading from Muck Farm 3 was 222 lbs/yr. All of the remaining loading totals 226 lbs/yr, or about 9 percent of the total baseline load. These other loads include loading from natural area runoff, septic tanks, and point sources. **Figure 4.11** shows the relative significance of these sources.

FIGURE 4.11. BASELINE TP LOADING TO TROUT LAKE



SW – Stormwater

4.6.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.6 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table describes some major restoration projects and local government efforts.

TABLE 4.6. MANAGEMENT ACTIONS IN THE TROUT LAKE SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY / PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
EUSTIS01	Lake Eustis; Trout Lake / throughout city of Eustis	Street Sweeping and Drainage Maintenance	City of Eustis Public Works	Unknown
TROUT02	Trout Lake / north and east of lake	Buffer Lands	City of Eustis	Unknown
TROUT01 / EUS25	Trout Lake / muck farm and restoration area east of Trout Lake	Pine Meadows Restoration Area	SJRWMD	726
TROUT03	Lake Umatilla watershed	Trowell Ave. Baffle Boxes	City of Umatilla / SJRWMD	Unknown
TROUT04	Trout Lake / Kentucky Ave.–Lake Umatilla watershed	Kentucky Ave. Retention Pond	City of Umatilla	Unknown
TROUT05	Trout Lake Basin	Trout Lake Basin Study	Lake County Public Works	Unknown
TROUT06	Trout Lake Basin / Getford Rd.	Getford Rd. Stormwater Park	Lake County Pubic Works / city of Eustis	Unknown
UMATILLA01	Within city of Umatilla jurisdiction	Green Space Ordinance	City of Umatilla	May prevent future loadings of nutrients
UMATILLA02	Within city of Umatilla jurisdiction	Stormwater Development Ordinance	City of Umatilla	May prevent future loadings of nutrients

* Load reductions are in lbs/yr, unless otherwise indicated.

Major Restoration Projects

The Pine Meadows restoration project (SJRWMD) will reduce TP loading to Trout Lake by 726 lbs/yr. If a private restoration plan for Muck Farm 3 is accomplished, an additional reduction of 19 lbs/yr of TP is expected. Otherwise, most of the Trout Lake sub-basin is rural, and few stormwater improvement projects are planned.

The Pine Meadows Restoration Area (PMRA) is a former muck farm purchased by the SJRWMD in 1992. The restoration area includes approximately 620 acres and connects with Hicks Ditch, in the Lake Eustis and Trout Lake watersheds. Adjacent to PMRA is a muck farm (Muck Farm 3 in the pie chart), comprising about 230 acres. The PMRA has been operated passively to restore wetland habitat, with water levels fluctuating with rainfall and evaporation, and an open culvert connection with Hicks Ditch. The SJRWMD will continue to evaluate whether alum treatment of the PMRA is necessary to achieve a targeted discharge of 1 pound per acre per year (lb/acre/yr) of TP. If so, the district will design and implement treatment, and develop a long-term restoration plan for the property. From 2000–05, estimated TP discharges from the PMRA ranged from 0.8 to 1.9 lbs/acre/yr.

In May 2005, Muck Farm 3 was sold. The owner intends to use it for mitigation, either by creating a mitigation bank and selling credits, or by selling portions of the property to applicants who need to mitigate for wetland impacts on their construction projects. The 2010 TP load estimates for Lake Eustis and Trout Lake in the BMAP assume that the Muck Farm 3 property will also achieve a TP discharge of 1 lb/acre/yr.

City of Umatilla

The city of Umatilla is collaborating with Lake County, the Lake County School Board, and the SJRWMD to develop and fund a stormwater retrofit project to control and treat flooding near the middle and high schools, and reduce pollutant discharges to Lake Umatilla. Lake Umatilla conveys nutrient loading to Trout Lake via Hicks Ditch. The project would involve the possible donation of land by the School Board for stormwater retention and potential funding assistance from Lake County and the SJRWMD. In an earlier trial project funded by a federal block grant and matching funds from the state and the city, two baffle boxes were placed on Trowell Ave. to remove sediment from stormwater entering Lake Umatilla. The grant included the construction of two wet detention ponds and redirection of stormwater into the existing stormwater pond.

Ordinances passed by Umatilla have the potential for managing future development to prevent—or at least reduce—further increases in TP loadings to Trout Lake and possibly Lake Yale. All new development in the city is required to contain at least 25 percent green space; green space set-asides are one form of LID. The city also requires all new development to retain and treat all stormwater on site.

The city has problems with an old and failing wastewater collection and treatment infrastructure. Umatilla is underlain with clay tile wastewater pipes and has a 40-year-old wastewater treatment facility in need of expansion and upgrade. The total estimated project cost to repair the wastewater infrastructure is $8.2 million; of that amount, $1.5 million was provided by the Florida Legislature and $650,000 by a block grant in 2006. Priority infrastructure fixes for the city, as funds are available, are the repair or replacement of clay tile wastewater collection pipes, the connection of homes located on Snake Island in Lake Umatilla to central sewer, and the development of a public access wastewater reuse system. The city anticipates submitting additional funding requests for the project to the Legislature. When fully funded and implemented, the project could significantly reduce nutrient loading to Lake Umatilla and ultimately to Trout Lake.

City of Eustis

The city of Eustis's drainage maintenance and street-sweeping activities help to prevent pollutants from reaching Lake Eustis. The city has an active stormwater retrofit program, as noted in **Section 4.5,** though most activities are directed toward reducing TP loadings into Lake Eustis. The city is collaborating with Lake County Public Works on the Getford Rd. Stormwater Park project.

Lake County

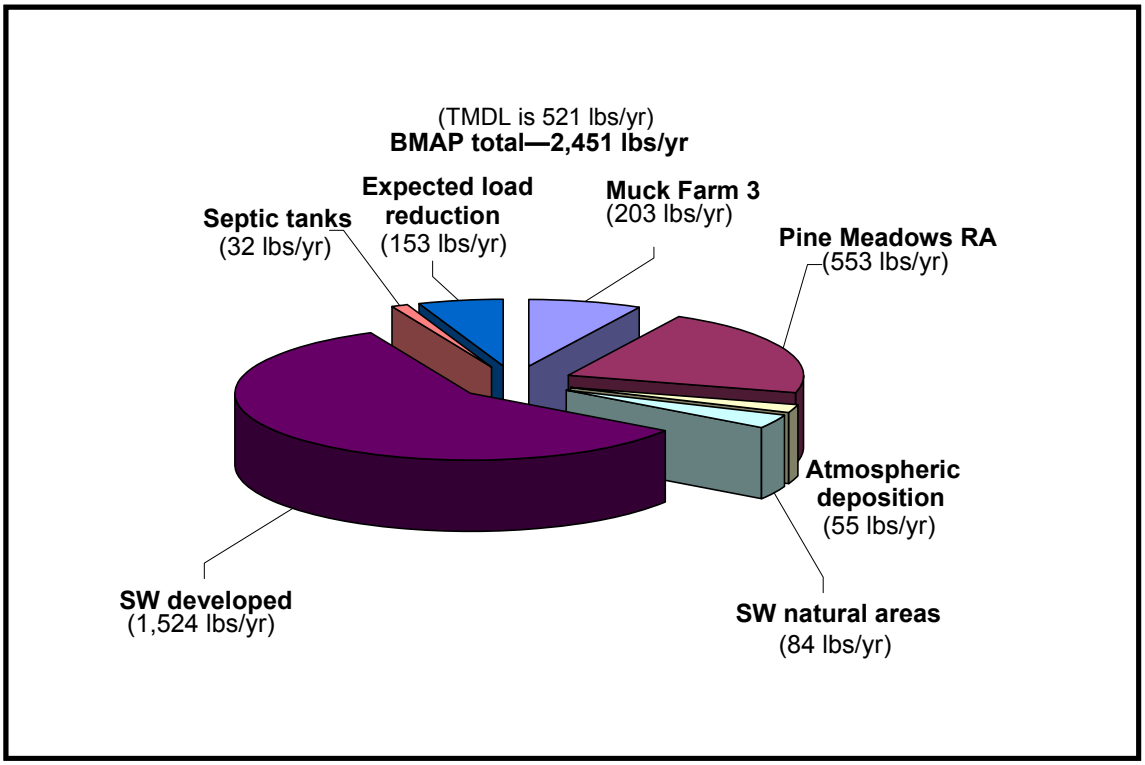
Lake County initiated the Trout Lake sub-basin study as a continuation of the Lake Eustis Basin Study. An inventory of stormwater management structures is complete, and pollutant loadings estimates are in development.

Lake County Public Works is collaborating with the city of Eustis to design and implement the Getford Rd. Stormwater Park project. When completed this project will improve drainage along Getford Rd. and result in water quality improvements to stormwater discharged into Trout Lake. The project is still in the early implementation stages, but does include plans for a regional stormwater pond to treat stormwater generated from Getford Rd. within the city of Eustis and unincorporated Lake County. Reductions of TP loading cannot be estimated at this time.

4.6.3 Anticipated Reductions of Total Phosphorus

Figure 4.12 presents the expected net TP loading to Trout Lake. Overall, a net reduction in TP loading of 153 lbs/yr is expected. This means that Trout Lake cannot be expected to meet the TMDL. An additional reduction in TP loading of 1,930 lbs/yr is needed to meet the TMDL for the lake.

FIGURE 4.12. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO TROUT LAKE



SW – Stormwater

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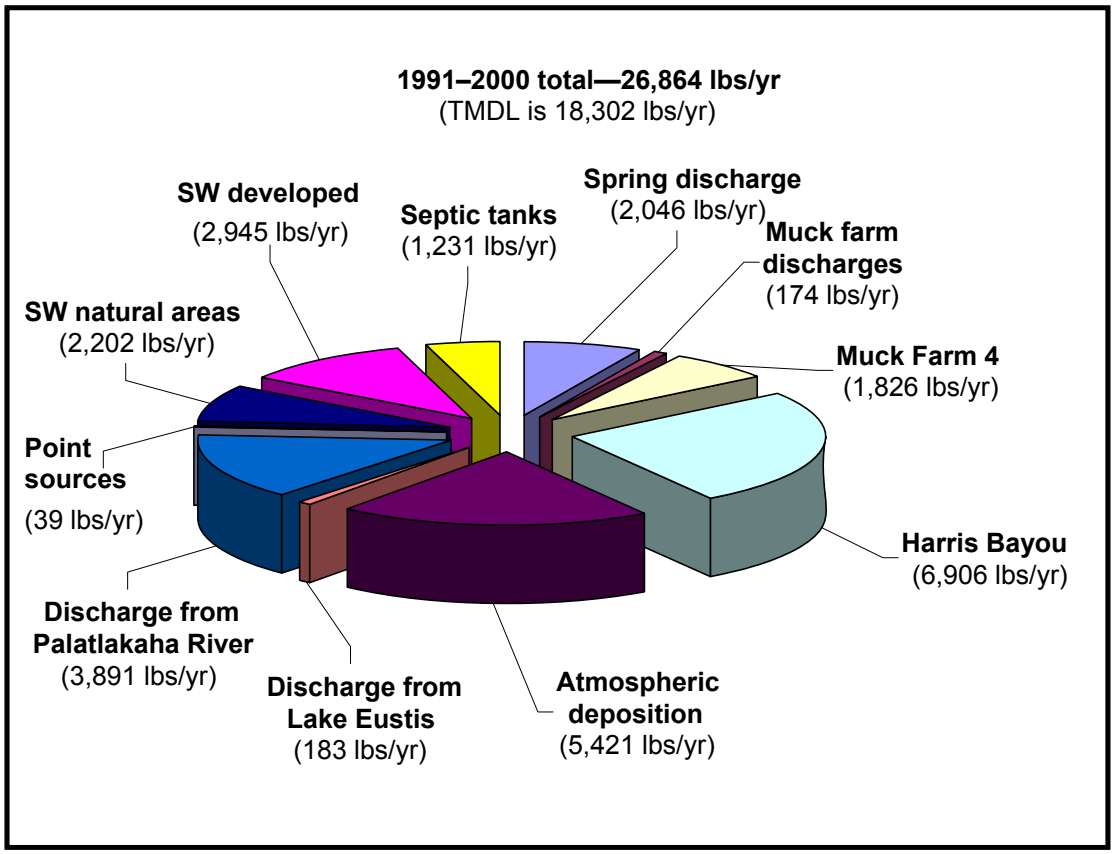
4.7 Lake Harris Sub-basin

4.7.1 Pollutant Sources by Source Category

The baseline TP loading of 26,864 lbs/yr to the Lake Harris sub-basin comes from a larger, somewhat more evenly distributed, variety of sources than the other lakes addressed in this BMAP (see **Figure 4.13**). Tributary inflows, in this case from Lake Eustis and the Palatlakaha River, are typically a large source of nutrients, but in this sub-basin contributed an average of 4,074 lbs/yr, or only about 15 percent of the total load. Loadings from muck farms and former muck farm areas (Harris Bayou) averaged 8,906 lbs/yr (33 percent) during the baseline period. Compared with the other lakes in the Upper Ocklawaha River Basin, atmospheric deposition is a larger proportion of the average baseline load, about 20 percent. Stormwater runoff from natural and developed areas averaged 5,147 lbs/yr, about 19 percent

of the load. Spring discharges are more significant in the Lake Harris sub-basin than in the other sub-basins, and averaged about 8 percent of the load during the baseline period. Septic tanks make up only 5 percent and point sources less than 1 percent of the TP load.

FIGURE 4.13. BASELINE TP LOADING TO LAKE HARRIS



SW – Stormwater

4.7.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.7 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table provides further details on some of these management actions.

TABLE 4.7. MANAGEMENT ACTIONS IN THE LAKE HARRIS SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY / PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
HAR01	Lake Harris / near Venetian Gardens Canals	Lakeshore Dr. Stormwater Project	City of Leesburg / LCWA / DEP	2
HAR02	Lake Harris / north shore of Lake Harris	Lake Harris Conservation Area	SJRWMD	6,665
HAR03	Lake Harris / Harris Conservation Area to Lake Griffin	Harris Bayou Conveyance Project	SJRWMD	415
HAR04	Lake Harris	SR 500 US 441– System A	DOT	13
HAR05	Lake Harris	SR 500 US 441– System B1	DOT	18
HAR06	Lake Harris	SR 500 US 441– System B2	DOT	10
HAR07	Lake Harris	SR 500 US 441– Basin 1	DOT	13
HAR08	Lake Harris	SR 500 US 441– Basin 3	DOT	11
HAR09	Lake Harris	SR 500 US 441– Basin 4	DOT	4
HAR10	Lake Harris	SR 500 US 441– Basin 5	DOT	22
HAR11	Lake Harris	SR 500 US 441– Basin 6	DOT	5
HAR12	Lake Harris / Little Lake Harris drainage sub-basin	Lake Harris and Little Lake Harris Basin Study	Lake County Public Works	N/A
HAR13	Hollondel Rd. / Lake Harris sub-basin	Hollondel Rd. Stormwater Pond	Lake County Public Works / SJRWMD / DEP	150
HAR14	Dead River Rd. / Dead River	Dead River Rd. Stormwater Park	Lake County Public Works / Lake County Public Lands / DEP	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
N/A = Not applicable.

Major Restoration Projects and Stormwater Projects

A combined reduction in TP loading to Lake Harris of 7,080 lbs/yr is expected to occur through the restoration of former muck farmland on the lake by the SJRWMD. Current stormwater projects identified by the BWG should further reduce loading by an estimated 98 lbs/yr.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

A muck farm that was located on the north shore of Lake Harris is being restored by the SJRWMD (HAR02). Nutrient discharges from this former farmland are being reduced to an estimated TP loading of 1 lb/acre. Total TP reduction is 6,665 lbs/y,r with an additional reduction of 415 lbs/yr achieved by the re-establishment of a flow path from Lake Harris to

Lake Griffin (HAR03). Included with reductions in nutrient loading are aquatic and wetland habitat restoration.

LAKE COUNTY

The county is completing a comprehensive assessment of the Lake Harris sub-basin to identify potential stormwater retrofit projects that will further reduce the TP load. The county's consultant is performing or has completed the following tasks for Lake County for both Lake Harris and Lake Eustis:

- *Has completed the sub-basin delineations for the entire watershed, which entails providing the drainage area for each pipe or ditch in the watershed.*
- *Has established basin parameters for the sub-basins, which entails providing the drainage areas and runoff curve numbers. There are approximately 100 sub-basins for both Lake Harris and Lake Eustis.*
- *Has completed the Pollutant Loading Analysis.*
- *Has ranked priority sub-basins by pollutant loading, and is working on the map to display the sub-basins.*
- *Is developing conceptual water quality retrofit projects for review.*

Two high-priority stormwater retrofit projects have been identified for this sub-basin as a result of the basin study: the Hollondel Rd. Stormwater Pond and Dead River Stormwater Park. The Hollondel property is being sought for purchase with the assistance of the SJRWMD. After the completion of the land purchase, Lake County will proceed with construction of the stormwater improvements to achieve an estimated 150 lbs/yr of TP removal. The Dead River Project is a collaborative effort between Lake County Public Works and the Public Lands Program. The purchase of property for the stormwater part is under way. When completed, this park will include a stormwater pond to treat runoff as well as some amenities for the public.

FLORIDA DEPARTMENT OF TRANSPORTATION

Other activities in the area include an ongoing DOT road-widening project on SR 500 (US Highway 441) from 4 to 6 lanes, from west of College Rd. (Leesburg) to west of Lakeshore Blvd. (Tavares). Of the roadway's 5 drainage sub-basins, 3 discharge toward Lake Harris. Stormwater from the section draining to Lake Harris (2.7 ± miles) is treated with dry retention and wet detention stormwater ponds. The completion of these projects will provide 96 lbs/yr of TP loading. No future DOT projects in the Lake Harris sub-basin are currently in the Five-Year Work Program.

CITY OF LEESBURG

The city of Leesburg is also assessing potential projects within its incorporated limits and is completing a stormwater master plan. The study area for the master plan includes the present-day city limits and future growth areas. The master plan includes elements focusing on existing stormwater infrastructure, operations, and the identification of sub-basin projects that will contribute to TP reductions in runoff. The City Commission recently approved an increase in the stormwater management fee that will produce about $500,000 annually to be

dedicated to capital projects identified in the master plan. The 10-year Capital Improvement Plan for stormwater includes additional programmed funding for infrastructure rehabilitation and improvements intended to upgrade or replace the aging stormwater infrastructure.

The city has also begun work on the Whispering Pines sub-basin project, which is mostly funded by grants from the LCWA and DEP. A recent engineering evaluation of the sub-basin has also led to an expansion of the scope of the project to capture and treat significant runoff from the older downtown area.

Additional projects that will benefit Lake Harris are under evaluation. They include two projects in the Venetian Gardens area targeted at capturing and treating untreated runoff. One of these will take place in conjunction with the redevelopment of the community center.

The city is subject to NPDES Phase II regulations. It has obtained its NPDES Phase II MS4 permit and has submitted its first annual report, which has been accepted as complete by DEP. The city has also initiated a program to place "No Dumping–Drains to Lake!" signs on appropriate stormwater inlets. Leesburg regularly sweeps city streets, preventing sediment and other pollutants from discharging into Lake Harris (see **Section 4.7**).

Sources Still To Be Addressed

Lake Harris receives a significant portion of its TP load from Helena Run, which functions as a drainage conduit for several major water features west of Lake Harris, including Bugg Springs, Lake Denham, and the 5,500-acre Okahumpka Marsh. The LCWA owns about 2,200 acres in the Okahumpka Marsh.

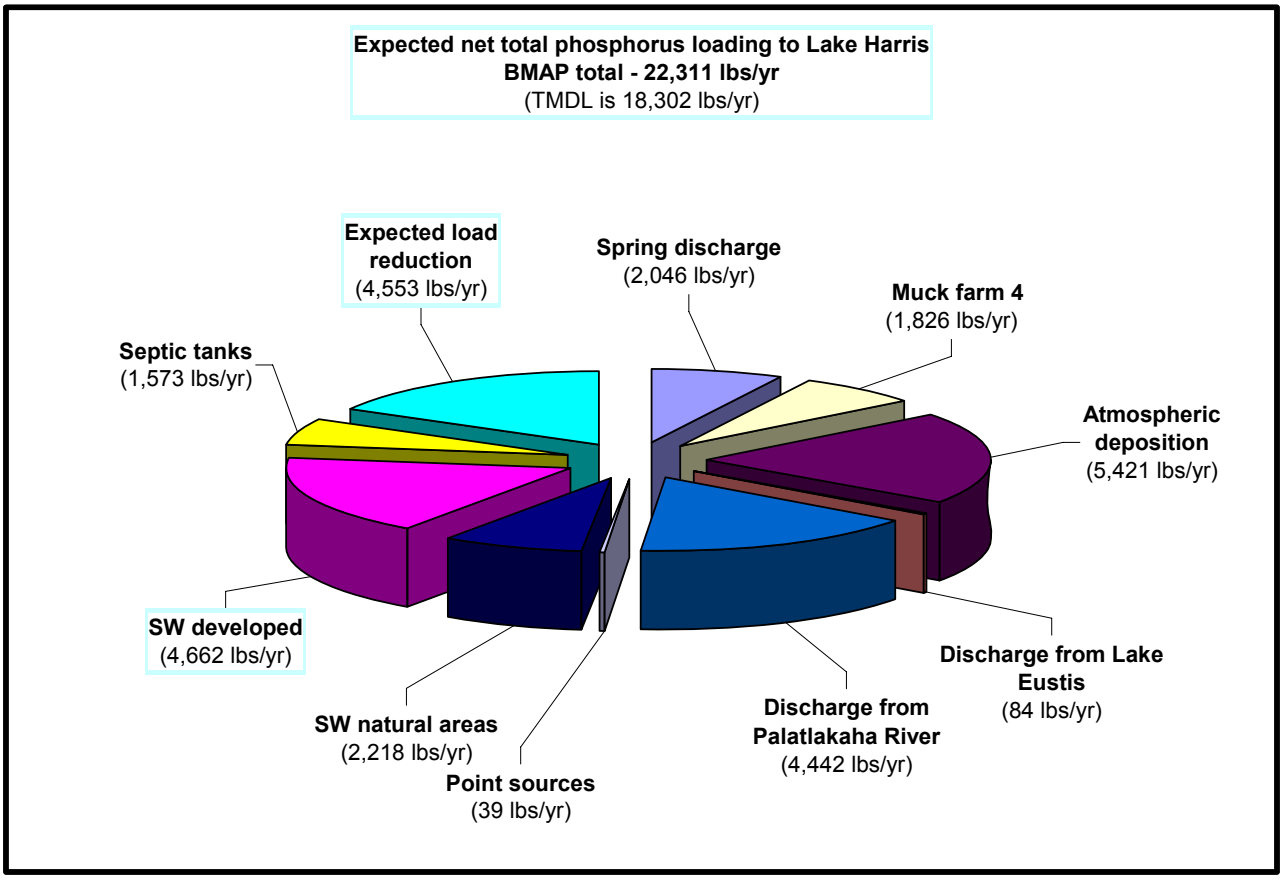
Several sources of TP are associated with the remaining portion of the marsh, including the city of Leesburg wastewater treatment plant, a 500-acre muck farm (Muck Farm 4 in the pie chart), and several smaller farming operations. Reducing TP discharge from any of these sources could significantly reduce the TP load to Lake Harris.

4.7.3 Anticipated Reductions of Total Phosphorus

The expected net TP loading to Lake Harris, presented in **Figure 4.14**, includes reductions from the projects listed above and loading increases from estimated future growth. The net reduction is projected to be 4,553 lbs/yr, or about 17 percent. However, to meet the TMDL target for Lake Harris, an additional reduction of 4,009 lbs/yr is needed.

Increased loading from future growth is the most important TMDL-related issue facing the sub-basin. Without factoring in future growth, the net loadings would be much closer to the TMDL. The net increase comes primarily from anticipated runoff from developed uses and loading from more septic tanks (a net increase of 2,307 lbs/yr). An increase in loading of 551 lbs/yr from the Palatlakaha River, caused by expected growth in that sub-basin, is also anticipated.

FIGURE 4.14. ESTIMATED LOAD REDUCTION AND NET TP LOADING TO LAKE HARRIS



SW – Stormwater

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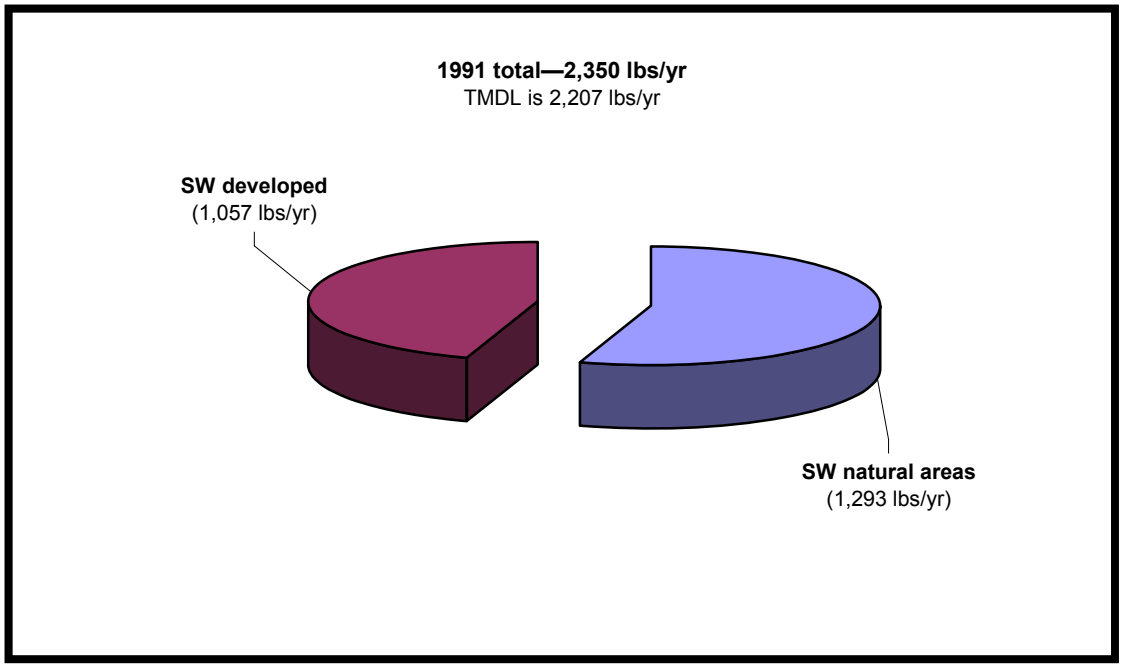
4.8 *Palatlakaha River Sub-basin*

4.8.1 Pollutant Sources by Source Category

The baseline TP loading to the Palatlakaha River sub-basin averaged 2,350 lbs/yr and was caused by stormwater runoff from natural areas (1,293 lbs/yr) and developed sources (1,057 lbs/yr). Loading estimates were not available for other sources, including septic tanks or atmospheric deposition. **Figure 4.15** shows the relative significance of the estimated sources.

Nutrients (TP and TN) and BOD were identified as the pollutants contributing to the depressed DO levels. DO is not expected to achieve 5 parts per million (ppm) at all places and all times (the state standard) because of the substantial contribution of drainage from wetlands. Other causes of depressed DO levels are the decay of organic matter that contributes oxygen-demanding substances in the water column and nutrients that can fuel algal and bacterial growth. Respiration by bacteria and algae can also contribute to low DO levels.

FIGURE 4.15. BASELINE TP LOADING TO THE PALATLAKAHA RIVER SUB-BASIN



SW – Stormwater

4.8.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.8 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table provides additional details on some of these management actions.

TABLE 4.8. MANAGEMENT ACTIONS IN THE PALATLAKAHA RIVER SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
PAL01	Palatlakaha River / GSACSC	Septic Tank LDR	Lake County Environmental Services	May prevent future loading of nutrients
PAL02	Palatlakaha River / sub-basins of Lakes Louisa, Minnehaha, Minneola	Drainage Evaluation: Lakes Louisa, Minnehaha, Minneola	Lake County Public Works / SJRWMD / LCWA	N/A
PAL03	Palatlakaha River / Lake Minneola drainage sub-basin in Clermont	Clermont Stormwater Pond	City of Clermont Engineering Department / LCWA	Unknown–direct discharge eliminated
PAL07	Palatlakaha River / throughout Clermont	Clermont Storm Drain Marking	City of Clermont Engineering Department	Unknown
PAL08	Palatlakaha River / south of SR 50 and west of US 27	Lake Minnehaha Study/ Stormwater Improvements	City of Clermont Engineering Department / LCWA	Unknown
PAL09	Palatlakaha River / south of SR 50 and west of US 27	Lake Winona Study/ Stormwater Improvements	City of Clermont Engineering Department / LCWA	Unknown
PAL10	Palatlakaha River / north of SR 50	Village Estates Sewer Connection	City of Groveland and developer	Unknown
PAL11	Palatlakaha River / GSACSC	Groveland Septic Tank Prohibition	City of Groveland	May prevent future loading of nutrients
PAL12	Palatlakaha River / GSACSC	Green Swamp Additional Stormwater Runoff Retention	City of Groveland	May prevent future loading of nutrients
PAL13	Palatlakaha River/ City Core, north and south of SR 50	Groveland Stormwater Study	Groveland / Community Redevelopment Agency	May prevent future loading of nutrients
PAL14	Big Creek	US 27–Basin 1	DOT	13.3
PAL15	Palatlakaha River / Lake Minneola Shores–County Road (CR) 561A	Lake Minneola Shores Ditch Reconstruction	Lake County Public Works	Unknown
PAL16	Palatlakaha River / Lakeshore Dr. in Clermont	Lakeshore Dr. Clermont Retrofit	Lake County Public Works	Unknown
PAL17	Palatlakaha River / Lakes Minnehaha, Minneola/Clermont	Elbert St. and Virginia St. Swale	Lake County Public Works	Unknown
PAL18	Palatlakaha River / Forest Subdivision	Disston Ave. and Bike Trail	City of Minneola	Unknown
PAL19	Palatlakaha River	The Crescent	City of Minneola / DEP	Unknown
PAL20	Palatlakaha River / Waterford Landing Subdivision	Firestone / Waterford Landing	City of Minneola	Unknown
PAL21	Palatlakaha sub-basin from Lake Minneola north to Lake Harris	Lower Palatlakaha Basin Study	Lake County Public Works	Unknown
PAL22	Palatlakaha River / GSACSC within Groveland city limits	Groveland Septic Tank LDR	City of Groveland	Unknown
CLR01	Palatlakaha River / Clermont	Baffle Boxes	City of Clermont	TP reduction of 30% for amount treated
CLR02	Palatlakaha River / Clermont	Street Sweeping	City of Clermont	Unknown–Collect 328 cubic yards per year
GROVE01	Palatlakaha River / Groveland city limits	Street Sweeping	City of Groveland Public Works Division	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
N/A = Not applicable.

There is one quantified load reduction project in the sub-basin: a planned DOT project involving a wet detention pond, which is estimated to reduce TP loading by 13.3 lbs/yr. The cities of Clermont, Groveland, and Minneola, as well as Lake County, have other stormwater efforts and studies planned for the sub-basin. Some of these efforts are highlighted below.

Lake County

The Upper Palatlakaha River Basin Study—comprising a study of Lakes Minneola, Minnehaha, and Louisa—was completed in May 2003. The study generated the CR 561A project, which consisted of removing paved ditch bottoms, recontouring ditches, and adding ditch blocks. The project was completed in 2004. It also generated the Lake Shore Drive exfiltration project, completed in January 2006. Four other water quality improvement projects are currently in design. A final pollutant load reduction estimate has not yet been determined for these projects, and construction is not yet scheduled.

Lake County has under way a basin study of the Lower Palatlakaha River, from the Lake Minneola outfall to Lake Harris. The study, which is an inventory of stormwater management structures, includes estimates of loadings of TP from the inlet drainage basins. The study will complete Lake County's inventory of the Upper Ocklawaha River Basin.

City of Clermont

The Clermont City Council and staff are proactive in efforts to maintain high water quality in the waterbodies in and around Clermont. The city is not currently an MS4 permit holder, but has initiated several programs that are protective of water quality in the Palatlakaha River. The following describes various programs, policies, and ordinances that the city has implemented to protect the health of the Clermont Chain of Lakes and the smaller, closed-basin lakes within its borders:

- ***Public Education****—The first line of defense for water quality is public education. This includes an emphasis on water conservation to reduce the amount of runoff entering waterbodies. The city employs a full-time Water Conservation Technician who makes regular rounds of the city to observe irrigation practices and provide information and guidance on more efficient use of irrigation water. The city has a continuing contract with the University of Florida for the Florida Yards and Neighborhoods Program. This is a well-developed series of seminars presented at no cost to residents, business owners, and city maintenance staff to educate them on BMPs for the use of herbicides, pesticides, and fertilizers; irrigation techniques; and landscape management. The city recently installed signs on stormwater inlets that discharge directly to surface waters.*

- ***Maintenance****—The city has a series of maintenance programs to promote water quality in the area's lakes. It conducts a regular street-sweeping regime to minimize the amount of debris entering waterbodies. City crews regularly maintain municipally owned stormwater ponds to ensure their proper function. Privately owned retention ponds fall under the city's jurisdiction, and the maintenance of these ponds is enforceable through the Code Enforcement Department. Finally, the city uses BMPs to maintain parks and public lands.*

- ***Ordinances****—The city has adopted a series of ordinances to maintain the environmental health of the city. The Water Efficient Irrigation and Landscape Ordinance is designed to minimize the use of water and chemicals in landscapes. City ordinance prohibits the use*

of septic tanks in the city, and all residents and businesses are required to connect to the central sewer system. City ordinances also require that the redevelopment of properties in areas without stormwater management systems include stormwater treatment ponds for impervious areas as part of the project.

- ***Stormwater Retrofits****—The city has historically funded projects to improve the quality of stormwater entering area lakes. It retrofitted the Historic Downtown District drainage system to eliminate direct discharge into Lake Minneola. Now the stormwater flows into a large retention pond in the city's Waterfront Park property. Several major projects are planned to improve or maintain water quality in Lakes Winona and Minnehaha. In 2005, the city teamed up with the LCWA to study the drainage entering both lakes and to identify areas where the city could make drainage improvements to capture and treat stormwater prior to discharge to the lakes. These projects are included in the city's stormwater capital improvements plan for future budget years.*

City of Groveland

The city of Groveland is currently not an MS4 permit holder but has a number of initiatives in place to help improve water quality in the Palatlakaha River Basin. These include management strategies through comprehensive plan policies, studies, and improvement projects. The comprehensive plan policies require the following:

- *All new development in the city must connect to the city's central sewer system,*
- *All new development in the unincorporated county within 5,000 feet must connect to the city's central sewer system,*
- *Existing septic tanks in the GSACSC must be cleaned and inspected at least once every five years, in accordance with the requirements of Lake County's Public Health Unit,*
- *New development in the GSACSC must be designed in a way that does not alter the quality of surface water, and*
- *A minimum 50-foot upland buffer is required in the GSACSC.*

The city has a continuing policy of ensuring that existing development connects to new sewer lines installed in the city. It also works to obtain financial assistance to extend the sewer lines to older properties. In partnership with its Community Redevelopment Agency, the city has contracted with engineers to undertake a Master Stormwater Study of the older parts of the city, in order to identify areas where improvements are required to prevent stormwater runoff from reaching surface waters. As part of the project, appropriate stormwater retrofit projects will be designed for future implementation.

The city began a street-sweeping program in 2003. Streets are swept at least once every 30 days to remove debris and sediment and prevent potential pollutants from entering the Palatlakaha River.

Town of Mascotte

Though there is some question whether the current boundaries of the town of Mascotte cross into the Palatlakaha River sub-basin, imminent growth in the area may bring the town further within the sub-basin drainage area.

City of Minneola

Most of the city area is developed, except for recently annexed land. The city has two distinct areas: an older downtown and new subdivisions located on the outskirts. Part of the western half of the downtown area (west of US 27) is located along or near the shoreline of Lake Minneola.

The city's Stormwater Management Master Plan was completed in September 2003. As part of the plan, the entire city was inventoried for existing stormwater structures, and preliminary calculations of pollutant loadings from sub-basins were completed. Most new development has stormwater management systems. Generally, the downtown area lacks any type of stormwater management system. The portion of the downtown area along Lake Minneola discharges stormwater runoff directly into the lake, and ultimately the Palatlakaha River. The remaining downtown area discharges stormwater runoff into seven landlocked, unconnected lake sub-basins.

More than a dozen capital improvement projects identified in the stormwater plan would address erosion along street rights-of-way and the inadequate conveyance of stormwater that is causing localized flooding. The projects are listed in **Table 4.9**, which also identifies their relationship to correcting runoff entering Lake Minneola. Most of the capital improvement projects are in the conceptual engineering stage, while five projects are in the conceptual analysis stage. Additional small projects that address the repair and replacement or operation and maintenance of existing stormwater management systems are also being considered. Some of these will remediate the discharge of stormwater runoff directly into Lake Minneola. It is anticipated that the completion of the projects will reduce BOD and nutrient loadings to Lake Minneola and will indirectly benefit the Palatlakaha River.

TABLE 4.9. POTENTIAL PROJECTS FOR THE CITY OF MINNEOLA

CAPITAL IMPROVEMENT PROJECT	STAGE OF ANALYSIS	RELATION TO LAKE MINNEOLA
Lakeshore Dr.	Conceptual engineering cancelled after land acquisition efforts failed	Contributes runoff
Chester St. and Disston Ave.	Conceptual engineering	Contributes runoff
Main Ave. and Bike Trail	Conceptual engineering	Contributes runoff
Disston Ave. and Bike Trail	Under construction	Contributes runoff
Dove Hollow Subdivision	Conceptual engineering	Does not contribute runoff
East Osceola Court	Conceptual engineering	Does not contribute runoff
West Osceola Court	Conceptual engineering	Does not contribute runoff
Chester from Galena to Hodges Pond	Conceptual engineering	Does not contribute runoff
Bloxham Ave.	Conceptual engineering	Does not contribute runoff
Capacity analysis of Martin's Lake	Conceptual analysis	Does not contribute runoff
Capacity analysis of Hodge's Pond	Conceptual analysis	Does not contribute runoff
Capacity analysis/Chester Oaks Pond	Conceptual analysis	Does not contribute runoff
Capacity analysis of Forest Pond	Conceptual analysis	Does not contribute runoff
Capacity analysis of Basin L24-12 pond and depression	Conceptual analysis	Does not contribute runoff
The Crescent	Completed	Contributes runoff
Ridgecrest Loop	Completed	Does not contribute runoff

In addition, the city of Minneola received its NPDES Phase II MS4 permit on August 4, 2004. The city will be implementing ordinances or amending the Land Development Code to incorporate BMPs, and will be distributing educational pamphlets. Actions will include the following:

- *Adopting an ordinance making it unlawful to discharge nonstormwater materials into the city's storm system,*
- *Conducting public meetings in an effort to minimize stormwater pollution,*
- *Adding a link to the city's Web page to the University of Florida's Florida Yards and Neighborhoods Program,*
- *Implementing an Adopt a Lake program,*
- *Carrying out street sweeping,*
- *Using a VAC-TRON to maintain the stormwater system,*
- *Implementing a stormwater drain stenciling program,*
- *Distributing educational materials, including a Pointless Personal Pollution pamphlet, a Save the Swales pamphlet, and newsletters to residents, with a section on stormwater pollution prevention, and*
- *Seeking an increase in the stormwater utility fee to cover the cost of maintenance and projects based on the amount of impervious surface and type of use (e.g., residential, commercial).*

Silviculture Operations

BMPs for silviculture were developed in the mid-1970s, and BMP compliance has been monitored statewide since 1981. Without BMPs, forestry activities can deliver sediment and nutrients to adjacent water resources at levels that may adversely affect aquatic ecosystems chemically, physically, and biologically. However, Florida BMPs are effective in protecting water quality and aquatic habitat by minimizing or eliminating the delivery of forestry-related sediment, nutrients, and other pollutants, and by maintaining or improving both instream and riparian habitats. BMP effectiveness research conducted in Florida reported no evidence of sediment delivery or other impacts to the aquatic ecosystem following intensive silviculture operations on a variety of sites and under varying site conditions (Vowell, 2001; Vowell and Frydenborg, 2004).

As authorized by the FWRA, DACS' Division of Forestry (DOF) promulgated Rule 5I-6, F.A.C., effective February 11, 2004. The rule formally adopted the Silviculture BMP Manual and requires forest landowners who elect to participate in the rule provisions to submit a NOI.

FORESTRY PRACTICES IN THE PALATLAKAHA RIVER SUB-BASIN

Total acreages of forest and managed forest in the sub-basin were estimated from 1995, 2000, and (created) 2005 land use/cover maps (see **Table 4.10**). Acreages of both types of forest land have fluctuated between mapping years and do not display a consistent downward or upward trend.

TABLE 4.10. FOREST LAND ACREAGE IN THE PALATLAKAHA RIVER SUB-BASIN

YEAR	TOTAL FOREST ACREAGE	MANAGED FOREST ACREAGE
1995	9,217	3,766
2000	11,322	5,949
2005	9,777	4,584

According to the DOF survey, since 1995 compliance with silviculture BMPs in the Palatlakaha River sub-basin has ranged from 82 to 100 percent, with compliance averaging 90 percent for applicable BMPs being implemented correctly. **Table 4.11** displays annual compliance rates. Active silviculture sites were not identified in 2005.

TABLE 4.11. FLORIDA SILVICULTURE BMP IMPLEMENTATION SUMMARY, BY SURVEY YEAR: LAKE COUNTY–PALATLAKAHA RIVER SUB-BASIN

YEAR	PALATLAKAHA RIVER SUB-BASIN COMPLIANCE RANGE	AVERAGE PALATLAKAHA SUB-BASIN
1995	88%–92% (2)*	90% (2)
1997	82% (1)	82% (1)
1999	94% (1)	94% (1)
2001	85% (1)	85% (1)
2003	100% (2)	100% (2)
2005	No Sites Identified	No Sites Identified
Total	**Not Applicable**	**90.2%**

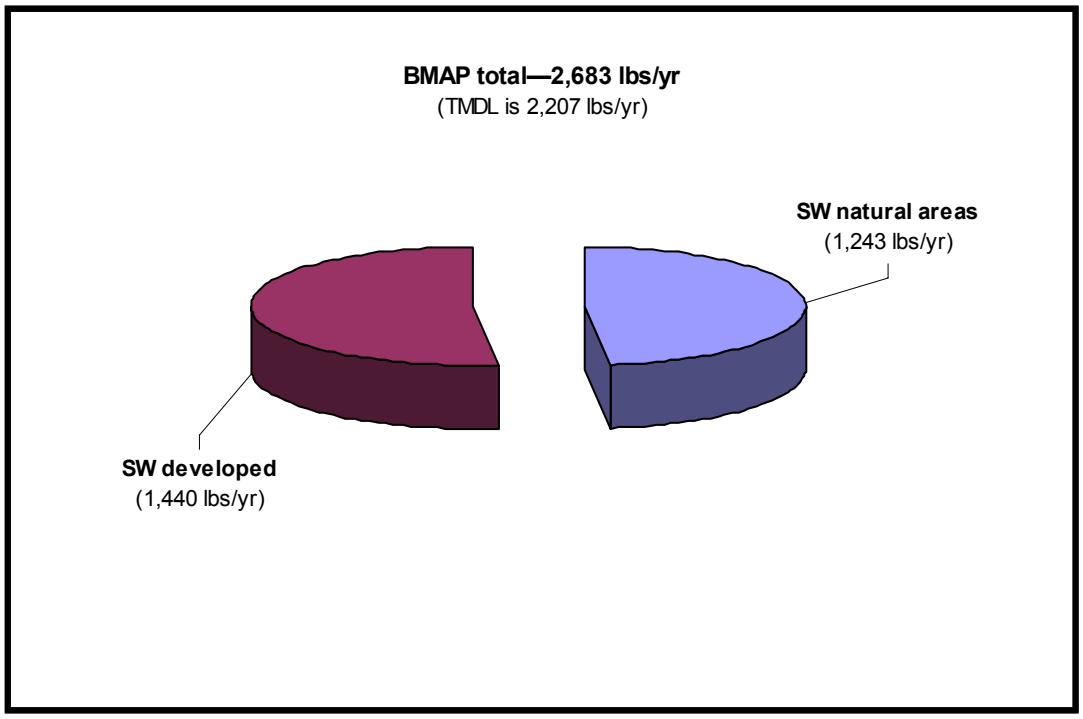
* (Number of sites per survey year in parentheses.)

BMPs apply to all silviculture operations, but many operations are conducted on sites that do not include streams, wetlands, or other water resource features that some practices are designed to protect. On such sites, there would be no need for buffers, wetland leave trees, or other BMPs. In practice, BMPs apply to some fraction of all silviculture operations that occur in a given year.

4.8.3 Anticipated Reductions in Total Phosphorus

Figure 4.16 presents the estimated net TP loading to the Palatlakaha River sub-basin. With one exception, the management actions described above could not be quantified; therefore, associated load reductions could not be factored into the net loading estimate. Overall, a net increase in TP loading to the sub-basin of 333 lbs/yr is estimated (about a 14 percent increase), attributed to future land use changes. This means that the Palatlakaha River sub-basin is not expected to meet the TMDL; rather, TP loading would need to be reduced by about 476 lbs/yr to meet the TMDL for the sub-basin. However, the sub-basin is characterized in **Figure 1.2** (in Chapter 1) as being close to its TMDL because of the relatively small reduction needed. Following BMAP adoption, the BWG will continue to explore possible management actions to reach the TMDL and ways to quantify existing actions.

FIGURE 4.16. ESTIMATED NET TP LOADINGS TO THE PALATLAKAHA RIVER SUB-BASIN



SW – Stormwater

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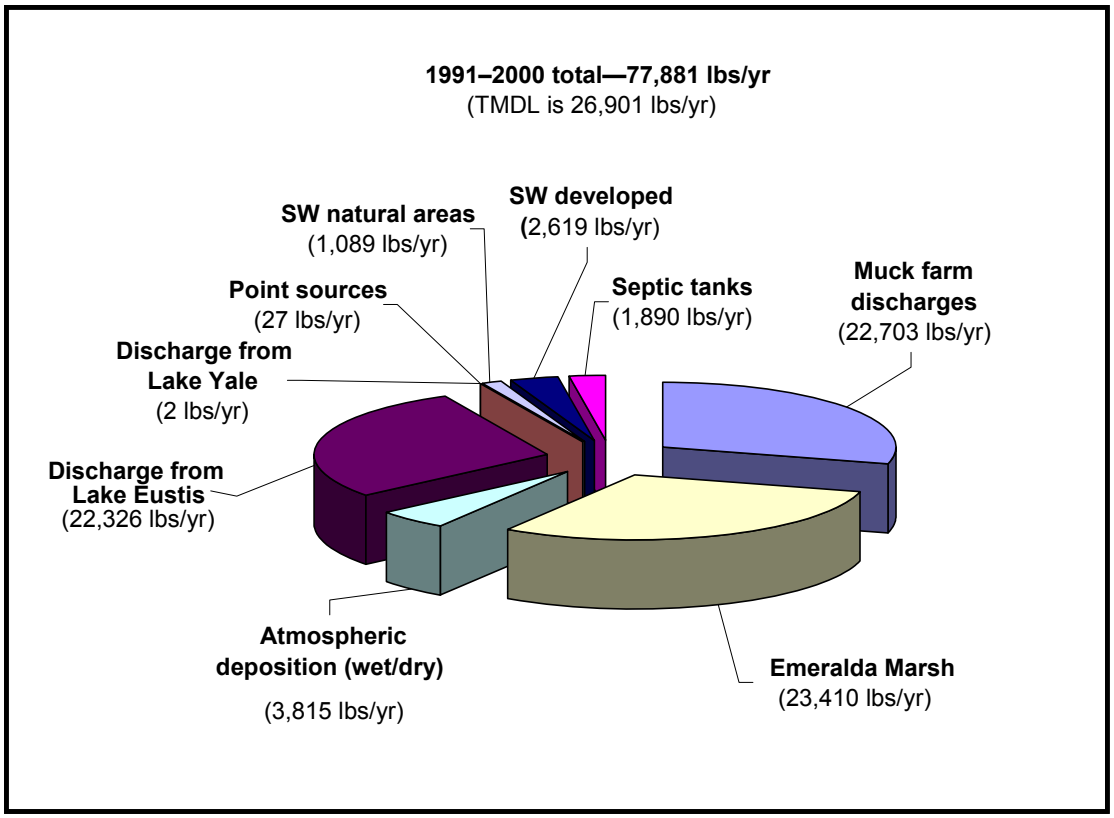
4.9 Lake Griffin Sub-basin

4.9.1 Pollutant Sources by Source Category

The baseline TP loading to Lake Griffin averaged 77,881 lbs/yr and was primarily caused by tributary flows from Lake Eustis, muck farm discharges, and discharges from the Emeralda Marsh Restoration Area (22,326 lbs/yr, 22,703 lbs/yr, and 23,410 lbs/yr, respectively). These three sources contribute 68,439 lbs/yr, or 88 percent of the average TP load. Loadings from atmospheric deposition represented the next largest baseline load of 3,815 lbs/yr, or nearly 5 percent of the total. All the remaining loading totals 5,627 lbs/yr, or about 7 percent of the total baseline load. These other loads include stormwater runoff, loading from septic tanks, and point sources. **Figure 4.17** shows the relative significance of these sources.

FIGURE 4.17. BASELINE TP LOADING TO LAKE GRIFFIN



SW – Stormwater

4.9.2 Management Actions to Reduce Total Phosphorus Loading

Table 4.12 lists implemented and planned projects and activities in the sub-basin (see **Appendix H** for additional project details). The text following the table provides additional details on some of these management actions.

Impacts of Upstream Activities

The primary reduction in TP loading is expected to occur through improved water quality in Lake Eustis and the elimination of muck farm discharges. In addition, SJRWMD restoration activities at Emeralda Marsh should significantly reduce loading to Lake Griffin. A reduction of 51,661 lbs/yr in loading is estimated for these three sources. However, the Harris Bayou project (HAR03), which re-establishes a connection from Lake Harris to Lake Griffin, adds 415 lbs/yr of TP loading to Lake Griffin.

TABLE 4.12. MANAGEMENT ACTIONS IN THE LAKE GRIFFIN SUB-BASIN

PROJECT NUMBER	GENERAL LOCATION	PROJECT NAME	LEAD ENTITY/ PROJECT PARTNERS	ESTIMATED TP LOAD REDUCTION*
GRIF01	Lake Griffin / Emeralda Marsh Conservation Area north of Haynes Creek	Lake Griffin Emeralda Marsh Restoration	SJRWMD	41,450
GRIF02**	Lake Griffin	Gizzard Shad Harvest	SJRWMD	Unknown
GRIF04	Lake Griffin sub-basin / Haynes Creek each	Lake Griffin Sub-basin Drainage Evaluation	Lake County Public Works	N/A
GRIF05	Lake Griffin / Lazy Oaks community	Lazy Oaks Retrofit	Lake County Public Works / LCWA / DEP	19
GRIF06	Lake Griffin / Griffwood Community Mobile Home Park	Griffwood Community Retrofit	Lake County Public Works / LCWA / DEP	33
GRIF07	Lake Griffin / Brittany Estates Mobile Home Park Community	Brittany Estates Retrofit	Lake County Public Works / LCWA / DEP	12.5
GRIF08	Lake Griffin / Canal St.	Canal St. Retrofit	Leesburg / LCWA	Unknown
GRIF10	Lake Griffin / Whispering Pines sub-basin	Whispering Pines Regional Stormwater Retrofit	City of Leesburg / LCWA / DEP	130
GRIF12	Lake Griffin / Lake Griffin State Park	Lake Griffin State Park Retrofit	DEP/LCWA	11.0
GRIF13	Lake Griffin	SR 500 US 441– Basin 100	DOT	54.66
GRIF14	Lake Griffin	SR 500 US 441– Basin 200	DOT	74.06
GRIF15	Lake Griffin	SR 500 US 441– Basin 2	DOT	9.59
GRIF16	Lake Griffin / Picciola Rd.	Picciola Rd. Ditches	Lake County Public Works	Unknown
GRIF17	Lake Griffin / Harbor Oaks	Harbor Oaks Retrofit	Lake County Public Works	Unknown
GRIF18	Lake Griffin / Lakeside Village	Lakeside Village Retrofit	Lake County Public Works	Unknown
GRIF20	Lake Griffin / Lake Griffin Marina	Lake Griffin Marina Improvements	Lake County Public Works	Unknown
GRIF21	Lake Griffin / CR 466B	CR 466B Swale Improvements	Lake County Public Works	Unknown
GRIF22	Haynes Creek Reach / east of Lake Griffin	Mid-Florida Lake Mobile Home Park Retrofit	Lake County Public Works / DEP / LCWA	42
LEESBURG01	Leesburg city limits	Street Sweeping	City of Leesburg Environmental Services	Unknown

* Load reductions are in lbs/yr, unless otherwise indicated.
** Removes nutrients and reduces internal recycling, but does not reduce external loads.
N/A = Not applicable.

St. Johns River Water Management District

To accelerate the recovery of water quality in Lake Griffin, the SJRWMD has harvested rough fish (primarily gizzard shad), which directly removes nutrients (via fish tissue) and helps reduce the internal recycling of nutrients in the lake. Over 2.2 million pounds of shad have been harvested during the past five years. It is estimated that 1 million pounds of shad may recycle up to 25,000 pounds of TP in a year. A portion of that recycled TP may come from bottom sediments, and limiting the recycling will reduce algal growth. In the 5 full years that shad have been harvested from Lake Griffin (2002–06), more than 15,000 pounds of TP have been removed in the shad bodies. For comparison, this estimated average annual removal (about 3,100 pounds) equals about 4 percent of the baseline annual external load to the lake, and about 11 percent of the adopted TMDL. However, shad harvest is a temporary measure to accelerate the lake's recovery and reduce the baseline loading. It does not reduce external TP loading and is not incorporated into the estimated load reductions.

Stormwater Projects

Implemented stormwater improvement projects are expected to reduce TP loading by 202 lbs/yr. DOT has several projects under way in the Lake Griffin watershed, and several municipalities plan to implement future studies, projects, or programs. Future stormwater projects will reduce loading by an additional 185 lbs/yr. The city of Leesburg and Lake County continue to plan and evaluate the need for additional projects.

LAKE COUNTY

Lake County's Lake Griffin Basin Study was completed in January 2001. The lake was listed as the number one priority in Lake County for water quality improvements. Several projects have been constructed, including Brittany Estates exfiltration system, Lazy Oaks exfiltration system, Haynes Creek Park dry pond, Mid-Florida Lakes exfiltration system, and Griffwood exfiltration system. Three additional projects have been designed and are now in the easement acquisition process: Harbor Oaks exfiltration system, Lakeside Village underdrain system, and Picciola Rd. recontoured ditches. One project, Lake Griffin Marina, is still in design. It will include swale improvements and a sediment removal structure.

FLORIDA DEPARTMENT OF TRANSPORTATION

A DOT construction project in the sub-basin to widen SR 500 (US 441) from Mills St. to west of College Rd. (Leesburg) is nearing completion. Several DOT road projects are planned in the sub-basin. Contingent on legislative funding, the following projects will eventually occur:

- *SR 500 (US 441) from Perkins St. to north of Griffin Rd. The project, which includes intersection improvements at US 27 and US 441, is located in Leesburg.*
- *SR 500 (US 441) from Perkins St. to SR 44 in Leesburg. The project includes the addition of travel lanes and recreational travel improvements.*
- *SR 500 (US 441) from Martin Luther King Blvd. to Lake Ella Rd. The project includes the addition of travel lanes.*
- *SR 500 (US 441) Lake Ella Rd. to Avienda Central Rd. The project includes road widening with the addition of travel lanes. This stretch of road between Fruitland Park*

and Lady Lake has undulating topography with many closed sub-basins. Drainage from the highway improvements will likely not reach Lake Griffin or tributaries to the lake.

All DOT roadway improvement projects are designed to meet regulatory permitting criteria for water quality and water quantity considerations for the receiving waterbodies.

CITY OF LEESBURG

The completion of the Whispering Pines Regional Stormwater Retrofit by the city of Leesburg will remove 130 lbs/yr of TP from Lake Griffin. In addition to the Whispering Pines project, the city has completed a the Canal Street stormwater retrofit. Leesburg has maintained a street sweeping program since the 1970s.

CITY OF FRUITLAND PARK

The city of Fruitland Park is implementing the following projects:

- *The completion of connection of businesses along US 27/ US 441 to the city's wastewater treatment system is expected by mid-2007. This will take all businesses along US 27 / US 441 off septic tanks. Most new growth will be required to connect to the city's Phase II wastewater treatment plant expansion. The design of the plant will be complete in about mid-2007.*
- *The completion of the city's stormwater master plan is expected in early 2007.*
- *The following EPA pamphlets and educational materials have been printed and are in use:*
  - After the Storm,
  - Make Your Home the Solution to Stormwater Pollution, and
  - Clean Water—Everybody's Business bookmarks.

TOWN OF LADY LAKE

The town of Lady Lake completed a Joint Planning Agreement (JPA) with Lake County in 2006. Under the JPA, the town's service area will include unincorporated Lake County east of Lady Lake to the border of the Harbor Hills Development of Regional Impact (DRI). While the extension of water and sewer services this far east of town is a goal, it is not a near-term one. The town expects the service expansion to take approximately 10 to15 years, at which time Lady Lake may be a contributor to the pollutant loading of Lake Griffin. However, the town is already committed to gradually reducing the number of septic tanks and providing BMPs for stormwater runoff in its existing closed sub-basin jurisdiction. Also, Lady Lake will be developing a stormwater master plan in the next 3 years. Maintenance practices currently involve the periodic cleaning of stormwater catch basins and the cleaning of DOT flumes on US 27 / US 441.

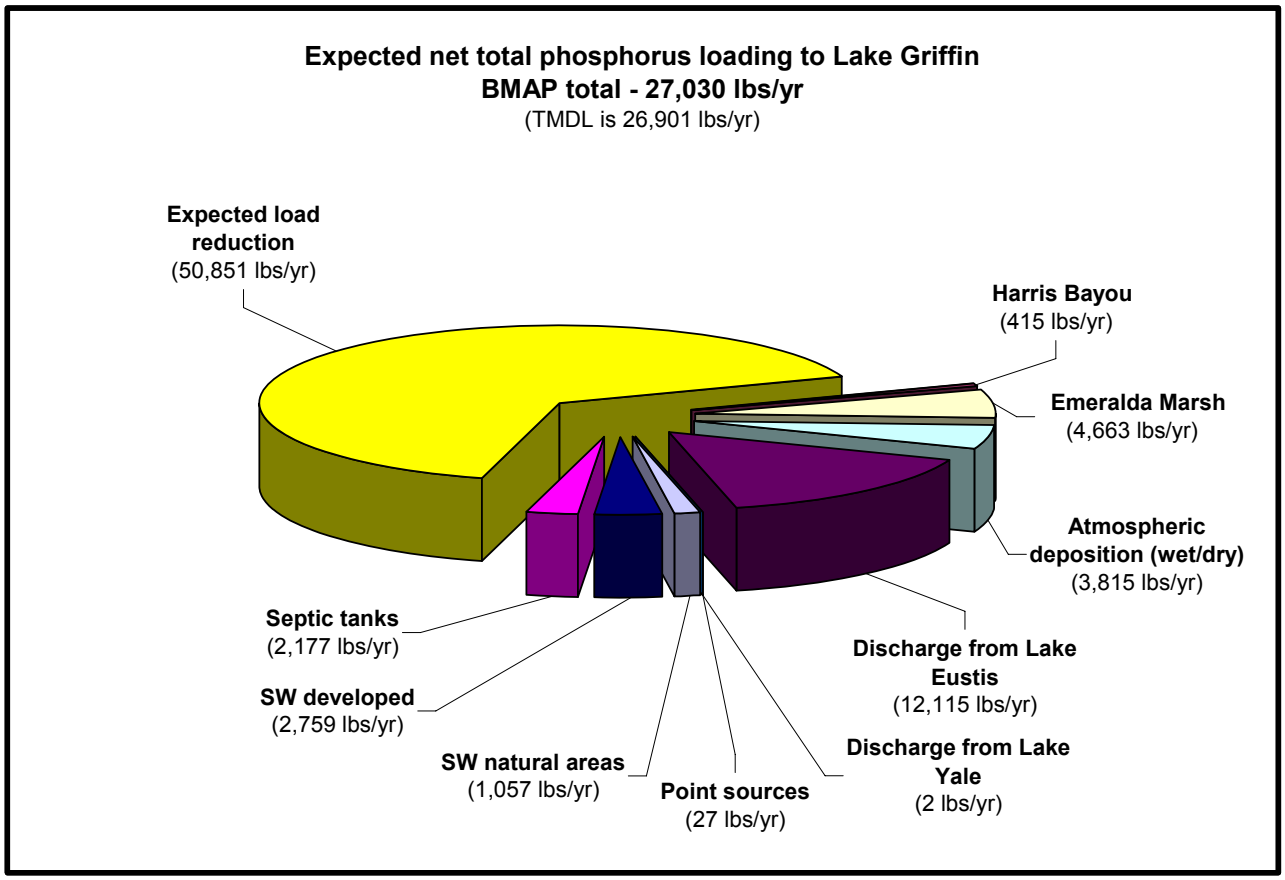
4.9.3 Anticipated Reductions in Total Phosphorus

Figure 4.18 presents the expected net TP loading to Lake Griffin. After factoring in reductions from the projects described above and increases for estimates for future growth, the net reduction in TP loading to Lake Griffin is estimated to be 50,851 lbs/yr (about a 65

percent reduction). This reduction is nearly sufficient to meet the TMDL for the lake (short by 129 lbs/yr).

Because the lake lies at the end of the chain, an improvement in the upstream lake is directly linked to an improvement in waters downstream. The expected improvement in Lake Griffin will help improve conditions in the Ocklawaha River, downstream.

FIGURE 4.18. ESTIMATED LOAD REDUCTION AND NET TP LOADINGS TO LAKE GRIFFIN



SW – Stormwater

♦ ♦ ♦

4.10 Lake Yale Sub-basin

4.10.1 Pollutant Sources by Source Category

The baseline TP loading to Lake Yale averaged 3,158 lbs/yr, primarily caused by atmospheric deposition totaling 1,442 lbs/yr, or 46 percent of the average TP loading. Loading from stormwater runoff from developed and natural areas was 768 lbs/yr and 547 lbs/yr, respectively. All the remaining loading totals 401 lbs/yr, or about 13 percent of the total baseline load. These other loads include loading from septic tanks and point sources. **Figure 4.19** shows the relative significance of these sources.

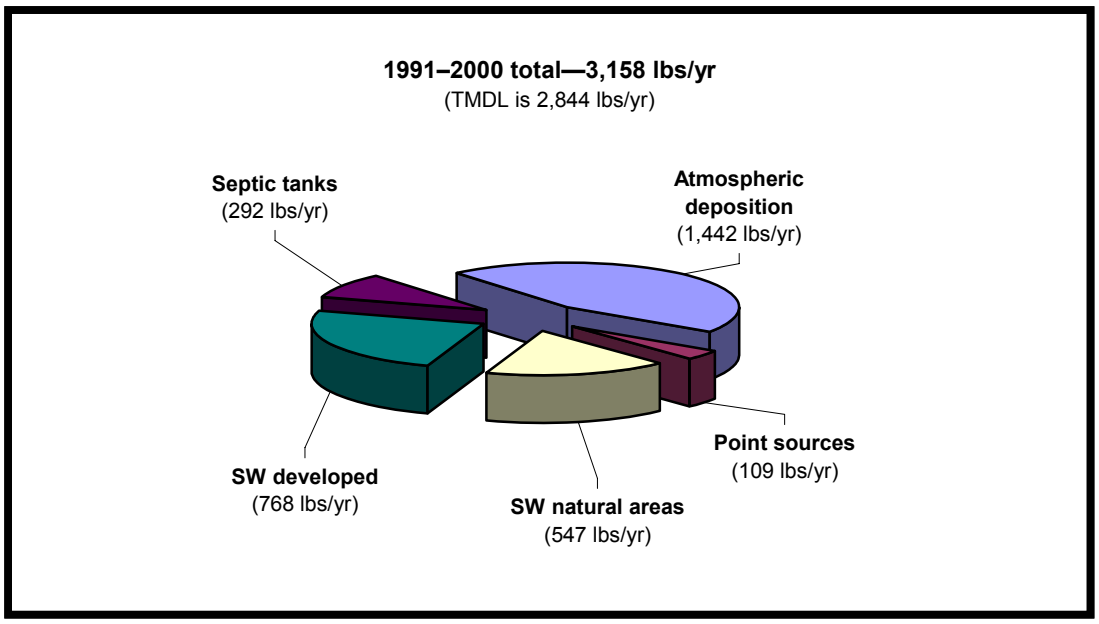
4.10.2 Management Actions to Reduce Total Phosphorus Loading

The Lake Yale sub-basin is mainly rural, and there are currently no stormwater improvement projects under way. **Table 4.6** contains a description of the project. Future growth increases loading to the lake by about 600 lbs/yr.

Lake County initiated the Lake Yale Basin Study in 2006. When completed, it will list the stormwater retrofit projects needed to reduce TP loadings to the lake. The scope of the study has been defined, and initial meetings with basin stakeholders have been held. Marion County's Clean Water Program provided Lake County with information for the Marion County portion of the Lake Yale sub-basin. The estimated date for the completion of the study is the end of 2007.

Currently, stormwater drainage managed by the city of Umatilla does not discharge into Lake Yale. That could change in the future if growth moves the boundary of Umatilla farther west, but there are currently no plans to annex land west of the current Umatilla boundary. Umatilla city ordinances describing stormwater management and green space requirements for new development (see Table 4.6) would benefit Lake Yale by reducing potential TP loadings from future new development. A citrus-processing plant had a historical discharge via a drainage ditch to Lake Yale, but that discharge has ceased.

FIGURE 4.19. BASELINE TP LOADING TO LAKE YALE



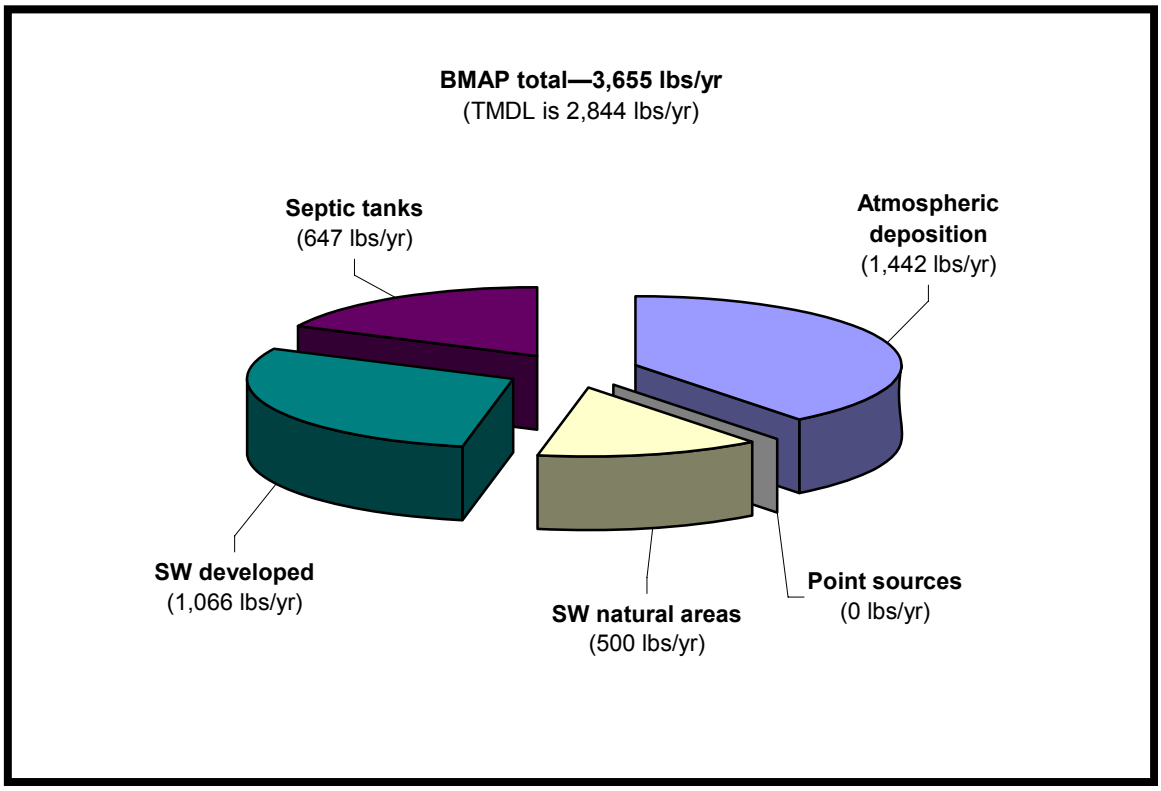
SW – Stormwater

4.10.3 Anticipated Reductions in Total Phosphorus

Figure 4.20 presents the expected net TP loading to Lake Yale. The point source discharge to surface waters (from a former citrus-processing plant) that occurred during the TMDL baseline period has ceased. However, considering increases from estimates for future growth, the net change in TP loading to Lake Yale is estimated to increase by 497 lbs/yr (about 16 percent), meaning that Lake Yale is not expected to meet the TMDL without further

management actions. A net reduction in TP loading of 811 lbs/yr is needed to meet the TMDL for Lake Yale.

FIGURE 4.20. ESTIMATED LOAD REDUCTION AND NET TP LOADINGS TO LAKE YALE



SW – Stormwater

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CHAPTER 5. FUNDING MANAGEMENT ACTIONS

5.1 BMAP Funding Sources

The BMAP identifies management actions estimated at more than $195 million. The sources identified to implement these management actions include local, regional, and state funds. In many cases, these funds are combined to implement joint projects to achieve water quality improvements. **Table H-1** in **Appendix H** lists the BMAP funding sources, which include state agency funds, SJRWMD cost-share grants, county stormwater assessment fees, local and regional ad valorem funds, legislative special appropriations, SWIM funds, Beltway Mitigation funds, land acquisition funds, community block development grants, and others. Funding sources come with specific requirements and are often limited; therefore, it is important that information on new or unknown potential funding sources be accessible and shared. **Section 5.2** discusses some water quality improvement funding programs that may not yet be fully tapped.

5.2 Potential Funding Assistance for Water Quality Improvement

5.2.1 Federal Section 319 Funding

DEP's Nonpoint Source Management Section administers grant money it receives from the EPA through Section 319(h) of the federal Clean Water Act. These funds can be used to implement projects or programs that will help reduce nonpoint sources of pollution. Priority is given to projects or programs in the state's nonpoint source priority watersheds, which are TMDL waterbodies, the state's SWIM watersheds, and National Estuary Program waters. All projects must include at least a 40 percent nonfederal match.

Examples of fundable projects include the demonstration and evaluation of BMPs, nonpoint pollution reduction in priority watersheds, ground water protection from nonpoint sources, and public education programs on nonpoint source management. State and local governments and agencies, colleges, universities, nonprofit organizations, public utilities, and water management districts may apply for Section 319 funding. Partnerships with other entities are strongly encouraged.

Section 319 funds will be targeted first to projects affecting waterbodies with established TMDLs, waterbodies on the Verified List of impaired waters (the 303[d] list), and watersheds with a comprehensive watershed plan. **Table 5.1** presents the nine elements of a comprehensive watershed plan (as defined under EPA guidance) and the corresponding components in this BMAP.

Projects are solicited from late January through early February. Project proposals are due each year in late May, with project selection completed by late summer. Additional information is available at http://www.dep.state.fl.us/water/nonpoint/319h.htm.

TABLE 5.1. EPA'S NINE ELEMENTS OF A COMPREHENSIVE WATERSHED MANAGEMENT PLAN

WATERSHED MANAGEMENT PLAN PER EPA GUIDANCE	UPPER OCKLAWAHA RIVER BMAP
a. An identification of the causes and sources or groups of similar sources that will need to be controlled to achieve the load reductions estimated in the watershed-based plan.	Section 3.2; Appendix D
b. An estimate of the load reductions expected for the management measures described under Item (c) below.	Section 3.5; Appendix H
c. A description of the nonpoint source management measures that will need to be implemented to achieve the load reductions estimated under Item (b) above and an identification of the critical areas in which those measures will be needed to implement the plan.	Section 1.3; Chapter 4; Appendix H
d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied on to implement the plan.	Section 3.4, Chapter 4; Appendix H
e. An information/education component that will be used to enhance public understanding of the project and encourage early and continued public participation in selecting, designing, and implementing the nonpoint source management measures that will be implemented.	Section 1.3; Chapter 6; Appendix C
f A schedule for implementing the nonpoint source management measures identified in this plan that is reasonably expeditious.	Chapter 4; Appendix H
g A description of interim, measurable milestones for determining whether nonpoint source management measures or other control actions are being implemented.	Chapter 6
h. 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 and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a nonpoint source TMDL has been established, whether the TMDL needs to be revised.	Chapter 6
i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under Item (h) above.	Chapter 6

5.2.2 Water Projects Grant Program (Section 403.885, F.S.)

This funding is available to counties, municipalities, water management districts, and special districts with legal responsibilities for water quality improvement, water management, stormwater management, wastewater management, lake and river water restoration projects, and drinking water projects. The types of projects eligible for funding consideration are water quality improvement, stormwater management, wastewater management, water restoration, and other water projects as specifically appropriated by the Legislature. DEP must evaluate all projects to determine if they do the following:

- *Protect public health or the environment; and*
- *Implement plans developed pursuant to the SWIM Act created in Part IV, Chapter 373, F.S.; other water restoration plans required by law; management plans prepared under Section 403.067, F.S. (TMDL implementation); or other plans adopted by local government for water quality improvement and water restoration.*

The law was changed during the 2006 legislative session to remove the local matching requirement. However, projects are rarely funded by the Legislature for their full cost, and often for substantially less. Therefore, local funds will almost certainly be needed to complete individual projects.

Requests for funding for the following state fiscal year are solicited from about mid-December to mid-January, before the start of the legislative session. Funding for the project is secured through the state budget process. Additional information is available at http://www.dep.state.fl.us/water/.

5.2.3 Water Protection and Sustainability Program (Section 403.890, F.S.) and TMDL Water Quality Restoration Grants

The Water Protection and Sustainability Program provides annual funding to DEP for implementing BMPs and capital projects necessary to implement the goals of the TMDL Program. These funds are restricted to projects that reduce pollutant loadings to waterbodies on the state's Verified List of impaired waters, or to waterbodies with a DEP-proposed or -adopted TMDL. Out of the annual funding level of $20 million, 85 percent is available to DEP to address water quality impacts to nonagricultural nonpoint sources.

In addition, DEP receives about $8 million per year from Documentary Stamp Tax fees for TMDL water quality restoration grants, which can be used for urban nonpoint source research or stormwater retrofit projects.

The funds from both of these sources will be available for TMDL implementation through the TMDL Water Quality Restoration Grant Program, which funds projects where the state has established a TMDL. Initially, these funds may be available for projects to address nonpoint source pollution in waterbodies that have been verified as impaired and placed on the state's 303(d) list. A 50 percent local match will be required.

Since the grants must be used within 3 years, they primarily are targeted to projects that are ready for construction in the next 6 to 10 months. Land acquisition, design, and permitting should be complete or nearing completion. While DEP will not fund these preliminary project elements, they are eligible for matching funds. Most projects will require storm event monitoring to document the project's effectiveness in removing pollutants. All data will be entered into the Florida BMP Database. Projects will be selected for funding based on the following:

- *Reduction of loadings of pollutants of concern discharged to impaired waters (those on the DEP-adopted, basin-specific Verified List of impaired waters),*
- *Amount of anticipated load reduction in the pollutant(s) of concern,*
- *Cost per pound of pollutant removed,*
- *Amount of matching funds, and*
- *Establishment by the local government of a dedicated funding source for stormwater management, such as a stormwater utility.*

Applications for grant funding are accepted continuously. Additional information is available at http://www.dep.state.fl.us/water/watersheds/tmdl_grant.htm.

5.2.4 Water Pollution Control State Revolving Fund

The Clean Water Act State Revolving Fund (SRF) Program provides low-interest loans for water pollution control activities and facilities. Water pollution control is divided into point sources (usually through a permit for discharge in an urban area) and nonpoint sources

(generally by controlling stormwater runoff from agricultural operations). The program revolves in perpetuity, using state and federal appropriations, loan repayments, investment earnings, and bond proceeds. The Clean Water SRF Program is distinct from the Safe Drinking Water Act SRF, which provides funding for drinking water activities and facilities.

Projects eligible for Clean Water SRF loans include wastewater management facilities, reclaimed wastewater reuse facilities, stormwater management facilities, widely accepted practices (i.e., BMPs) for controlling pollution from agricultural stormwater runoff, and estuary protection activities and facilities.

Eligibility requirements are established in the federal Clean Water Act. Local governments (municipalities, counties, authorities, special districts, and agencies) are eligible for loans to control wastewater and stormwater pollution. Nongovernmental parties (basically any entity that can repay a loan) are eligible for loans to control stormwater pollution related to agricultural operations.

Requests for loans are accepted throughout the year. Hearings to add projects to the fundable projects list are held on the second Wednesday of each quarter. Nonfederal money is available as a local match. Additional information is available at http://www.dep.state.fl.us/water/wff/cwsrf/index.htm.

5.2.5 St. Johns River Water Management District Cooperative Cost-share Program

The SJRWMD provides funds from ad valorem taxes to support local government stormwater management projects. The program's priorities are to support stormwater management efforts that contribute to the improvement of water quality by achieving PLRGs or TMDLs. The district may also consider projects that protect or preserve water quality in designated SWIM waterbodies. Funding for projects will be determined by the SJRWMD Governing Board. Funds are provided as a cost reimbursement after project completion.

Parties eligible to apply for funds include local governmental agencies, municipalities, county governments, special districts, and other public entities located within the jurisdiction of the SJRWMD. Private utilities and not-for-profit organizations may participate along with eligible parties in these stormwater management projects, contributing to a proposal submitted by an eligible party.

Project applications are accepted between late May and August. Additional information is available at http://www.sjrwmd.com/programs/cost_share.html.

5.2.6 Lake County Water Authority Cooperative Stormwater Grants

The LCWA Board of Trustees provides cost reimbursement funds to local governments for projects aimed at improving water quality. About $1 million is available each year. Projects are expected to provide public benefits and pollutant removal capacity. Typically, the LCWA solicits projects in January, and final decisions for awarding funds are made in March or April. The funding match amounts requested for a project can vary, though the LCWA recommends at least a 50 percent cost-share. Although the program favors construction, funds may be provided for land acquisition and/or design. Additional information is available at http://www.lcwa.org.

CHAPTER 6: ASSESSING PROGRESS AND MAKING CHANGES

Successful BMAP implementation requires commitment and follow-up. In the Statement of Commitment to Plan Implementation (Chapter 7), BWG members expressed their intention to carry out the plan, monitor its effects, and continue to coordinate within and across jurisdictions to achieve water quality targets. The FWRA requires an assessment every five years to determine whether there is reasonable progress in implementing the BMAP and achieving pollutant load reductions. The BMAP must contain a water quality monitoring component sufficient to make this evaluation.

6.1 Tracking Implementation

The BWG has agreed to meet every six months after the adoption of the BMAP to follow up on plan implementation, share new information, and continue to coordinate on TMDL-related issues. At the BWG's direction, a concise, tabular format was developed for an annual implementation report that each plan participant will submit to the BWG. These annual reports will most likely be consolidated into a single, easy-to-read report, which provides accountability and allows the BWG to see quickly the status of BMAP implementation. **Table 6.3,** at the end of this chapter, shows the draft annual reporting format. Other implementation tracking measures may be developed by the BWG, as needed.

6.2 Monitoring Water Quality and Pollutant Loads

The TWG is developing a strategy for monitoring water quality and measuring pollutant loads that builds on existing programs being conducted by DEP, the SJRWMD, Lake County, Orange County, WAV volunteers, and the LCWA. Two water quality monitoring networks would be used: a trend network that tracks water quality changes in each impaired waterbody and a potential sources network that provides information about TN and TP loadings contributed by external sources, used in pollutant modeling for the PLRG and TMDL. **Appendix I** lists the water quality monitoring stations for BMAP follow-up.

DEP and BWG partners currently collect water quality data periodically from over 200 locations in the Upper Ocklawaha Basin lakes and streams, as well as the Palatlakaha River. DEP has collected water quality data since the 1970s, but more recently has focused its data collection efforts on biological indicators of water quality and sampling needed to support the IWR. OCEPD and Lake County Environmental Services have maintained water quality networks since the 1970s to track the status of lakes and streams in their respective jurisdictions. The SJRWMD has collected water quality and phytoplankton data since 1989 to support SWIM restoration programs for Lake Apopka and the Upper Ocklawaha River Basin. The FWC plans to initiate a statewide lake monitoring network intended to evaluate the status and condition of fish populations within representative lakes. Lakes Harris, Griffin, and Apopka are included as part of that network.

The elements of the strategy, with some of the details, are listed below. **This is a preliminary outline;** further details and refinements of data interpretation and reporting are under development and require BWG approval before implementation.

6.2.1 Monitoring Objectives and Anticipated Benefits

- ***Primary Objective—****Monitoring TMDL waterbodies for the following:*
  - To determine whether the target TP and TN (where applicable) concentrations used to develop the TMDLs are being achieved, and
  - To determine whether expected improvements in other water quality indicators are being achieved, particularly reductions in chlorophyll *a* concentrations and the Trophic State Index (TSI).
- ***Secondary Objective—****Measure loadings of TMDL targeted pollutants, as follows:*
  - Tributary loadings, and
  - Loadings associated with specific sources or projects, as feasible.
- ***Anticipated Benefits—****Provide information that is useful to the following :*
  - Evaluating the cost-effectiveness of load reduction strategies,
  - Modifying existing and selecting future load reduction projects,
  - Streamlining and coordinating agency/group efforts to effectively distribute resources and reduce duplication, and
  - Better understanding the relationship between pollutant loadings and waterbody response.

6.2.2 Water Quality Indicators (representing applicable designated uses)

Establishing indicators of water quality condition is important to evaluating success in meeting the TMDLs for the target constituents in the basin. Some of these indicators have numeric or narrative standards (Section 62-302.530, F.A.C.), and some are associated with the TSI (Section 63-303.352, F.A.C.). The TSI is used in the IWR analysis (Rule 62-303, F.A.C.) to interpret narrative nutrient standards. Monitoring and analysis are used to evaluate whether applicable target concentrations for nutrients are being attained (see **Table 1.3** in Chapter 1 for TP and TN target concentrations).

Table 6.1 lists the core and supplemental water quality indicators selected for the basin to ascertain whether a waterbody meets its designated uses. **Core indicators** are those most directly related to the target constituents. The 10 impaired waterbodies in the Upper Ocklawaha River Basin are listed as impaired for TP and have TMDLs for TP. In addition, Trout Lake is impaired for TN and has a TMDL for TN. The Palatlakaha River is impaired for low DO, with TMDLs developed for the identified causative pollutants of TN, TP, and BOD.

Nutrient impairment (TN and TP) in lakes is determined by the TSI number. Measurements of chlorophyll *a*, TN, and TP are needed to complete the TSI calculation. **Supplemental indicators** are supporting measures that help interpret water quality improvements that occur with reductions in nutrient loadings and the achievement of designated uses and anticipated waterbody responses.

Table 6.2 shows the waterbody responses anticipated as load reductions are achieved. These responses will help determine whether the related designated uses (for Class III waters) are being met in the TMDL waterbodies.

TABLE 6.1. CORE AND SUPPLEMENTAL WATER QUALITY INDICATORS

WATER QUALITY INDICATOR	LAKES	CANALS	PALATLAKAHA RIVER
Core Indicators			
Biological Oxygen Demand (BOD)			√
Chlorophyll *a* (Chl-a)	√	√	√
Dissolved Oxygen (DO)			√
Stream Condition Index (SCI)			√
Total Nitrogen (TN)	√	√	√
Total Phosphorus (TP)	√	√	√
Trophic Condition per the TSI	√		
Supplemental Indicators			
Algal Biomass	√		
Alkalinity	√	√	√
BOD			√
Clarity Measured as Secchi Depth	√	√	√
Color	√		
Conductivity	√	√	√
Dissolved Oxygen (DO)	√	√	
pH	√	√	√
Temperature	√	√	√
Total Organic Carbon (TOC)	√	√	
Total Suspended Solids (TSS)	√	√	√
Turbidity	√	√	√
Unionized Ammonia	√	√	√
Field Conditions during Sampling	√	√	√

TABLE 6.2. ANTICIPATED WATERBODY RESPONSES TO LOAD REDUCTIONS

ANTICIPATED WATERBODY RESPONSE– INDICATOR RESPONSE	RELATED DESIGNATED USES	
	Recreation	***Fish/wildlife***
Reduction in frequency and magnitude of algal blooms—decreased frequency of chlorophyll *a* values greater than 60 ppb; decreased concentrations of TN and TP; decreased TSI; changes in phytoplankton community structure	√	√
Increased water transparency—increased Secchi depth; decreased chlorophyll *a* concentrations	√	√
Re-establishment of noninvasive, beneficial aquatic plants		√
Reduction in resuspension of bottom sediments—decreased TSS and turbidity	√	√
Improved habitat quality for sport fish	√	√
Increased sportfish populations	√	√

6.2.3 Monitoring Design

- *Stations*
  - A network of stations supporting both the primary and secondary objectives was assembled from monitoring networks supported by Lake County, the LCWA, Orange County, WAV volunteers, and the SJRWMD.
  - For the primary objective, stations representative of the lakes, the tributaries between the lakes (e.g., Haynes Creek, Dead River, Dora Canal), and the

Palatlakaha River [see **Figure 6.1**] were selected for preliminary inclusion in the network).

- As a secondary objective, stations that provide data on specific loading sources were selected for preliminary inclusion in the network (see **Figure 6.2**).
- Information describing each network includes station location, frequency of sampling, indicators sampled, and responsible entity.

- *Further refinements will be made to the assembled sampling network of existing and new stations to address the following concerns:*
  - Identify how TMDL cyclical strategic monitoring will be factored into the monitoring design,
  - Identify how to use feedback from research monitoring efforts, if appropriate, and
  - Evaluate the need for additional stations, indicators, change in sampling frequency, and other concerns.

6.2.4 Quality Assurance/Quality Control Mechanisms

- *Summarize QA standards used by each monitoring entity:*
  - Reference lab quality assurance/quality control (QA/QC) protocols.
- *For all labs, document/provide details of their lab plans:*
  - Recommend monitoring entities conduct TMDL field and lab QA/QC overview or "survey" regarding protocols followed (e.g., documentation, meter calibration, sample collection, holding times, lab receipts). DEP to provide survey instrument.
- *Ensure compliance with DEP requirements for data to be used in TMDL development (and tracking).*
- *Employ QA techniques that will further document the credibility and comparability of data collected (e.g., split samples, round robin).*

6.2.5 Data Management Mechanism(s) for Data Storage and Retrieval

- *Data from all partners goes to DEP's centralized water quality database (e.g., Lake County, Orange County, the SJRWMD, and the LCWA [to be incorporated with Lake County]).*
- *DEP, as the centralized database manager, will be responsible for data storage and retrieval after the data have been uploaded. The responsibility for data quality rests with the contributing agency.*
- *Protocols for data interpretation and comparison will be developed by DEP and shared among cooperating agencies. Protocols for how to handle data qualifier codes, replicate samples, and below-detection-limit values will be developed.*

6.2.6 Data Analysis/Assessment—Methodology for Assessing Attainment of Monitoring Objectives

- *Identify method(s) for analysis of BMAP monitoring data; account for potential anomalies (e.g., describe environmental conditions at the time of sampling that may affect the outcome of the analysis, such as weather or seasonal variations), and*

- *Summarize DEP process for assessing and listing impaired waters under the IWR; discuss how BMAP monitoring feeds into that process.*

6.2.7 Reporting—Regular Reporting Mechanism for Water Quality Monitoring Results

- *Potential Reporting Mechanisms for BMAP Monitoring:*
  - Periodic reporting and analysis of water quality observations and trends (at least annually) to track progress in improving water quality to meet target concentrations and TSI. Proposed product is a short, stand-alone annual report on the progress/status of monitoring with appropriate analysis of data. Would need to develop simple, clear format for this purpose.
  - Ocklawaha Basin Water Quality Assessment Report (4- to 5-year cycle)—contains DEP evaluation/updated status of waterbodies under the IWR assessment. Identifies whether a water meets or does not meet designated use. Can include BMAP monitoring analysis.
  - Possible use of local Web sites—Lake County and Orange County online water atlases—to distribute information to the public. Need to consider amount/format of information posted, in place of or in addition to posting entire report(s); should be the same wherever used.
  - Other Web sites (e.g., DEP, SJRWMD). Same considerations as above.

6.2.8 Programmatic Evaluation

- *Periodically evaluate the adequacy and effectiveness of the monitoring strategy and make adjustments as necessary, and*
- *On an annual basis, check the adequacy of station locations/numbers, frequency of data collection, and other needs.*

6.2.9 General Support and Infrastructure Planning

- *Evaluation of needs to support continued monitoring effort,*
- *Funding,*
- *Staff training, and*
- *Additional resources needed.*

6.3 BMP-specific Monitoring

As part of the BMAP implementation and follow-up process, BWG members will discuss the possibility of BMP-specific monitoring. This would involve individual entities voluntarily monitoring the impacts of one of the BMPs included in their management actions identified in the BMAP. Although this might not be feasible for every BMAP partner, even a few monitoring efforts would provide important data on the effectiveness of individual BMPs.

FIGURE 6.1. LOCATION OF TREND STATIONS IN THE UPPER OCKLAWAHA RIVER BASIN

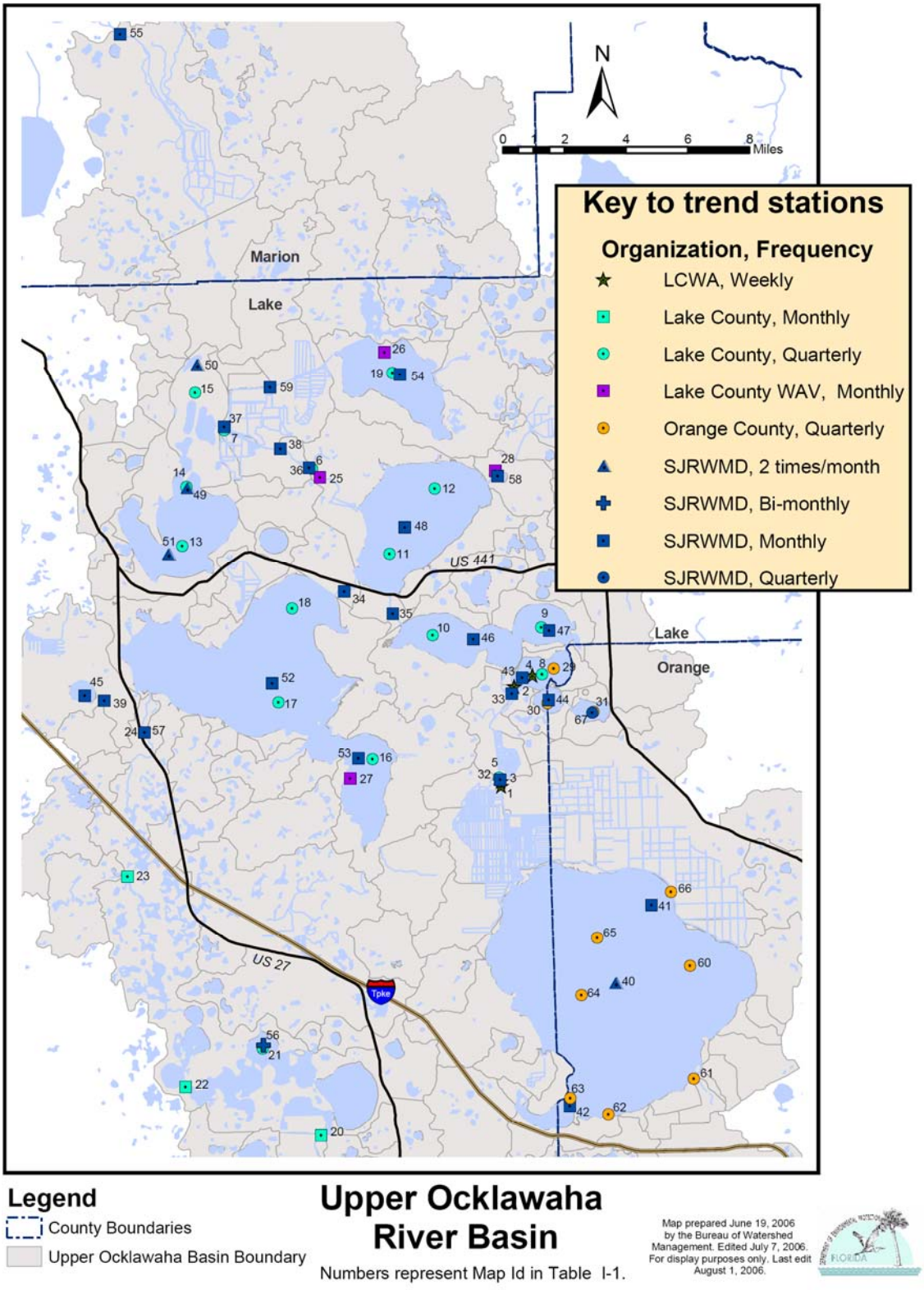
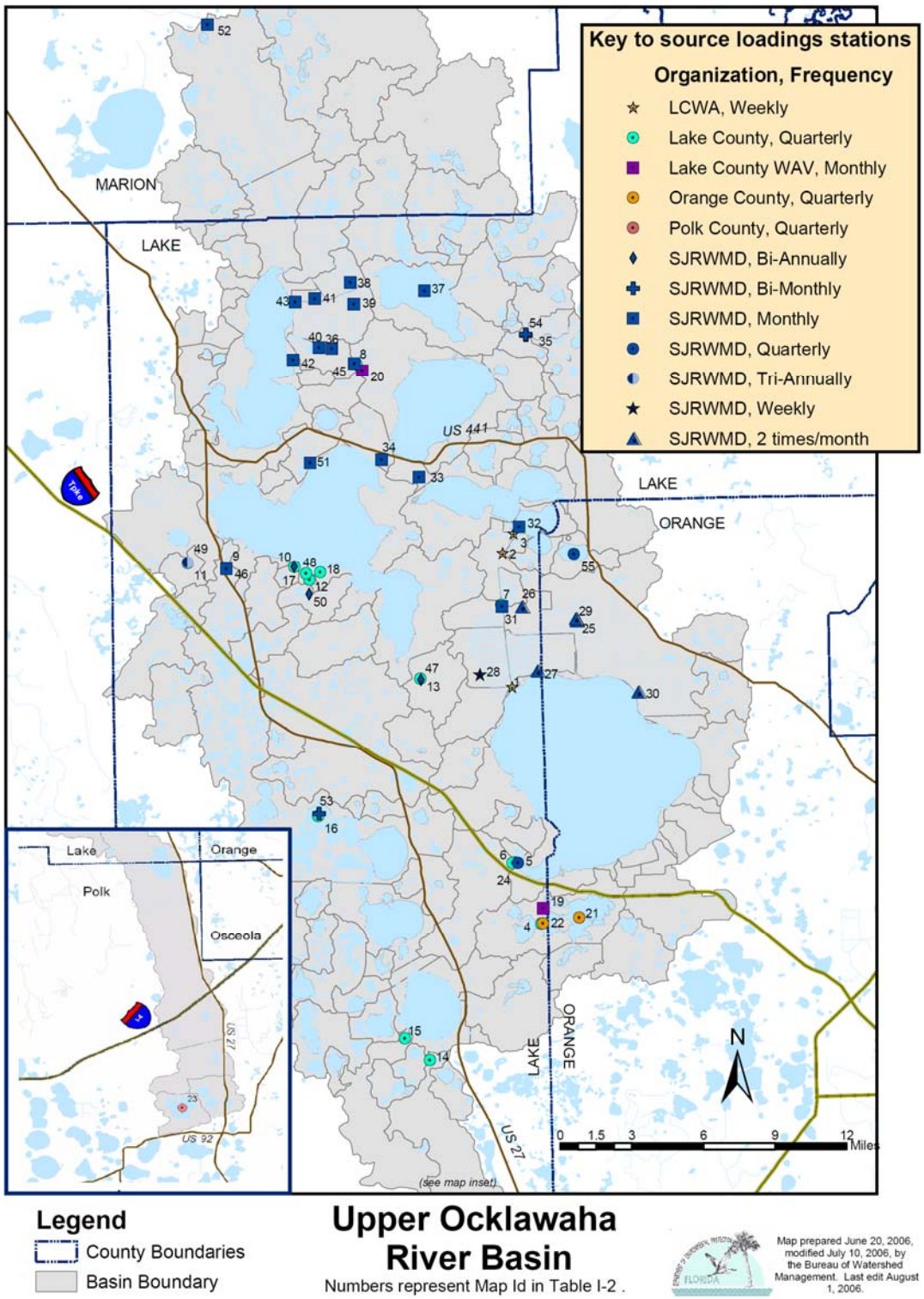


FIGURE 6.2. CONTRIBUTING SOURCES MONITORING NETWORK IN THE UPPER OCKLAWAHA RIVER BASIN



6.4 Adaptive Management

Adaptive management involves setting up a mechanism for making course corrections in the BMAP when circumstances change or feedback mechanisms indicate that a more effective strategy is needed. The FWRA requires that the plan be revised, as appropriate, in cooperation with basin stakeholders. All or part of a revised BMAP must be adopted by secretarial order. Adaptive management measures include the following:

- *Procedures to determine whether additional cooperative actions 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, and*
- *Descriptions of the BWG's role after BMAP completion.*

Tracking implementation, monitoring water quality and pollutant loads, and holding periodic BWG meetings to share information and expertise are key components of adaptive management.

BMAP implementation will be a long-term process. Some key projects, with significant estimated load reductions, will extend well beyond the first five years of BMAP implementation. TMDLs established for the basin likely will not be achieved in the near term. The BWG will track its implementation efforts and monitor water quality in TMDL waterbodies (through existing water quality monitoring programs) to ensure that the BMAP is carried out and to measure its effectiveness. The BWG will meet periodically (approximately every six months) to discuss implementation issues, consider new information, and determine what other management actions are needed for the waterbodies not projected to meet their TMDLs.

Each entity responsible for implementing management actions as part of the BMAP will complete an annual report for submittal to the BWG and DEP. The report will track the implementation status of any management actions listed in the BMAP and document additional management actions undertaken to further water quality improvements in the basin. The report will primarily comprise a table that includes data elements such as the following:

- *BMAP project,*
- *Affected area,*
- *Brief description,*
- *Project start/end,*
- *Project/activity status,*
- *TP removal estimate,*
- *Project monitoring results, and*
- *Comments.*

The BWG will review the reports once a year to assess progress towards meeting the BMAP's goals. The semiannual meetings will also consider follow-up actions to improve the implementation of the agreed-on management actions and/or modify those actions as necessary to achieve the necessary pollutant reductions. In BMAP follow-up meetings, the BWG will discuss implementation milestones and will work on developing a decision-making tool that integrates implementation tracking and water quality monitoring information, to assist in determining whether plan adjustments are needed. One of the BWG's most immediate tasks is to evaluate what additional efforts are necessary to meet the TMDLs in the waterbodies that are projected to fall short under the current BMAP.

TABLE 6.3. DRAFT BMAP ANNUAL REPORTING FORMAT

2006 Upper Ocklawaha River Basin Management Action Plan

___YEAR___ ANNUAL IMPLEMENTATION REPORT

REPORTING ENTITY: _____ DATE: _____

Note: This report may include relevant MS4 activities, whether contained in the BMAP or not.

IMPLEMENTATION STATUS–BMAP MANAGEMENT ACTIONS

[1] BMAP PROJECT #	AFFECTED AREA	[2] BRIEF DESCRIPTION	[3] PROJECTED START/END	[4] PROJECT/ACTIVITY STATUS	[5] TP REMOVAL ESTIMATE		[6] PROJECT MONITORING RESULTS	[7] COMMENTS
					Total	*Interim*		
Shade if also an MS4 activity								

NEW MANAGEMENT ACTIONS

[1] BMAP PROJECT #	AFFECTED AREA	[2] BRIEF DESCRIPTION	[3] PROJECTED START/END	[4] PROJECT/ACTIVITY STATUS	[5] TP REMOVAL ESTIMATE		[6] PROJECT MONITORING RESULTS	[7] COMMENTS
					Total	*Interim*		
Shade if also an MS4 activity								

Directions for BMAP Annual Reporting Format (Draft):

[1] **BMAP Projects**: This includes projects and other management actions. Use the project number assigned in the BMAP Projects/Activities table (e.g., EUS10). Please include all management actions for which you have lead responsibility in the BMAP, regardless of their status. **New Management Actions**: Include new projects/activities that are not included in the BMAP in the New Management Actions table. Create a project number for new management actions by using the prefix, then -N# (e.g., EUS-N1). **If a management action listed in either table is part of your MS4, please shade the project number box in grey**.

[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] Clearly summarize 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 time frames (e.g., 2 public workshops on lawn fertilizer in March 2007). 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, and technical difficulties. 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 7: 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 Upper Ocklawaha BWG have demonstrated their willingness to confer with and support each other in their efforts.

BWG members have signed individual statements of commitment to BMAP implementation **(Figure 7.1)** or adopted resolutions that will be collected and kept as part of the DEP record of BMAP development and implementation. A list of signatories follows **Figure 7.1.**

FIGURE 7.1. COMMITMENT TO BMAP IMPLEMENTATION

2007

UPPER OCKLAWAHA RIVER BASIN MANAGEMENT ACTION PLAN

STATEMENT OF COMMITMENT TO PLAN IMPLEMENTATION

The Upper Ocklawaha River Basin Management Action Plan (BMAP) was finalized as a consensus document on April 26, 2007, by authorized representatives of the agencies and organizations listed as members of the Upper Ocklawaha River Basin Working Group (BWG).

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

- Seek the necessary approvals and funding to implement the consensus management actions identified in the BMAP, and implement 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 ensure that the BMAP is carried out,
- Inform DEP and the BWG of any permanent obstacles to carrying out management actions for which they are responsible, including technical, funding, and legal obstacles,
- Conduct water quality monitoring according to the monitoring strategy developed by the Technical Working Group and approved by the BWG,
- Continue to use a coordinated and comprehensive watershed management approach to address and achieve TMDL-related pollutant load reductions and water quality improvements, and
- Continue to communicate and coordinate actions and funding across agencies and programs with regard to BMAP implementation.

SIGNATORIES:

ENTITY	SIGNATORY	TITLE	DATE
ALLIANCE TO PROTECT WATER RESOURCES, INC.	Nancy H. Fullerton	Vice President	12/5/07
LAKE COUNTY	Welton Caldwell	Chairman	6/22/07
ORANGE COUNTY	Richard Crotty	Mayor	4/11/07
MARION COUNTY	James Payton	Chairman	8/1/06
POLK COUNTY	Michael Herr	County Manager	9/05/07
LAKE COUNTY WATER AUTHORITY	Larry Everly, Sr.	Chairman	6/28/06
CITY OF APOPKA	Pending		
CITY OF CLERMONT	Harold Turville	Mayor	7/25/06
CITY OF EUSTIS	Jonnie Hale	Mayor/Commissioner	7/6/06
CITY OF FRUITLAND PARK	Pending		
CITY OF GROVELAND	James Smith	Mayor	7/3/06
TOWN OF LADY LAKE	Max Pullen	Mayor	8/17/06
CITY OF LEESBURG	Bob Lovell	Mayor	4/24/06
CITY OF MINNEOLA	David Yeager	Mayor	8/22/06
CITY OF MOUNT DORA	James Yatsuk	Mayor	4/18/06
CITY OF TAVARES	Sandy Gamble	Mayor	4/18/07
CITY OF WINTER GARDEN	Jack Quesinberry	Mayor	9/13/07
CITY OF OCOEE	S. Scott Vandergrif	Mayor	1/16/07
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION	Vivian Garfein	Director, Central District	8/27/07
FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 5	George S. Lovett	Director of Transportation Development	10/15/07
FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION	Victor Heller	Assistant Executive Director	6/19/07
FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, OFFICE OF AGRICULTURAL WATER POLICY	Richard J. Budell	Director	10/04/07
ST. JOHNS RIVER WATER MANAGEMENT DISTRICT	Kirby Green	Director	8/7/06

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 5 groups, on a rotating schedule. **Table A-1** shows the hydrologic basins in each of the 5 groups, and the DEP district office of jurisdiction. **Table A-2** illustrates the repeating 5-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
Northwest	Ochlockonee–- St. Marks	Apalachicola–Chipola	Choctawhatchee–St. Andrews Bay	Pensacola Bay	Perdido Bay
Northeast	Suwannee	Lower St. Johns	–	Nassau–St. Marys	Upper East Coast
Central	Ocklawaha	Middle St. Johns	Upper St. Johns	Kissimmee	Indian River Lagoon
Southwest	Tampa Bay	Tampa Bay Tributaries	Sarasota Bay–Peace–Myakka	Withlacoochee	Springs Coast
South	Everglades West Coast	Charlotte Harbor	Caloosahatchee	Fisheating Creek	Florida Keys
Southeast	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, as follows:

- ***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), or other approach, to achieve the TMDL, and*
- ***PHASE 5**: Implementation of the BMAP, or other approach, and monitoring of results.*

TABLE A-2. BASIN ROTATION SCHEDULE FOR TMDL DEVELOPMENT AND IMPLEMENTATION

Year	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10
	Phases of the Cycle					Phases of the Cycle				
Group 1	1	2	3	4	5	1	2	3	4	5
Group 2		1	2	3	4	5	1	2	3	4
Group 3			1	2	3	4	5	1	2	3
Group 4				1	2	3	4	5	1	2
Group 5					1	2	3	4	5	1
	1st Five-year Cycle – High-priority Waters					2nd Five-year Cycle – Medium-priority Waters				

* Projected years for Phases 3, 4, and 5 may change due to accelerated local activities, length of plan development, legal challenges, etc.

TMDL development and implementation are ongoing, cyclical processes, as illustrated in **Table A-2.** DEP will re-evaluate impaired waters every five years to determine whether improvements are being achieved and whether to refine loading estimates and TMDL allocations using new data. In order to allow time to determine the impacts of management actions on pollutant loadings, TMDLs generally will not be revised in the short term. However, additional impaired waters for TMDL establishment may be identified within a basin that already has TMDLs.

If any changes in a TMDL are required, the applicable TMDL rule will be revised, thus providing a point of legal entry for interested parties. Changes to a TMDL would prompt revisions to the applicable BMAP, which will be revisited at least every five years and modified as necessary.

APPENDIX B. SUMMARY OF STATUTORY PROVISIONS GUIDING BMAP DEVELOPMENT AND IMPLEMENTATION

SECTION 403.067(7), FLORIDA STATUTES—*Summary of Excerpts*

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** [WMD] does not require WMD adoption of the TMDL.
- **TMDL implementation may include**, but is not limited to:
  - Permitting and other existing regulatory programs.
  - Nonregulatory 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.

SECTION 403.067(7), FLORIDA STATUTES—*Summary of Excerpts (continued)*

- 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.

SECTION 403.067(7), FLORIDA STATUTES—*Summary of Excerpts (continued)*

BEST MANAGEMENT PRACTICES

- DEP, in cooperation with WMDs and other interested parties, may develop interim measures, BMPs, or other measures for nongricultural 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 re-evaluate 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

Upper Ocklawaha Basin Working Group

In the spring of 2004, DEP joined with stakeholders in the Upper Ocklawaha River Basin to form the Upper Ocklawaha BWG. The first formal meeting of the BWG was held on July 1, 2004. The BWG met every one to two months through June 2006 to develop a BMAP. **Figure C-1** presents the BWG's organizational structure.

A representative from each key stakeholder entity was asked to participate on the BWG. In addition, affected municipalities, counties, and the LCWA were asked to appoint an elected official liaison to communicate between their elected bodies and the BWG. The elected official liaisons were given two special briefings during the BMAP development process, and some of them regularly attended BWG meetings.

DEP maintained a broad-based email distribution list, which included BWG members, elected officials, and any other individuals and organizations who provided their email addresses. Four meetings targeted at the public were held, one prior to the formation of the BWG, and three subsequently: April 15, 2004; March 10, 2005; November 10, 2005, and May 18, 2006. These meetings were advertised in the local newspaper (the *Daily Commercial*) and the *Florida Administrative Weekly*, through email distributions, and, in some cases, through mailed invitations. The meeting of May 18, 2006 specifically met the requirements of Section 403.067(9)(a)3, F.S.

BWG Meeting Process

CONSENSUS

BWG members agreed on the following consensus statement: ***Consensus is unanimity minus one or two.***

Though the consensus statement was generally accepted, the BWG raised concerns that the resistance of one or two members could stop an agreement from being reached. The BWG members recognized, however, that certain members have a unique perspective on an issue, such as a larger geographic scope of agency responsibilities, or that the member may be the only representative of a particular interest (e.g., small business or environmental advocacy).

The BWG expressed a desire to attain full unanimity by exploring alternative proposals when there were dissenting viewpoints within the group.

PUBLIC PARTICIPATION

All BWG meetings were open to the public. Several members of the public regularly attended BWG meetings and participated in the discussion. Subsequent to the discussion of issues by the BWG at each meeting, but prior to developing consensus, the public was given time to ask questions and make comments that could, and often did, influence the BWG's decisions.

FIGURE C-1. BASIN WORKING GROUP ORGANIZATIONAL STRUCTURE

BASIN WORKING GROUP (BWG)

Function:
- Develop a consensus-based BMAP to implement TMDLs in the Upper Ocklawaha River Basin
- Has final decision-making role on BMAP development
- Includes Technical Working Group (TWG) subcommittee

Makeup:
- Lake County and 12 municipalities in the county:
  - City of Clermont
  - City of Eustis
  - City of Fruitland Park
  - City of Groveland
  - Town of Lady Lake
  - City of Leesburg
  - City of Mascotte
  - City of Minneola
  - Town of Montverde
  - City of Mount Dora
  - City of Tavares
  - City of Umatilla
- Lake County Water Authority
- Marion County
- Orange County and 3 municipalities in the county:
  - City of Apopka
  - City of Ocoee
  - City of Winter Garden
- Polk County
- St. Johns River Water Management District
- Florida Department of Transportation
- Florida Fish and Wildlife Commission
- Florida Department of Agriculture and Consumer Services
- Florida Department of Environmental Protection
- Agriculture industry representative
- Alliance for the Protection of Water Resources (environmental representative)

Meetings/Workshops Held:
- Monthly meetings generally held on the second Thursday of the month from June 2004 to June 2006, with subsequent meetings held on:
  - November 9, 2006
  - January 25, 2007
  - April 21, 2007

CITIZEN INPUT

Function:
- Ensure that all interested parties are involved and heard in the TMDL process
- Ensure the broad dissemination of TMDL information and the BMAP
- Allow for public discussion of issues and strategies

Makeup:
- Interested parties and the public at large

General Public Meetings/Workshops Held:
- April 15, 2004
- March 10, 2005
- November 10, 2005
- May 18, 2006

***Note**: Several interested citizens also attended the BWG meetings regularly*

SPECIAL BRIEFINGS/PRESENTATIONS (AS NEEDED)

Function:
- To brief councils, commissions, special interest groups, community organizations, and others on the TMDL process and the progress of the BWG, as requested or needed

Makeup:
- Affected and/or interested elected bodies, organizations, and other groups in the basin

ELECTED OFFICIAL LIAISONS

Role/Function:
- Serve as point of contact for elected local governing bodies
- Represent the citizens in their jurisdictions
- Attend BWG and public meetings, as desired
- Provide feedback to the BWG
- Assist in developing effective means of informing and involving elected officials, and in securing their endorsement of a consensus BMAP

Makeup:
- One elected official appointed by and representing each local government participating in BMAP development. Periodic briefings as a group to the individual elected officials appointed by each local government to serve as a liaison to the BMAP development process.

Elected Official Liaison Briefings:
- January 26, 2005
- October 26, 2005

Local Government Elected Body Briefings:
- April 2006
- January 2007

THE TECHNICAL WORKING GROUP

The BWG formed a TWG, which met regularly to address technical questions from the BWG, prepare technical materials for the BMAP, and develop recommendations for the BWG's consideration. The TWG was composed of BWG members and staff of BWG entities. All TWG meetings were open to anyone interested in attending.

PLAN APPROVAL AND ADOPTION

The BWG approved the final Upper Ocklawaha River BMAP at its June 22, 2006 meeting. Subsequent to consensus approval, each participating entity signed a statement of commitment (see Chapter 7) to plan implementation. Many of the participating local governments also issued resolutions of support for the BMAP. The final BMAP will be adopted by DEP Secretarial order.

APPENDIX D. NET ESTIMATED TOTAL PHOSPHORUS LOADS AFTER BMAP IMPLEMENTATION

Starting with the baseline loadings for sources of TP, tables were developed for the individual sub-basins showing the estimated change in TP loading after the implementation of projects and activities in this plan. These tables factor in the estimated load reductions from current and planned projects and the estimated loading changes associated with future growth, resulting in a net estimated TP load for each impaired waterbody. Current projects are those completed as of the end of 2005. Future projects are those planned for initiation or completion after 2005. The estimated load changes from future growth are based primarily on future land use maps. **Table 3.7,** in Chapter 3, summarizes the net estimated loadings for all the TMDL waterbodies. **Tables D-1** to **D-10** show the net estimated load calculations for each waterbody. These net loadings may be updated as part of BWG follow-up on BMAP implementation.

Moving through the reduction tables, the tributary contribution to a waterbody's nutrient load changes proportionally with the change in upstream water quality. For example, current acquisition and restoration projects in Lake Apopka have improved water quality to the extent that the TP load to Lake Beauclair, just downstream, has been reduced by 26,011 lbs/yr, as shown in the current projects column in **Table D-2.** These improvements in upstream water quality are reflected in the nutrient load for each affected downstream waterbody. After factoring in all the projected changes in loading, the tables estimate a net TP load for the lake or waterbody. The data from the baseline column and the net loading columns were used to produce the pie diagrams shown in Chapter 4 for each waterbody.

TABLE D-1. LAKE APOPKA—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1989–94)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Gourd Neck Spring	2,204				2,204
Muck farm discharges	117,015	-117,015			0
Apopka restoration areas		37,477	-26,231		11,246
LAP09 Jones Ave. Regional SMP			(-945)		
Atmospheric deposition (wet/dry)	11,089				11,089
Tributary inflows	3,197		-134		3,063
LAP25 Pioneer Key Mobile Home Park			(-134)		
Point sources	617	2,050			2,667
Peat mine (inactive)	794	-794			0
Stormwater runoff	1,323	-35			1.288
Natural area runoff					
Runoff from developed uses					
LAP14 SR 50 Basin G		(3)			
LAP15 SR 50 Basin H		(-13)			
LAP16 SR 50-Basin I					
LAP18 Berg Dr. Retrofit		(-2)			
LAP19 Water St. Retrofit		(-23)			
Seepage/ground water	1,212				1,212
Margin of safety		1,168			1,168
Loading information					
Baseline and net TP loading (lbs/yr)	137,451	-77,149	-26,365	0	33,937
TMDL (lbs/yr)	35,052				35,052
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					0
Additional **percent reduction** in TP loading needed to meet TMDL					0

TABLE D-2. LAKE BEAUCLAIR—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Muck farm discharges					
Muck Farm 1 (active)	1,701				1,701
Atmospheric deposition (wet/dry)	311				311
Discharge from Lake Apopka	43,526	-26,011	-14,741		2,774
Acquisition and restoration on Lake Apopka		(-26,011)	(-9,741)		
ABC01 Nutrient Reduction Facility (NuRF)			(-5,000)		
BCL02 Suction dredging of west Lake Beauclair					
Discharge from Lake Dora	15	-4	-5		6
Point sources					
Stormwater runoff					
Natural area runoff	361			-48	313
Runoff from developed uses	565			845	1,410
Seepage/ground water					
Septic tanks	193			34	227
Loading information					
Baseline and net TP loading (lbs/yr)	46,672	-26,015	-14,746	831	6,742
TMDL (lbs/yr)	7,056				7,056
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**	39,616				0
Additional **percent reduction** in TP loading needed to meet TMDL					0

TABLE D-3. LAKE CARLTON—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Atmospheric deposition (wet/dry)	118				118
Point sources					
Stormwater runoff					
Natural area runoff	76			-25	51
Runoff from developed uses	216			254	470
Seepage/ground water					
Septic tanks	67			11	78
Loading information					
Baseline and net TP loading (lbs/yr)	477	0	0	240	717
TMDL (lbs/yr)	195				195
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**	282				522
Additional **percent reduction** in TP loading needed to meet TMDL					268%

TABLE D-4. LAKE DORA—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Atmospheric deposition (wet/dry)	1,266				1,266
Discharge from Lake Beauclair	36,007	-20,071	-11,377	641	5,200
Discharge from Lake Eustis	13		-2		11
Point sources					
Stormwater runoff					
Natural area runoff	325			-90	235
Runoff from developed uses	1,623	8		630	2,261
DORA04 SR 500 / US 441 Basin 300A		(-3)			
DORA05 SR 500 / US 441-Basin 300A,B,C,D		(11)			
Seepage/ground water					
Septic tanks	412			82	494
Loading information					
Baseline and net loading (lbs/yr)	39,646	-20,063	-11,379	1,263	9,467
Total TMDL (lbs/yr)	13,230				13,230
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					0
Additional **percent reduction** in TP loading needed to meet TMDL					0

TABLE D-5. LAKE EUSTIS—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Muck farm discharges					
Muck Farm 2 (inactive)	746	-746			0
Muck Farm 3 (inactive) – *anticipated private restoration*	633		-458		175
Restoration area discharges					
TROUT01 / EUS25 Pine Meadows Restoration Area	1,217	-603	-138		476
Atmospheric deposition (wet/dry)	2,250				2,250
Discharge from Lake Dora	19,089	-9,660	-5,479	609	4,559
Discharge from Lake Harris	6,284	-1,102	-635	672	5,219
Point sources					
Stormwater runoff					
Natural area runoff	957			-316	641
Runoff from developed uses	2,802	-313	-145	1,189	3,533
DORA9 SR 19 in Tavares-System I		(2)			
DORA10 SR 19 in Tavares-System II		(-1)			
DORA11 SR 19 in Tavares-System III		(-8)			
EUS02 Haynes Creek Park Retrofit		(-6)			
EUS06 Eustis St. / Ward Ave. S-W Facility		(-36)			
EUS07 Salem St. / Magnolia. Ave. Retrofit		(-63)			
EUS08 S. Grove St. and Palm Ave. S-W Facility		(-32)			
EUS09 Barnes Ave.and Center St. Retrofit		(-5)			
EUS10 Stevens Ave. Retrofit		(-41)			
EUS11 Russell Ave. Retrofit		(-31)			
EUS12 Hazzard Ave. Retrofit		(-14)			
EUS13 South Grove St. and Steven Ave. Retrofit			(-14)		
EUS14 SR 500 / US 441 Basin A		(-26)			
EUS15 SR 500 / US 441 Basin C		(-4)			
EUS16 SR 500 / US 441 Basin D		(1)			
EUS17 SR 500 / US 441 Basin E		(-15)			
EUS18 SR 500 / US 441 System C		(-21)			
EUS19 SR 19 in Tavares-System IV		(-10)			
EUS20 SR 500 / US 441		(-2)			
EUS21 SR 500 / US 441		(-3)			
EUS22 SR 500 / US 44-System D		(2)			
EUS23 South Bay St. and Eustis St. Retrofit			(-80)		
EUS24 North Bay St. and Clifford Ave. Retrofit			(-51)		
Seepage/ground water					
Septic tanks	1,525			886	2,411
Loading information					
Baseline and net TP loading (lbs/yr)	35,503	-12,424	-6,855	3,040	19,264
TMDL (lbs/yr)	20,286				20,286
Additional reduction needed in TP loading to meet TMDL					0
Additional **percent reduction** in TP loading needed					0

TABLE D-6. TROUT LAKE—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM RUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Muck farm discharges					
Muck Farm 2 (inactive)					
Muck Farm 3 (inactive)	222		-19		203
Restoration area discharges					
TROUT01 / EUS25 Pine Meadows Restoration Area	1,279		-726		553
Atmospheric deposition (wet/dry)	55				55
Point sources					
Stormwater runoff					
Natural area runoff	139			-55	84
Runoff from developed uses	877			647	1,524
Seepage/ground water					
Septic tanks	32				32
Loading information					
Baseline and net TP loading (lbs/yr)	2,604	0	-745	592	2,451
TMDL (lbs/yr)	521				521
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					1,930
Additional **percent reduction** in TP loading needed to meet TMDL					370%

TABLE D-7. LAKE HARRIS—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Spring discharge	2,046				2,046
Muck farm discharges	174	-174			0
Muck Farm 4 (active)	1,826				1,826
Restoration area discharges					
Harris Bayou	6,906	-4,441	-2,465		0
Atmospheric deposition (wet/dry)	5,421				5,421
Discharge from Lake Eustis	183		-99		84
Discharge from Palatlakaha River	3,891			551	4,442
Point sources	39				39
Stormwater runoff					
Natural area runoff	2,202			16	2,218
Runoff from developed uses	2,945	-98	-150	1,965	4,662
HAR01 Lakeshore Dr. Stormwater Project		(-2)			
HAR04 SR 500 / US 441 System A		(-13)			
HAR05 SR 500 / US 441 System B1		(-18)			
HAR06 SR 500 / US 441 System B2		(-10)			
HAR07 SR 500 / US 441 Basin 1		(-13)			
HAR08 SR 500 / US 441 Basin 3		(-11)			
HAR09 SR 500 / US 441 Basin 4		(-4)			
HAR10 SR 500 / US 441 Basin 5		(-22)			
HAR11 SR 500 / US 441 Basin 6		(-5)			
HAR13 Hollondel Road SW pond			-150		
Seepage/ground water					
Septic tanks	1,231			342	1,573
Loading information					
Baseline and net TP loading (lbs/yr)	26,864	-4,713	-2,714	2,874	22,311
TMDL (lbs/yr)	18,302				18,302
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					4,009
Additional **percent reduction** in TP loading needed to meet TMDL					22%

TABLE D-8. PALATLAKAHA RIVER—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Atmospheric deposition (wet/dry)					
Point sources					
Stormwater runoff					
Natural area runoff	1,293			-50	1,243
Runoff from developed uses	1,057		-13	396	1,440
PAL14 Big Creek US 27-Basin 1			(-13)		
Seepage/ground water					
Septic tanks					
Loading information					
Baseline and net TP loading (lbs/yr)	2,350	0	-13	346	2,683
TMDL (lbs/yr)	2,207				2,207
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					476
Additional **percent reduction** in TP loading needed to meet TMDL					22%

TABLE D-9. LAKE GRIFFIN—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Muck farm discharges	22,703	-22,703			0
Restoration area discharges					
HAR03 Harris Bayou Conveyance Project			415		415
GRIF01 Emeralda Marsh Restoration Area	23,410	-18,747			4,663
Atmospheric deposition (wet/dry)	3,815				3,815
Discharge from Lake Eustis	22,326	-7,813	-4,310	1,912	12,115
Discharge from Lake Yale	2				2
Point sources	27				27
Stormwater runoff					
Natural area runoff	1,089			-32	1,057
Runoff from developed uses	2,619	202	-185	527	2,759
GRIF05 Lazy Oaks Retrofit		(-19)			
GRIF06 Griffwood Community Retrofit		(-33)			
GRIF07 Brittany Estates Retrofit		(-13)			
GRIF10 Whispering Pines Regional SW retrofit			(-130)		
GRIF12 Lake Griffin State Park Retrofit		(-11)			
GRIF13 SR 500 / US 441 Basin 100			(-55)		
GRIF14 SR 500 / US 441 Basin 200		(-74)			
GRIF15 SR 500 / US 441 Basin 2		(-10)			
GRIF22 Mid-Florida Lake Mobile Home Park retrofit		(-42)			
Seepage/ground water					
Septic tanks	1,890			287	2,177
Loading information					
Baseline and net TP loading (lbs/yr)	77,881	-49,465	-4,080	2,694	27,030
TMDL (lbs/yr)	26,901				26,901
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					129
Additional **percent reduction** in TP loading needed to meet TMDL					1%

TABLE D-10. LAKE YALE—SUMMARY OF ESTIMATED REDUCTIONS IN TP FROM BMAP PROJECTS

SOURCES OF TP (LOADING IN LBS/YR)	TP LOADING BASELINE, NEEDED REDUCTIONS, AND ESTIMATED REDUCTIONS FROM RESTORATION AND STORMWATER PROJECTS				
	TMDL BASELINE LOADING (1991–2000)	ESTIMATED LOAD CHANGE FROM CURRENT PROJECTS (THROUGH 2005)	ESTIMATED LOAD CHANGE FROM FUTURE PROJECTS (2005 ON)	ESTIMATED LOAD CHANGE FROM GROWTH (2001–10)	NET ESTIMATED TP LOAD
Atmospheric deposition (wet/dry)	1,442				1,442
Point sources	109	-109			0
Stormwater runoff					
Natural area runoff	547			-47	500
Runoff from developed uses	768			298	1,066
Seepage/ground water					
Septic tanks	292			355	647
Loading information					
Baseline and net TP loading (lbs/yr)	3,158	-109	0	606	3,655
TMDL (lbs/yr)	2,844				2,844
Additional reduction in TP loading needed to meet TMDL **(lbs/yr)**					811
Additional **percent reduction** in TP loading needed to meet TMDL					29%

APPENDIX E. SUMMARY OF PLRG AND TMDL DEVELOPMENT METHODS

I. Pollutant Load Reduction Goal Development Methods and Peer Review (for Lakes Apopka, Beauclair, Dora, Harris, Little Harris, Eustis, Yale, and Griffin)

The TMDLs for the seven major lakes in the Upper Ocklawaha River Basin (Lakes Apopka, Beauclair, Dora, Harris-Little Harris, Eustis, Yale, and Griffin) were based on PLRGs developed by the SJRWMD. The TMDL for Lake Carlton was developed by DEP using the same methods as those used by the SJRWMD for the Harris Chain of Lakes. Section II of this appendix summarizes the TMDL methods used for Lake Carlton, Trout Lake, and the Palatlakaha River. The general process for the development of PLRGs is as follows:

1. *Identify the critical pollutant(s),*
2. *Estimate the existing pollutant load,*
3. *Determine the desired concentration for restoration or compliance with state water quality standards,*
4. *Determine the allowable pollutant load to reach the desired concentration, and*
5. *Determine the necessary load reductions.*

The Lake Apopka baseline loadings were developed several years earlier than those for the other sub-basins and included different methodologies and components. During the Apopka baseline period, septic tanks were not included in the loading estimates because they were considered insignificant compared with the large loading from the muck farms; however, septic tank loading may be incorporated as part of the ground water seepage estimate.

The major water quality problem in the Upper Ocklawaha River Basin lakes is eutrophication (excessive nutrient levels leading to algal blooms and poor water transparency). TP was identified as the critical pollutant for the lakes because of evidence for substantial historical increases in external loading of TP to the lakes and for TP as the key controlling nutrient for algae growth in the lakes. TP reduction will limit algal growth, which will improve water quality and the overall health of the lakes.

Existing external TP loads for the 7 lakes were estimated for the baseline period (1989–94 for Lake Apopka; 1991–2000 for the other lakes). “Antecedent” or natural background TP concentrations for the lakes were determined through a combination of existing concentrations in reference lakes, historical observations of water transparency, and modeling of natural background conditions in the basin. For Lake Apopka, TP concentrations were estimated for antecedent conditions, representing conditions just before the large-scale development of the muck farms (about 1940). For the other lakes, natural background TP concentrations were estimated, representing conditions before human influences.

Target TP concentrations for the lakes were established by allowing a 10 percent degradation from the antecedent or natural background water transparency, as specified in Florida water quality standards (Section 62-302.530, F.A.C.). The external TP loading target was determined by multiplying the ratio of target to existing TP concentrations by the existing external TP load. This calculation assumes that TP concentrations in each TMDL waterbody are directly proportional to external TP loading. This assumption is supported by water quality modeling in the Upper Ocklawaha River Basin lakes and by the responses of other lakes to TP load reduction.

A report on the development of interim PLRGs for the Upper Ocklawaha River Basin lakes was reviewed within the SJRWMD and then sent for peer review to DEP and the EPA in May 2003. SJRWMD responded to DEP questions about the report in July 2003. DEP adopted TMDLs based on the interim PLRG recommendations in September 2003. Before TMDL adoption, there were public review periods and hearings. The PLRG methodology was presented at meetings of the American Society of Limnology and Oceanography and the Florida Lake Management Society in June 2004. A presentation on the PLRG methodology was also made at a meeting of the Harris Chain of Lakes Restoration Council in June 2003. The final PLRG report was published on the SJRWMD Web site in September 2004, and has been available for public review since then.

Management Actions Considered in PLRG Development for the Harris Chain of Lakes

The primary land use data layer used for stormwater runoff estimates was derived from aerial photos taken in 1994–95. A secondary land use layer was developed from aerial photos taken primarily in 1987. Differences between the 1987 and 1995 land use maps were used to determine development that occurred in the watershed after 1987. It was assumed that there was no stormwater treatment for lands already developed in 1987, but there was stormwater treatment for lands developed after 1987. Based on the average treatment performance from 13 studies of Florida stormwater systems, it was assumed that stormwater treatment removed 63 percent of the TP load. The same methods were used to estimate stormwater treatment for new development in the 2005 land use maps.

II. TMDL Development Methods (for the Palatlakaha River, Trout Lake, and Lake Carlton)

Palatlakaha River Sub-basin

The most downstream segment of the Palatlakaha River (WBID 2839) was verified impaired in 2002 and placed on the state's 303(d) list for the development of TMDLs. The segment was verified impaired for DO because more than 10 percent of the values measured were less than the state criterion of 5 ppm. Nutrients (TP and TN) and BOD were identified as the pollutants contributing to the depressed DO levels. DO is not expected to achieve 5 ppm at all times and all places because of the substantial contribution of drainage from wetlands. Other causes of depressed DO levels are the decay of organic matter that contributes oxygen-demanding substances in the water column and nutrients that can fuel algal and bacterial growth. Respiration by bacteria and algae can contribute to low DO levels.

A background condition was established for DO that accounted for the natural depression of DO from wetland drainage. The Palatlakaha River passed a SCI test in January 1992, indicating that the river was biologically healthy and adapted to DO levels

lower than 5 ppm. Land use loadings for 1991 were calculated to establish the corresponding conditions that supported a healthy biological community and the acceptable TMDL loadings.

In 2003, a TMDL for BOD was adopted for WBID 2839. The upstream boundary for this TMDL was between Lakes Minneola and Minnehaha. The BOD TMDL for the Palatlakaha River is based on land use loadings to the river. A number of modeling assumptions were made, as follows:

- *A simplified approach was used based solely on loadings from different land uses. Septic tanks were not calculated as a separate loading but were assumed to be part of overall loadings from different land use categories.*
- *The only source of loadings was surface runoff; ground water inputs were not included. It was also assumed that all runoff generated was part of the loading to the river. Atmospheric deposition is part of surface runoff.*
- *All nutrients were assumed to be in a dissolved form and biologically available.*
- *The only part of the sub-basin for which land use loadings were calculated was WBID 2839. Tributary loadings from upstream and western drainage areas were not included.*

Land use loadings calculated for 2000 were compared with the baseline year of 1991. The difference or increase in loading found for 2000, compared with 1991, was adopted as the reduction needed to meet the TMDL.

Lake Carlton

The TP TMDL developed for Lake Carlton followed the methodology used by the SJRWMD to establish TP PLRGs for the Upper Ocklawaha Chain of Lakes. A detailed description of the methodology can be found in Fulton et al., 2004. Lake Carlton did not have any gauged or ungauged tributaries, springs, or point sources. Stormwater runoff associated with various land uses, septic tanks, and direct atmospheric precipitation (wet and dry) on the lake surface was the primary source quantified. The 1995 land use information was used, with soils data and annual rainfall totals for the 1991–2000 period, to estimate stormwater runoff contributions to the lake. Atmospheric deposition data collected in the watershed were used to estimate annual loads to the lake surface. The TMDL baseline TP loading estimate does not include loading from water exchanged with Lake Beauclair; this loading may be large. Loads presented in the TMDL document represented the average from the 10 individual years.

Trout Lake

Based on the information provided by DEP NPDES Stormwater Program staff, the city of Eustis is on the Phase II MS4 list. However, none of the watershed currently lies in an area covered under an MS4. As such, there are currently no point sources authorized to discharge to the lake under the NPDES Program.

The nutrient TMDL for Trout Lake was developed using the Watershed Management Model (WMM), in conjunction with the BATHTUB model. The WMM estimates loadings to a waterbody based on the imperviousness and EMC of TN and TP from the different land use types in the watershed. The spatial distribution and acreage of different land use categories were identified using the SJRWMD 1995 land use coverage (scale 1:40,000) contained in the DEP geographic information system (GIS) library. Methods

used to estimate the TN and TP loadings from the watershed, precipitation directly on the surface of the lake, and the contribution from leaking septic tanks are described in detail in the DEP report, *Nutrient Total Maximum Daily Load for Trout Lake, Lake County, Florida* (Gao and Gilbert, January 2004).

The BATHTUB eutrophication model is a suite of empirically derived, steady-state models developed by the U.S. Army Corps of Engineers (USACOE) Waterways Experimental Station. The primary function of these models is to estimate nutrient concentrations and algal biomass resulting from different patterns of nutrient loadings to the lake. The target for TMDL development was based on the models' prediction of a background TSI for the lake. The DEP report referenced above includes details for developing the background condition and the resulting TMDL target.

Management Actions Accounted for in Developing the Trout Lake TMDL

Historical development in the Trout Lake watershed created flooding and water quality problems. These changes in land use increased the amount of runoff and lowered water quality; one consequence was increased nutrient loading into Trout Lake. In fact, Hicks Ditch is part of the Upper Ocklawaha River Basin, which has been identified by the SJRWMD as a high-priority basin for restoration.

In an initial effort to reduce nutrient runoff into the lake, the SJRWMD purchased a 670-acre muck farm in the watershed through an active muck farm acquisition program. The EMCs used in the model were provided by the SJRWMD and therefore take into account the site-specific changes in runoff water quality. Additionally, the loading estimates were based on the EMCs of TN and TP for different land use categories in the Trout Lake watershed, as provided by the SJRWMD. As these EMCs were based on local conditions, they should account for the degree of stormwater controls already in place in the watershed.

APPENDIX F. DESCRIPTION OF METHODS USED TO ESTIMATE LOADING INCREASES ASSOCIATED WITH FUTURE GROWTH FROM 2000 TO 2010

Harris Chain of Lakes

The TP source tables include expected changes in external TP loads from existing and future projects, and from future growth in the basin. For SJRWMD restoration areas, the expected load changes from current projects were estimated by combining TP concentrations occurring in 2004 with the discharge volumes occurring during the TMDL baseline period. The expected future load changes from SJRWMD restoration areas were estimated assuming a discharge of 1 lb/acre/yr of TP (some SJRWMD restoration areas are already meeting this target). It was also assumed that this discharge rate will be achieved for Muck Farm 3, which was sold last year to a new owner who intends to develop it as a wetland mitigation area.

During the baseline period, TP loading from stormwater runoff was estimated from land uses in the Upper Ocklawaha River Basin (using a 1995 land use map for the drainage sub-basins for the Harris Chain of Lakes). Different methods were used for different parts of the basin to estimate 2010 stormwater loading. For Lake Apopka, it was assumed that there would be no increase over baseline conditions, because the special stormwater rule established for that sub-basin requires new development to prevent any increases in runoff.

To estimate stormwater runoff for existing conditions for the Harris Chain of Lakes (Beauclair, Dora, Harris, Eustis, Griffin, Yale, and Carlton), a composite 2005 land use map was developed that combined several source maps, including the following:

- *2002 Lake County land use map for unincorporated areas of the county,*
- *SJRWMD and Lake County conservation area maps,*
- *Existing city land use maps (Tavares, Leesburg, Mount Dora),*
- *City of Eustis future land use map,*
- *Orange County 2020 future land use map, and*
- *SJRWMD 2000 land use map (other cities, north Lake Griffin sub-basin, Marion County).*

This 2005 land use map was used to estimate existing TP loading from stormwater runoff using the same methods as for the baseline period. The 2010 stormwater loading was extrapolated using one of two methods. For areas represented by future land uses in the 2005 land use map (the city of Eustis and Orange County), it was assumed that there would be no further changes in loading from the 2005 estimates. For other areas, the same rate of change in loading was assumed for the periods from 2005–10 and 1995–2005. For example, if TP loading from developed land uses increased 10 percent in the 10 years between 1995 and 2005, it was assumed that it would increase another 5 percent in the next 5-year period.

The projected increases in stormwater TP loading were compared with the projected increases in population size over the same 5-year period (2005–10), using population data from the Lake County Forecast Socioeconomic Data Development Update (January 2005), prepared for the Lake–Sumter Metropolitan Planning Organization by Tindale-Oliver and Associates. The

projected increases in stormwater TP loading (ranging from 5 to 27 percent) were similar to, and strongly correlated with (r = 0.97), the increases in estimated population size (6 to 27 percent).

Similar methods were used to estimate 2010 TP loading from septic tanks for the Harris Chain of Lakes. Only septic systems located within 200 meters of the lakes, lakeshore wetlands, or canals connecting to the lakes were assumed to contribute nutrients to the lakes. Counts of structures in this zone were made from 1995 (baseline) and 2004 (existing) aerial photos, excluding areas known to be served by municipal sewage treatment plants. The same methods were used to estimate TP discharges from the counts of baseline and existing septic systems. As with stormwater runoff, the same rate of change in loading was assumed for the 2004–10 period and the 1995–2004 period.

Palatlakaha River Basin

The Palatlakaha River was identified as impaired for DO. DEP determined that the existing concentrations of TN, TP, and BOD in the river contributed to the impairment. A TMDL was adopted for WBID 2839 in 2003 that addresses loadings of TN, TP, and BOD.

Expected future growth and development in the Palatlakaha River sub-basin will potentially increase the loadings of TN, TP, and BOD materials into the river. The DO TMDL developed for the Palatlakaha River used 1991 land use loadings as a baseline to establish the TMDL. Reductions needed to meet the TMDL were based on the difference between land use loadings calculated for 2000 and the baseline year of 1991. Loading reductions needed in the future to achieve the DO TMDL are expected to be higher than the current level of reductions identified in the TMDL.

To estimate the size of future loadings and better address their impact on the sub-basin, DEP created an estimated 2005 land use/cover map and projected growth to 2010 based on past rates of growth and type of development in the sub-basin. Land use/cover information was used in the development of the TMDL to estimate nutrient and BOD stormwater loadings from different categories of land use. The drainage area of the sub-basin used to estimate runoff was 137,342.5 acres, including all land surfaces and watercourses that drained either directly or indirectly into the Palatlakaha River, with two exceptions: the Grassy Lake and Jacks Lake watersheds are closed drainage basins that do not discharge surface runoff into the Palatlakaha River.

Future Land Use Mapping for the Palatlakaha River Basin

The Palatlakaha River sub-basin is contained within Lake, Polk, Sumter, and Orange Counties. For the Lake County portion of the sub-basin, a land use map prepared by the Lake County Planning Department was used as a base map. This map reflected land cover/land use in unincorporated Lake County as recently as 2002. Future land use and planning information from the cities of Leesburg, Groveland, Minneola, and Clermont was incorporated into the base map to better reflect urban land cover. The area of these cities continues to grow through the annexation of neighboring county land. Information from these cities reflects active and near-future development. Future land use maps were compared with 2004 aerial photos to verify that development was under way.

The portions of the sub-basin in Sumter and Orange Counties were small in area compared with those in Lake and Polk Counties, did not include connected surface water features, and did not include areas of proposed development. For portions of the sub-basin in Sumter and Orange Counties, a SJRWMD 2000 land use map digitized from 1999–2000 aerial photos was used to fill in these areas. The SJRWMD 2000 land use was visually checked against the Lake County base map at the boundaries to confirm matches with land use categories across county

boundaries. A second visual check was made using 2004 aerial photos to confirm that land use had not changed between 2000 and 2004.

The Palatlakaha River sub-basin south of US 192 is located in Polk County. Future and current land use maps were not available for this part of the sub-basin. Instead, the SJRWMD 2000 land use map was used as a base map. To update the SJRWMD base map, it was compared with 2004 digital aerial photos to identify locations where land use had changed from forest or agriculture to residential development. Residential development was estimated as low, medium, or high density, depending on the number of housing units found per acre, as estimated by GIS. Land use changes for the larger parcels of land were field verified.

Estimating Loadings

Annual contributions of different land uses to watershed loadings were estimated using a spreadsheet version of the WMM (1998), as modified by DEP. This model converts the annual amount of rainfall into surface runoff. Each land use in the sub-basin contains both pervious and impervious surfaces. Runoff coefficients for pervious and impervious surface area control the volume of runoff. Nonpoint source loadings are calculated by multiplying together the total surface runoff and EMCs of each pollutant for each land use type.

The original TMDL model only accounted for loadings from WBID 2839, the most downstream segment of the Palatlakaha River, and did not include the effects of growth on land use loadings upstream of Lake Minneola and west of the Palatlakaha River. Loadings for the entire Palatlakaha River sub-basin, as previously defined, were calculated to better estimate the percent increase in loadings in the sub-basin between 2000 and 2005. To establish a historical trend of percent change in loadings for the sub-basin, estimates were also made for 1995 and 2000 for the entire sub-basin. SJRWMD 1995 data were used to obtain land use acreages for 1995, and SJRWMD 2000 data were used to obtain land use acreages for 2000.

The baseline year used for developing the Palatlakaha River TMDL land use loadings was 1991. The calculation of the 2005 estimated land use loading required rerunning the WMM model, with new acreages for the different categories of land use but the same rainfall and runoff coefficients as 1991. The change in loadings between 2000 and 2005 was calculated as a percent change in loading. The additional percent increase in loading was added to the 2000 existing land use loading. The expected increase in loadings for 2005–10 was calculated as the average percent change of two trend periods: 1995–2000 and 2000–05. The predicted increase was also added to the 2000 existing loading.

APPENDIX G. TARGET POLLUTANTS ACROSS FLORIDA

Table G-1 summarizes the waters impaired by various causes for each waterbody type in the Group 1–4 basins (see **Appendix A);** the principal causes of impairment are as follows:

- *Out of 825 river/stream segments assessed: DO, fecal coliform, chlorophyll, fish advisories for mercury, and total coliform.*
- *Out of 286 lake segments assessed: TSI, fish advisories for mercury, DO, historical TSI, and total coliform.*
- *Out of 354 estuarine segments assessed: fish advisories for mercury, chlorophyll, DO, and fecal coliform.*
- *Out of 115 coastal segments assessed: fish advisories for mercury and dioxin.*

TABLE G-1. SUMMARY OF IMPAIRMENTS IN BASIN GROUPS 1–4

PARAMETER*	RIVERS/STREAMS		LAKES		ESTUARIES		COASTAL WATERS	
	NUMBER OF WATERBODIES	MILES IMPAIRED	NUMBER OF WATERBODIES	MILES IMPAIRED	NUMBER OF WATERBODIES	MILES IMPAIRED	NUMBER OF WATERBODIES	MILES IMPAIRED
DO	258	2,288	31	119,296	64	461	2	1
FECAL COLIFORM	153	1,132	5	4,416	54	641	5	1
CHLOROPHYLL	105	1,073	7	29,696	74	647		
MERCURY–FISH	46	708	25	92,352	40	772	97	1,170
TOTAL COLIFORM	78	673	5	24,768	22	110		
HISTORICAL CHLOROPHYLL	28	503	5	1,856	23	191		
IRON	30	387	5	26,752	15	168		
TURBIDITY	16	212	2	704				
LEAD	15	97	9	10,048	9	137		
CADMIUM	1	15	1	5,248	2	67		
UNIONIZED AMMONIA	8	40	11	22,976				
pH	24	311			3	5		
BIOLOGY	9	211			2	57		
ALKALINITY	9	130						
TOTAL SUSPENDED SOLIDS	10	96						
CONDUCTANCE	9	93						
COPPER	8	50			15	109		
DIOXINS-FISH	1	48			20	678	7	162
DISSOLVED SOLIDS	3	38						
BOD 5-DAY	2	32						
TSI			169	729,216				
HISTORICAL TSI			7	30,592				
SILVER			1	13,760	2	67		
SELENIUM					2	67		
THALLIUM					2	67		
NICKEL					3	29		

Source: DEP, May 2, 2006.
* Similar causes of impairments are anticipated for the Group 5 basins.

Note: Minimum state surface water criteria (Section 62-302.500, F.A.C.) provide that metals shall be measured as total recoverable metal, with specified exceptions.

APPENDIX H. MANAGEMENT ACTIONS, BY WATERBODY SEGMENT

Table H-1 lists the completed, ongoing, or planned management actions that are expected to contribute to TP reductions to TMDL waterbodies in the Upper Ocklawaha River Basin. Many of the projects listed have load reduction numbers associated with them, in lbs/yr. These estimated reductions were calculated by the individual entities that are responsible for the projects. The TWG reviewed these numbers and concurred that they were credible estimates.

***Note**: With regard to DOT projects, a few stormwater facilities show negative TP load reductions. The new roadway stormwater management systems now treat stormwater runoff from the entire roadway surface, including adjacent lands whose stormwater was previously untreated. The new roadway systems met regulatory criteria when permitted; however, the projects are not pure "retrofit" projects, and therefore do not necessarily meet pre/postconstruction TP load criteria (which exceed current regulatory criteria establishing design and performance standards for stormwater management systems).*

Many of the management actions under way or proposed cannot currently be quantified, and some may never be. However, it is reasonable to assume that these actions will have some beneficial effect on reducing TP loadings, however indirectly. Some activities, such as street sweeping and the use of baffle boxes to filter stormwater, have a more direct connection to load reductions, and studies have been conducted or initiated to collect data that will lead to the quantification of those activities, as discussed below.

- ***Street Sweeping***

  As part of its MS4 program, Orange County implements a street-sweeping program. To help quantify the pollutant load reduction resulting from street sweeping, Orange County has gathered data on all of the streets swept in the county and has transferred the information into Global Imaging System software, which will be used to select study locations for sampling street debris to evaluate the content and leachability of common pollutants. The county hopes that these data, along with information from a recent report, Contamination of Sediments in Street Sweepings and Stormwater Systems: Pollutant Composition and Sediment Reuse Options *(Leibens, 2001), will help to quantify the concentrations of pollutants per ton of street-sweeping material for each land use in the central Florida area. This will help the county quantify a pollutant load reduction for street sweeping, develop effective sweeping efforts, and establish an appropriate frequency.*

- ***Baffle Boxes***

  Many of the stormwater outfalls contributing significantly to pollutant load loadings are located in heavily developed areas. Due to the limitations of rights of way and the desire to reduce the operational complexity and costs of retrofitting these outfalls, an "end-of-pipe" mechanism is often the treatment method of choice. One example is a baffle box—an elongated, underground concrete drainage structure with baffles that promote the sedimentation of particulates in untreated stormwater flows. There are many proprietary or brand-name structures available on the market that operate similarly. These treatment systems remove TSS, floating debris and litter, and other substances typically associated with these pollutants. For instance, when TSS loads are

removed, metals, polycylic aromatic hydrocarbons (PAHs), and the particulate fraction of nutrients are removed as well. In the Upper Ocklawaha River Basin, nutrient removal is of the utmost importance.

The nutrient removal efficiency of baffle boxes is closely linked to the fraction of nutrients adhering to particulates in the stormwater and the ability of the baffle box to keep organic yard wastes above the water column. On average, studies indicate that approximately 80 to 90 percent of the TSS load can be removed when a baffle box removes particles in the range of 80 to 150 microns and larger. It has been suggested (Herr and Harper, 1999) that the fractions of particulate and dissolved TP are 50 percent each in residential stormwater runoff. Harper et al. also suggest that the particulate and dissolved fractions for nitrogen are 60 and 40 percent, respectively, for residential land use. Ultimately, the removal of TP ranges from approximately 25 to 40 percent when a baffle box unit achieves 80 percent TSS removal. ***For the purposes of this BMAP, it is recommended that 30 percent TP removal efficiency be applied to baffle boxes that have been engineered for a specific drainage area. This removal efficiency can be applied as more is known about the amount of material removed by the baffle boxes in use in a specific area.***

End-of-pipe stormwater treatment units have high maintenance demands due to the limited volume that these systems provide and the high pollutant loads in the drainage basins that they typically serve. Maintaining a baffle box is critical to achieving consistent pollutant removal efficiency. It has been estimated that there is a 2 to 7 percent decrease in efficiency when the baffle box is only half full of sediments. As the baffle box fills, the resuspension and some loss of trapped sediments occur in the structure. Therefore, when a baffle box is proposed as a permanent BMP for TP removal, a plan for inspection and maintenance must be part of the project design. Standard baffle box design should include features such as deflector fins to minimize the resuspension of particulates during a storm event. Additional pollutant removal effectiveness may be achieved when the baffle box system is fitted with a screen that keeps yard debris out of the water column. This type of system can reduce or eliminate the leaching of nutrients into the water column, if cleaned often enough.

Despite the complex nature of stormwater treatment, the maintenance demands of these types of units, and the difficulty of quantifying associated pollutant removal, they are still valuable on-site stormwater treatment tools used by many entities in the basin as part of their local efforts to reduce nutrient contributions to surface waters.

TABLE H.1. CURRENT AND PLANNED MANAGEMENT ACTIONS TO ACHIEVE REDUCTIONS IN TP LOADINGS TO TMDL WATERS IN THE UPPER OCKLAWAHA RIVER BASIN

Key to Table H.1:
Table H.1 shows project number, project name, associated WBID, general location, project detail, lead entity/partners, project status project cost, funding sources, estimated TP load reduction, and permit links, as applicable. The projects are generally organized by sub-basin, starting with the Lake Apopka sub-basin and moving downstream. **Table H.1** uses the following abbreviations/footnotes:

-- Not applicable.
***** Removes nutrients and reduces internal recycling, but does not reduce external loads.
[1] Load reductions are given in lbs/yr, unless otherwise indicated.

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
Lake Apopka Sub-basin								
APOPKA01 - Street sweeping	Apopka city-wide / Street sweeping to reduce debris and sediment entering Lake Apopka. The benchmark frequency for sweeping shall be quarterly or as needed. Removes sediment and debris from streets that would otherwise contribute potential nutrient loadings to Lake Apopka.	Unknown	2835D / Lake Apopka	City of Apopka / MS4 Phase I / FLS000011 / --	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
APOPKA02 - Educational outreach	Apopka city-wide / Various educational activities that inform and give guidance to citizens on importance of water as a resource. Activities included presentations, newspaper articles, handouts, mailouts on topic of water conservation and stormwater runoff. Storm drain stenciling program that engages local volunteers. Informs residents of discharges into surface waters. Indirect benefit to Lake Apopka by reducing pollutant sources and runoff within watershed.	Unknown	2835D / Lake Apopka	City of Apopka / MS4 Phase I / FLS000011 / --	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing	Education and outreach efforts
APOPKA03 - Stormwater collection system maintenance	Apopka city-wide / Maintenance and cleaning of stormwater inlets, ditches, swales, and ponds. The benchmark frequency for this routine maintenance shall be quarterly or as needed. Indirect benefit to Lake Apopka by reducing pollutant sources and runoff within	Unknown	2835D / Lake Apopka	City of Apopka / MS4 Phase I / FLS000011 / --	City of Apopka / City of Apopka / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
	watershed.							
LAP01 - Apopka Basin Development Guidelines, contained within County Land Development Regulations.	Lake County portion of Lake Apopka watershed including Johns Lake. / Apopka Basin Development Guidelines, contained within Lake County Land Development Regulations. Provides ground and surface water protection.	Not applicable	2835D; 2835C / Lake Apopka drainage basin; Gourd Neck Spring	-- / -- / -- / Lake County Environmental Services	Lake County Environmental Services / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
LAP02 - Lake Apopka Basin Drainage Inventory	Lake Apopka Basin / Lake Apopka Basin Drainage Inventory, per Lake County's Stormwater Program. Precursor to stormwater retrofit or restoration activities. BCI contracted to assess and inventory stormwater management features and outfalls and delineate drainage subbasins.	Not applicable	2835D; 2835C / Gourd Neck Spring; Lake Apopka	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / SJRWMD - $12,567 cost-share grant ; Lake County Stormwater Assessment - $12,567 / SJRWMD	$25,135	Complete / 2002	Special studies and planning efforts
LAP04 - Johns Lake Stormwater Master Plan	Johns Lake drainage basin / Orange and Lake Counties' Stormwater Programs stormwater Master Plan. Part of Apopka Drainage Basin inventory. Johns Lake Master Plan was joint project between Orange County, Lake County and LCWA done by Miller, Sellen, Connor, and Walsh. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lake to determine nonpoint sources of pollution.	Not applicable	2835D / Lake Apopka	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works; Orange County Public Works; LCWA / Lake County Stormwater Assessment-$24,958; Orange County-$200,000; LCWA-$25,000 / --	$250,000	Complete / 10/2003	Special studies and planning efforts
LAP05 - Lake Apopka Constructed Marsh flow-way Phase 1	Northwest shore of Lake Apopka / Constructed marsh on northwest shore of lake. Lake water pumped through marsh to remove particulates and nutrients from lake water. Marsh designed to treat about 150 cfs.	external reduction: 4,864 and flow-way: 17,640 to 22,050	2835D / Lake Apopka	-- / -- / -- / Lake Apopka SWIM Plan	SJRWMD / SJRWMD - SWIM Legislative Appropriation/ Ad Valorem/Beltway Mitigation Lake County / LCWA - $1,000,000 EPA - $1,000,000 / LCWA/ Lake County / EPA	Total $~15 million in land acquisition /$4.32 million phase 1 flow-way construction	Ongoing / Ongoing	Restoration and water quality improvement project
LAP06 - North Shore Restoration Area	North shore of Lake Apopka / Wetland habitat restoration. Remediate pesticide "hot spots" in soil.	99,960	2835D / Lake Apopka	-- / -- / -- / Lake Apopka SWIM Plan	SJRWMD / SJRWMD/Legislative appropriation - P2000:SOR: CARL; USDA WRP / USDA	$~100 million in land acquisition	Ongoing / Ongoing	Restoration and water quality improvement project

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
LAP07 - With-in Lake Habitat Restoration	Lake Apopka / Planting of wetland vegetation in littoral zone, largely north shore. Helps improve fishery, improve water quality, and may reduce nutrient levels, stabilize bottom, and reduce TSS.	Unknown	2835D / Lake Apopka	-- / -- / -- / Lake Apopka SWIM Plan	SJRWMD / SJRWMD ad valorem / --	~$10,000 annually	Ongoing / Ongoing	Restoration and water quality improvement project
LAP08 - Removal of Gizzard Shad	Lake Apopka / Harvest of gizzard shad by commercial fishermen. Removal of fish removes nutrients from lake. Reduce recycling of nutrients from sediments and reduce sediment resuspension (TSS). Stabilize bottom to reduce TSS.	Unknown	2835D / Lake Apopka	-- / -- / -- / Lake Apopka SWIM Plan	SJRWMD / SJRWMD ad valorem ;Lake County; LCWA; Legislature appropriation / Lake County / LCWA	~$500,000 annually	Ongoing / Ongoing	Restoration and water quality improvement project
LAP09 - Jones Avenue Regional Stormwater Management Project Section	North of Lake Apopka, city of Apopka, north shore of Lake Apopka / Jones Avenue Regional Stormwater Management Project in northern part of north shore area is 15-acre regional wet detention pond and 20-acre wetland restoration project located in Section 19,20, 21;Township 20S; Range 27E. It serves an area of 1,000 acres during 100-year flood elevation. It treats 0.35 inches over 500 acres. This project serves to reduce maintenance of ditches along Jones Ave. Improve water quality: remove TP and TSS. Reduce stormwater runoff from hazardous waste site. Habitat restoration. Net decrease in TP and other parameters.	945	2835D / Lake Apopka	OCEPD / MS4 Phase I / FLS000011 / --	Orange County Public Works / Orange County - $4.3 million; SJRWMD Ad valorem - $300,000 (plus land costs for both partners) / SJRWMD Lands Division	$4,600,000	Ongoing / Projected completion 8/2007	Structural BMPs- Quantifiable load reductions
LAP14 - SR-50-Basin G	Johns Lake / SR 50 from west of Hancock Rd. to east of Turnpike -Basin G. Wet pond detention.	-2.8	2835B / Johns Lake	DOT, District 5 / MS4 Phase I / FLS000011 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007	Structural BMPs- Quantifiable load reductions
LAP15 - SR-50-Basin H	Johns Lake / SR 50 from west of Hancock Rd. to east of Turnpike -Basin H. Wet pond detention. No increase in TP load with road improvement	13.46	2835B / Johns Lake	DOT, District 5 / MS4 Phase I / FLS000011 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007	Structural BMPs- Quantifiable load reductions
LAP16 - SR 50– Basin I	Johns Lake / SR 50 from west of Hancock R .to east of Turnpike -Basin I. Dry detention pond. No increase in TP load with road improvement.	-0.02	2835B / Johns Lake	DOT, District 5 / MS4 Phase I / FLS000011 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start date 4/2007	Structural BMPs- Quantifiable load reductions
LAP18 - Berg Drive	Lake Apopka / Stormwater retrofit Section 16; Township 20; Range 27. Exfiltration chambers for discharge of stormwater. Percolation of existing stormwater through ground.	1.9	2835D / Lake Apopka	OCEPD / MS4 Phase I permit / FLS000011 / --	Orange County Public Works / Orange County Public Works / --	$207,000	Complete / 6/1/2000	Structural BMPs- Quantifiable load reductions

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
LAP19 - Water Street	Lake Apopka Basin / Stormwater retrofit Section 23; Township 22; Rrange 27. Retention pond. Treatment and or percolation of stormwater.	22.8	2835D / Lake Apopka	OCEPD / MS4 Phase I permit / FLS000011 / --	Orange County Public Works / Orange County Public Works / --	$104,000	Complete / 7/1/2000	Structural BMPs-Quantifiable load reductions
LAP20 - Lake Apopka Master Plan - Orange County	Lake Apopka / Lake Apopka Master Plan done by Camp, Dresser, and McKee. Stormwater management plan for Lake Apopka. Phase 1 complete, ongoing with Phases 2 and 3. Identify retrofit opportunities to remove nutrient loading into Lake Apopka.	Not applicable	2835D / Lake Apopka	OCEPD / MS4 Phase I permit / FLS000011 / --	Orange County Public Works / Orange County Public Works / --	$250,000	Ongoing / phase 1 complete; phase 2 and 3 in progress	Special studies and planning efforts
LAP21 - Burch's Quarters Community Development Project	Lake Apopka Basin / Paving and drainage upgrades - Section 22; Township 22; Range 27. Resurfacing and overbuilding of existing pavement; installation of proposed storm sewer system, cross drains; construction of dry retention pond and associated outfall system. Treatment of stormwater by percolation into ground.	Unknown	2835D / Lake Apopka	OCEPD / MS4 Phase I permit / FLS000011 / --	Orange County Public Works / Housing and Community Development - CDBG / --	$1,356,000	Complete / 11/1/2006	Structural BMPs-Load reductions not quantified
LAP22 - East Bay Streets Community Development Project	Lake Apopka Basin / Paving and drainage upgrades - Section 13, 24 ; Township 22; Range 27. Roadway improvements will include resurfacing and overbuilding of existing pavement. Miami curbing and sidewalks will be installed based on proposed typical section. Drainage improvements include installation of proposed storm sewer, cross drains, construction of retention ponds and associated outfall system.	Unknown	2835D / Lake Apopka	OCEPD / MS4 Phase I permit / FLS000011 / --	Orange County Public Works / Housing and Community Development Blcok Grant / --	$1,700,000 estimate	Pending / Projected start date 6/1/2007	Structural BMPs-Load reductions not quantified
LAP25 - Pioneer Key Regional Stormwater Project	Pioneer Key Mobile Home Park / Regional stormwater improvements with water quality enhancements. Construction of regional wet detention stormwater treatment pond. Reduce pollutant loading to Lake Apopka. Project completed in 2 phases. Pioneer Key Regional Stormwater Facility funded by DEP. Additional work will include reconstruction of roadways, installation of storm sewers, sanitary sewer, potable water, and sidewalks within road right of way. Second phase of construction to Pioneer Key II Mobile Home Park funded by Orange County Community Block Grant.	134	2835D / Lake Apopka	City of Ocoee / MS4 Phase I permit / FLS000011 / --	Ocoee Public Works / City of Ocoee and private property owner - 67.3%; Orange County Community Development Block Grant - 32.7%; DEP-$900,000 / Orange County CDBG Program; DEP	$2,500,000	Complete / 10/1/2006	Structural BMPs-Quantifiable load reductions

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
LAP27 - Montverde Boat Ramp Swale Improvement	Montverde boat ramp / Improvements made to swale system.	Unknown	2835D / Lake Apopka	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Construction planned for 2008	Basic stormwater management program implementation
LAP28 - Shore Drive and Lake Blvd-Johns Lake Retrofit	Shore Drive and Lake Blvd. / Exfiltration and outfall improvements.	Unknown	2835B / Johns Lake	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Construction planned for 2008	Basic stormwater management program implementation
LAP29 - Lake Fuller Retention Pond	Lake Fuller watershed / Runoff from southern Apopka was redirected to 10-acre detention pond. Stormwater discharge removed from Lake Fuller. This lake is within watershed of Lake Apopka and indirectly benefits Lake Apopka through reduction of stormwater runoff and loading from watershed.	Unknown	2835D / Lake Apopka	City of Apopka / MS4 Phase II / FLS000011 / --	City of Apopka / City of Apopka / --	Not available	Complete / complete	Structural BMPs-Load reductions not quantified
OCOEE01 - Street Sweeping	Ocoee city limits / Sweeping of city-maintained streets to remove dirt, vegetaton, and debris. The benchmark frequency for street sweeping is bi-montlyly and covers about 1,159 miles with a performance removal of 206 tons of debris collected annually.	Unknown	2835A; 2835D / Lake Apopka sub-basin	City of Ocoee / MS4 Phase I / FLS000011 / --	City of Ocoee Stormwater Department / City of Ocoee / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
ORANGE01 - Street Sweeping in the Lake Apopka Basin	Unincorporated Orange County within Lake Apopka Basin / Contractor and DOT conduct street sweeping. Contractor and DOT sweep about 460 miles of road periodically on annual countywide basis. The benchmark for sweeping shall be about 3,000 cumulative miles annually. Based on typical street sweeping, the debris picked up would be approximately 28 tons.	Unknown	2835D / Lake Apopka	OCEPD / MS4 Phase I / FLS000011 / --	OCEPD / Public Works / Orange County	Based on Orange County contract rates, the estimated annual cost would be $60,000.	Ongoing / Ongoing	Basic stormwater management program implementation
WNTRGAR01 - Street Sweeping	Winter Garden city limits / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency for sweeping shall be quarterly or as needed. The performance benchmark shall be 4,355 miles of pavement swept with 312 cubic tons of debris collected annually.	Unknown	2835A; 2835D / Lake Apopka sub-basin	City of Winter Garden Public Works / MS4 Phase I / FLS000011 / --	Winter Garden Public Works Department / City of Winter Garden / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
Lake Beauclair Sub-basin								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
ABC01 - Nutrient Reduction Facility	Apopka-Beauclair Canal/CC Ranch / Water in Apopka-Beauclair Canal treated off-line with alum. Removes phosphorus containing compounds from Lake Apopka discharge. Reduce loading from Lake Apopka to Lake Beauclair and Apopka-Beauclair Canal.	5000.00	2835A; 2834C / Lake Apopka Outlet; Apopka-Beauclair Canal; Lake Beauclair	-- / -- / -- / --	LCWA / LCWA;Legislature / SJRWMD / DEP	$5,200,000	Ongoing / Projected completion 8/1/2007	Restoration and water quality improvement project
ABC02 - Lois Drive baffle box	Lois Drive- unincorporated Lake County / Baffle box included with drainage improvements.	Unknown	2835C / Apopka Beauclair Canal	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Complete / 2005	Structural BMPs-Load reductions not quantified
BCL02 - Suction dredging of western Lake Beauclair	Western end of Lake Beauclair / Suction dredging to remove 1 million cubic yards of sediment in western end of Lake Beauclair.	Unknown	2834C / Lake Beauclair	-- / -- / -- / --	FWC/LCWA/SJRWMD / cost-share / --	$12,000,000	Pending / Projected completion 8/1/2008	Restoration and water quality improvement project
BCL03 - Gizzard shad harvest	Lake Beauclair in-lake removal of fish / Harvest of gizzard shad by commercial fishermen. Removal of fish removes nutrients from lake. Reduce recycling of nutrients from sediments and reduce sediment resuspension (TSS). Stabilize bottom to reduce TSS.	Unknown	2834C / Lake Beauclair	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRWMD Ad valorem; Legislative appropriation / --	$150,000/year in 2005 and 2006	Ongoing / Ongoing	Restoration and water quality improvement project
ORANGE04 - Street sweeping in the Lake Carlton and Lake Beauclair Basins	Orange County-maintained roads in sub-basins that contribute to Lake Carlton and Lake Beauclair, which is primarily roads around Lake Ola and areas to north of that lake. / Contracted street-sweeping services on Orange County–maintained roads. Basin area approximately 6,522 acres. Within that area, the benchmark is13.87 miles of roads swept monthly for annual total mileage of 166.44. Estimated amount of debris collected through that effort is a performance removal of 3,080 pounds.	Unknown	2834C; 2837B / Lake Carlton and Lake Beauclair drainage basin	OCEPD / MS4 Phase I / FLS000011 / --	OCEPD / Not available / --	Estimated cost based on Orange County contract rates is $3,300.	Ongoing / Ongoing	Basic stormwater management program implementation
Lake Dora Sub-basin								
DORA01 - Lake Dora Avenue improvement project	Lake Dora Ave. in Mt Dora (Lake Dora - northeast shore) / Failing infrastructure replacement and improvement. Failing infrastructure - twin corrugated metal pipes in residential yard. Pipes were part of stormwater conveyance system discharging untreated runoff from old Hwy. 441. CDS unit removes sediments and particulates. Pollutants targeted were organic matter (tree litter) and sediment fines.	Unknown	2831B / Lake Dora	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	Design - $45,270 Construction - $82,640	Complete / 2003	Structural BMPs-Load reductions not quantified

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
DORA02 - Tavares stormwater retrofit	Downtown Tavares / Reduce sediment input to Lake Dora.	Sediment collection only	2831B / Lake Dora	City of Tavares Public Works / MS4 Phase II / FLR04E113 / - -	Tavares / Tavares - 34.5%;LCWA - 34.5%;Legislature - 31% / LCWA / DEP	$60,000	Complete / 2004	Structural BMPs-Load reductions not quantified
DORA03 - Old Hwy 441 and Lake Dora	North side of Lakeshore Dr., old Hwy. 441 east of Tavares. / Deteriorating ditch and pipe system discharged stormwater from Old Hwy. 441 to Lake Dora. Upgrade of inlets and construction of wet detention pond to treat highway runoff. Reduce stormwater inputs to Lake Dora.	Unknown	2831B / Lake Dora	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Complete / 2003	Structural BMPs-Load reductions not quantified
DORA04 - SR 500 US 441-Basin 300A	Lake Saunders / US 441 from Lake Eustis Dr. to CR 44B Basin 300A. Exfiltration trench. No increase in TP with road improvement.	3.04	2831B / Lake Saunders	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 6/2007	Structural BMPs-Quantifiable load reductions
DORA05 - SR 500 US 441-Basin 300A,B,C,D	Lakes Saunders and Woodward / US 441 from Lake Eustis Dr. to CR 44B - Basin 300A, B, C & D.	-10.51	2831B / Lake Saunders; Lake Woodward	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 6/2007	Structural BMPs-Quantifiable load reductions
DORA13 - Gizzard shad harvest	Lake Dora in-lake removal of fish / Harvest of gizzard shad by commercial fishermen. Part of experimental assessment with UF and FWC. Removal of fish removes nutrient from lake. Reduce recycling of nutrients from sediments and reduce sediment resuspension (TSS). Stabilize bottom to reduce TSS.	Unknown	2831B / Lake Dora	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRMWD Ad valorem; Legislative appropriation / --	$150,000/year in 2005 and 2006	Ongoing / Ongoing	Restoration and water quality improvement project
DORA15 - Lake Saunders Flood Study	Lake Saunders sub-basin / Priority project identified from Lake Dora Basin Study.	Unknown	2831B; 2830A; 2830 / Lake Saunders; Lake Dora	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / --	$43,102	Ongoing / Ongoing	Special studies and planning efforts
DORA16 - Lake Gertrude Outfall Improvements	Lake Gertrude sub-basin / Proposed improvements to Lake Gertrude outfall. Lake Gertrude is tributary discharge to Lake Dora. Lake County and Mt. Dora have interlocal agreement to authorize project.	Unknown	2823A; 2831B / Lake Gertrude; Lake Dora	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	City of Mt. Dora / Not available / Lake County Public Works	$635,000	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified
MTDORA01 - Street Sweeping	Within city limits of Mt. Dora / Citywide street-sweeping program. Removes sediments and debris from streets and prevents their entry into lakes. May remove some TP if attached to sediment. The benchmark frequency for this activity shall be quarterly or as needed.	Unknown	2831B / Lake Dora	City of Mount Dora / MS4 Phase II / FLR04E121 / --	City of Mt. Dora / City of Mt. Dora / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
Projects that Apply to Lake Beauclair, Carlton, and Dora Sub-basins								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
DORA14 - Lake Dora, Beauclair, and Carlton Basin Study	Lake Carlton. Lake Beauclair. Lake Dora drainage basin within Lake County. / Lake Carlton basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities.	Not applicable	2837B; 2834C; 2831B / Lake Carlton; Lake Beauclair; Lake Dora	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000 for 3 lakes	Ongoing / Ongoing	Special studies and planning efforts
Projects that Apply to Lake Dora and Lake Eustis Sub-basins								
Tavares01 - Street Sweeping	Tavares / Citywide street-sweeping program. Removes sediment and debris from streets that would otherwise contribute potential nutrient loadings to Lakes Dora and Eustis. The benchmark frequency for sweeping shall be quareterly or as needed.	Unknown	2831B; 2817B / Lake Dora and Lake Eustis	City of Tavares Public Works / MS4 Phase II / FLR04E113 / - -	City of Tavares / City of Tavares / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
Tavares02 - Baffle Boxes	Tavares / Baffle boxes have been placed in many of direct stormwater discharges into these lakes. City has installed more than 10 baffle boxes during past 5 years. Funds were provided by LCWA and DEP. Boxes collect sediments and debris and prevent their entry into lakes. May remove some TP if attached to sediment.	Unknown	2831B; 2817B / Lake Dora and Lake Eustis	City of Tavares Public Works / MS4 Phase II / FLR04E113 / - -	City of Tavares / City of Tavares / --	Not available	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified
Lake Eustis Sub-basin								
DORA09 - State Road 19 in Tavares-System 1	Lake Eustis / SR 19 from 1.9 miles south of US 441 to US 441 - System 1 (Basins 1-4). Wet pond detention.	-2.02	2831B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs-Quantifiable load reductions
EUS02 - Haynes Creek Park Retrofit	Haynes Creek Park located on South Haynes Creek Rd. near Ocklawaha Rd. / Dry retention pond and about 400 feet of retention ditches with ditch blocks along South Haynes Creek Rd. Site is county park in single-family residence neighborhood. Park captures runoff from 8.2-acre watershed via South Haynes Creek Rd.	6.40	2817A; 2817B / Haynes Creek Reach; Lake Eustis	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851) / --	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004	Structural BMPs-Quantifiable load reductions
DORA10 - State Road 19 in Tavares-System II	Dora Canal / SR 19 from 1.9 miles south of US 441 to US 441 - System II (Basins 1&2). Wet pond detention. No increase in TP load with road improvement.	1.19	2831B / Dora Canal	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs-Quantifiable load reductions

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
DORA11 - State Road 19 in Tavares-System III	Dora Canal / SR 19 from 1.9 miles south of US 441 to US 441 - System III (Basins 1 & 2). Wet pond detention. No increase in TP load with road improvement.	7.78	2831B / Dora Canal	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs-Quantifiable load reductions
EUS04 - Lakes Eustis and Silver Lake Drainage Evaluation	Lake Eustis and Silver Lake Basins / Lake Eustis and Silver Lake drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lakes.	Not applicable	2817B / Lake Eustis	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$184,000	Complete / Complete	Special studies and planning efforts
EUS05 - Stormwater Retrofit	North Tavares / Sediment and debris collection box. Baffle box.	Sediment collection only	2817B / Lake Eustis	City of Tavares Public Works / MS4 Phase II / FLR04E113 / --	City of Tavares / LCWA / Tavares - 34.5%; LCWA - 34.5%; Legislature- 31% / DEP	$30,000	Complete / 1/1/2004	Structural BMPs-Load reductions not quantified
EUS06 - Eustis Street/Ward Avenue Stormwater Facility	Eustis St. and Ward Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	36.26	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / LCWA - 50% ; Legislature - 50% / LCWA / DEP	$355,550	Complete / 8/1/2003	Structural BMPs-Quantifiable load reductions
EUS07 - Salem Street and Magnolia Avenue Retrofit	Salem St. and Magnolia Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	62.54	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / DOT - $600,000; EUSTIS - $150,000 / DOT	$750,000	Complete / 2001	Structural BMPs-Quantifiable load reductions
EUS08 - South Grove Street and Palm Avenue Stormwater Facility	South Grove St., Eustis / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	32.41	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / LCWA / LCWA - $56,000; EUSTIS - $58,700 / --	$114,700	Complete / 2002	Structural BMPs-Quantifiable load reductions
EUS09 - Barnes Avenue and Center Street Retrofit	Barnes Ave. and Center St. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	4.84	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / Eustis - $100,000 / --	$100,000	Complete / 2003	Structural BMPs-Quantifiable load reductions
EUS10 - Stevens Avenue Retrofit	Stevens Ave. and Donnelly St. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Construction of new storm sewers. Diverts runoff prior to discharge into Lake Eustis to new detention pond at Stevens Ave. and Donnelly St.	40.64	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / DOT - $990,000;Eustis - $75,000 / DOT	$1,065,000	Complete / 2006	Structural BMPs-Quantifiable load reductions

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
EUS11 - Russell Avenue Retrofit	Russell Ave. / Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	30.97	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / - -	City of Eustis / LCWA - 50%;Eustis - 50% / LCWA	150,000	Complete / 7/1/2004	Structural BMPs- Quantifiable load reductions
EUS12 - Hazzard Avenue Retrofit	Hazzard Ave. / Divert stormwater runoff to wet retention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	14.02	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / - -	City of Eustis / LCWA - 50%;Eustis - 50% / LCWA	$76,539	Complete / 7/1/2004	Structural BMPs- Quantifiable load reductions
EUS13 - South Grove Street and Steven Avenue Retrofit	Intersection South Grove St. and Steven Ave. in Eustis / Stormwater retrofit. Exfiltration trenches.	14	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / - -	City of Eustis / Eustis Stormwater Utility Fee / --	$100,000	Complete / 4/15/2006	Structural BMPs- Quantifiable load reductions
EUS14 - SR 500 US 441-Basin A	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin A. Wet pond detention. No increase in TP with road improvement.	26.33	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS15 - SR 500 US 441-Basin C	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin C. Wet pond detention. No increase in TP with road improvement.	3.9	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS16 - SR 500 US 441-Basin D	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin D. Wet pond detention. No increase in TP load with road improvement.	-1.47	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS17 - SR 500 US 441-Basin E	Lake Eustis / US 441 from 0.2 miles west of Lake Shore Blvd. to Lake Eustis Dr. - Basin E. Wet pond detention. No increase in TP with road improvement.	15.19	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS18 - SR 500 US 441-System C	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System C. Wet pond detention. No increase in TP with road improvement.	21.15	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS19 - State Road 19 in Tavares-System IV	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System IV (Basin 2). Wet pond detention. No increase in TP load with road improvement.	9.82	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
EUS20 - SR 500 US 441	Lake Juanita / US 441 from Lake Eustis Dr. to CR 44B. Wet pond detention. No increase in TP load with road improvement.	1.85	2817B / Lake Juanita; Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 6/2007	Structural BMPs- Quantifiable load reductions

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
EUS21 - SR 500 US 441	Lake Juanita / US 441 from Lake Eustis Dr. to CR 44B. Wet pond detention. No increase in TP with road improvement.	3.28	2817B / Lake Juanita; Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Ongoing / Projected completion 6/2007	Structural BMPs-Quantifiable load reductions
EUS22 - SR 500 US 441-System D	Lake Eustis / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System D-No detention. No increase in TP load with road improvement.	-1.99	2817B / Lake Eustis	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs-Quantifiable load reductions
EUS23 - South Bay Street and Eustis Street Retrofit	Intersection South Bay St. and Eustis St. in Eustis / Stormwater retrofit. Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	80	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / LCWA - $289,000;DEP-$155,000;SJRWMD-$206,000 / LCWA / DEP / SJRWMD	$650,000	Complete / 7/20/2006	Structural BMPs-Quantifiable load reductions
EUS24 - North Bay Street and Clifford Avenue Retrofit	Intersection North Bay St. and Clifford Ave. in Eustis / Stormwater retrofit. Divert stormwater runoff to dry detention pond via storm sewer retrofit for total treatment and storage. Divert stormwater runoff to pond instead of discharge into Lake Eustis.	51	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / LCWA - $327,250; Eustis-$327,250 / LCWA / DEP / SJRWMD	$654,500	Ongoing / Projected completion 2007	Structural BMPs-Quantifiable load reductions
EUSTIS02 - Support of WAV Program	Within city of Eustis jurisdiction / Eustis is partner and financial supporter of WAV Program. WAV provides assistance to city with implementation of educational programs and water quality monitoring to support Eustis's MS4 permit.	Unknown	2817B / Lake Eustis	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / Eustis Stormwater Utility Fee / Lake County / LCWA	5,000 annually	Ongoing / Ongoing	Education and outreach efforts
EUSTIS03 - Stormwater design rules	Within city of Eustis jurisdiction / Eustis code sec. 115-5. Eustis stormwater rules for new development are more stringent than state or SJRWMD rules. All new development must provide stormwater treatment meeting city requirements and are subject to review by staff. City staff do field inspections of new construction. Eustis rule has 3 design criteria: 100-year storm, 50-year storm, and 25-year storm based on geotechnical and soil conditions. SJRWMD only requires 25-year peak storm flow design criteria. Most development within Eustis requires 50- or 100-year design criteria.	Unknown	2831B / Lake Eustis	--/ -- / -- / --	City of Eustis / Eustis Stormwater Utility Fee / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
Projects that Apply to Lake Eustis and Trout Lake Sub-basins								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
TROUT01 - Pine Meadows Restoration Area	Pine Meadows Restoration Area. Muck farm is east of Trout Lake and discharges to Hicks Ditch. / Reduce TP loadings from former muck farm. Restore aquatic, wetland, and riverine habitat. Chemical treatment of soil (alum) to bind phosphorus containing compounds. Reduce nutrient outflow to feasible level of 1.1 kg/ha/yr of TP, or about 1 lb. per acre. Trout Lake is a tributary to Lake Eustis. Reduction in nutrient loading benefits both Lake Eustis and Trout Lake.	1487 - Lake Eustis; 726 - Trout Lake	2817B; 2819A / Lake Eustis andTrout Lake	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRWMD / --	$1,300,000 combined cost for both lakes	Ongoing / Ongoing	Restoration and water quality improvement project
EUS25 - Pine Meadows Restoration Area	Pine Meadows Restoration Area. Muck farm is east of Trout Lake and discharges to Hicks Ditch. / Reduce TP loadings from former muck farm. Restore aquatic, wetland, and riverine habitat. Chemical treatment of soil (alum) to bind phosphorus containing compounds. Reduce nutrient outflow to feasible level of 1.1 kg/ha/yr of TP, or about 1 lb. per acre. Trout Lake is tributary to Lake Eustis. Reduction in nutrient loading benefits both Lake Eustis and Trout Lake.	1487 - Lake Eustis; 726 - Trout Lake	2817B; 2819A / Lake Eustis and Trout Lake	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRWMD / --	$1,300,000 combined cost for both lakes	Ongoing / Ongoing	Restoration and water quality improvement project
EUSTIS01 - Street Sweeping and Drainage Maintenance	Throughout city of Eustis / City, DOT, and citizen groups sweep streets. Downtown Village streets are swept weekly (52 times/yr). Other streets are swept monthly. The performance benchmark shall be 1,110 miles of road swept with 1,587 cubic yards of material removed annually.	Unknown	2817B; 2819B / Lake Eustis; Trout Lake	City of Eustis Public Works / MS4 Phase II / FLR04E100 / --	City of Eustis / Eustis Stormwater Utility Fee / --	$234,951 per year	Ongoing / Ongoing	Basic stormwater management program implementation
Trout Lake Sub-basin								
TROUT03 - Trowell Avenue Baffle Boxes	Lake Umatilla watershed / Installation of 2 baffle boxes at edge of Lake Umatilla to catch sediment carried in stormwater before it enters Lake Umatilla. Lake Umatilla drains into Trout Lake via Hicks Ditch. Funding for project was supplied by community block grant obtained with assistance of SJRWMD.	Unknown	2819A / Trout Lake	City of Umatilla Public Works / MS4 Phase II / FLR04E108 / --	City of Umatilla / Not available / SJRWMD	Not available	Complete / complete	Structural BMPs-Load reductions not quantified
TROUT04 - Kentucky Avenue Retention Pond	Kentucky Avenue-Lake Umatilla watershed / Retention pond located on Kentucky Ave. will reduce stormwater inputs into Lake Umatilla. Lake Umatilla drains into Trout Lake via Hicks Ditch.	Unknown	2819A / Trout Lake	City of Umatilla Public Works / MS4 Phase II / FLR04E108 / --	City of Umatilla / FEMA-El Nino grant; / State	$1,468,320	Complete / complete	Structural BMPs-Load reductions not quantified

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
TROUT05 - Trout Lake Basin Study	Trout Lake Basin / Basin study of Trout Lake basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Study is continuation of Lake Eustis Basin Study. Study performed by PEC.	Not applicable	2819A / Trout Lake	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / --	$130,000	Ongoing / Ongoing	Special studies and planning efforts
TROUT06 - Getford Road Stormwater Park	Trout Lake Basin / Lake County stormwater master plan implementation. Joint project between Lake County and city of Eustis. Construction of stormwater pond with passive park features.	Unknown	2819A / Trout Lake	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Stormwater / Lake County Stormwater Assessment; City of Eustis; DEP / City of Eustis	$2,000,000	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified
Projects that Apply to Both Trout Lake and Lake Yale Sub-basins								
UMATILLA01 - Green Space Ordinance	Within city limits of Umatilla / Umatilla Land Development Regulations, Chapter 6, Zoning District Regulations require that new development in Umatilla must set aside 25% of area as green space.	Not applicable	2819A ; 2807A / Trout Lake and Lake Yale	-- / -- / -- / --	City of Umatilla / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
UMATILLA02 - Stormwater Development Ordinance	Within city limits of Umatilla / Umatilla Code of Ordinances, Subdivision Regulation (k) Storm Drainage 19-53. All new development in Umatilla is required to retain stormwater runoff on site.	Not applicable	2819A; 2807A / Trout Lake and Lake Yale	-- / -- / -- / --	City of Umatilla / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
Lake Yale Sub-basin								
YALE01 - Lake Yale Basin Study	Lake Yale sub-basin / Basin study of Lake Yale sub-basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. Inwood is performing study for county. Marion County is participating in study by providing information/data for their part of basin.	Not applicable	2807A / Lake Yale	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / --	$266,374	Ongoing / Ongoing	Special studies and planning efforts
Palatlakaha River Sub-basin								
CLR01 - Baffle boxes	Throughout city of Clermont / 7 baffle boxes with hydrocarbon absorbent pillows installed. Each unit 15 ft. by 5.33 ft. by 7 ft. deep. Units installed recently, no estimate of debris and sediment removed.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Clermont / City of Clermont / --	Not available	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
CLR02 - Street Sweeping	Commercial area of Clermont and main roads / City sweeps streets within commercial area and main roads. The frequency benchmark shall be monthly or as needed. The performance benchmark shall be 650 miles of road swept per year with approximately 328.4 cubic yards of material removed annually.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Clermont / City of Clermont / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
GROVE01 - Street Sweeping	Groveland city limits / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency for street shall be onceevery 30 days or as needed.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Groveland Public Works Division / City of Groveland / --	$19,890 per year	Ongoing / Ongoing	Basic stormwater management program implementation
PAL01 - Septic Tank LDR	GSACSC / Septic tanks within Green Swamp are required to be pumped every five years. Land Development Regulation addresses ground and surface water protection.	Potential for preventing future loading of nutrients	2839 / Palatlakaha River	-- / -- / -- / --	Lake County Environmental Services / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
PAL02 - Drainage Evaluation: Lakes Louisa, Minnehaha, and Minneola	Basins of Lakes Louisa, Minnehaha and Minneola / Drainage Evaluation of basins of Lakes Louisa, Minnehaha and Minneola. Precursor to stormwater retrofit or restoration activities. Stanley Consultants contracted to assess and inventory stormwater management features and outfalls, delineate drainage subbasins, estimate and prioritize pollutant loads by subbasin, and develop conceptual projects that address pollutant load reduction.	Not applicable	2839 / Palatlakaha River	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater assessment - $50,000 ; SJRWMD - $50,000 stormwater cost-share grant LCWA - $64,951 stormwater grant / SJRWMD / LCWA	$164,951	Complete / complete	Special studies and planning efforts
PAL07 - Clermont Storm Drain Marking	Throughout city of Clermont / Storm drain marking: Signs were placed on all inlets in city with direct discharge to lake; project completed. Signs were placed on 350 inlets. Discourages dumping of chemicals or other harmful substances in stormwater inlets.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Clermont Engineering Dept. / Clermont Stormwater Fees / --	$720, in kind labor	Complete / 6/26/2005	Education and outreach efforts
PAL08 - Lake Minnehaha Study and Stormwater Improvements	South of SR 50 and west of US 27 / Lake Minnehaha Study and Stormwater Improvements; project will involve study followed by design of recommended improvements; goal is to collect and treat stormwater before it enters lake; began study June 2004. Project is currently in conceptual/study phase -- specific design has not yet been determined.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Clermont Engineering Dept. / 75% LCWA grant; 25% Clermont Stormwater Fees / LCWA	Study/ Design $64,000; Construction Costs TBD	Ongoing / Ongoing	Special studies and planning efforts

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PAL09 - Lake Winona Study and Stormwater Improvement	South of SR 50 and west of US 27 / Lake Winona Study and Stormwater Improvements; project will involve study followed by design of recommended improvements; goal is to collect and treat stormwater before it enters lake; began study June 2004. Project is currently in conceptual/study phase -- specific design has not yet been determined.	Unknown	2839 / Palatlakaha River	-- / -- / -- / --	City of Clermont Engineering Dept. / 75% LCWA grant;25% City Stormwater Fees / LCWA	Study/ Design $40,000; Construction Costs TBD	Ongoing / Ongoing	Special studies and planning efforts
PAL11 - Groveland Septic Tank Prohibition	GSACSC & Palatlakaha River including lakes / No septic tanks permitted in Green Swamp or on new development sites in Groveland. Addresses ground water protection.	Potential for preventing future loading of nutrients	2938 / Palatlakaha River	-- / -- / -- / --	City of Groveland / Developer as part of site development process. / Developer as part of site development process.	Not available	Complete / Ongoing	Regulations, ordinances, and guidelines
PAL12 - Green Swamp Additional Stormwater Runoff Retention	GSACSC / 3 inches of runoff to be retained in most effective recharge areas in GSACSC. Addresses ground and surface water protection.	Potential for preventing future loading of nutrients	2938 / Palatlakaha River	-- / -- / -- / --	City of Groveland / Developer as part of site development process. / Developer as part of site development process.	Not available	Complete / Ongoing	Regulations, ordinances, and guidelines
PAL13 - Groveland Stormwater Study	City Core, north and south of SR 50 / Stormwater study and development of masterplan for older parts of city of Groveland.	Potential for reducing loading of nutrients	2938 / Palatlakaha River	-- / -- / -- / --	City of Groveland / Groveland Community Redevelopment Agency and possible grants. / City of Groveland and Groveland Community Redevelopment Agency	$150,000	Complete / 2006	Special studies and planning efforts
PAL14 - US 27-Basin 1	Big Creek / US 27 from US 192 to North Boggy Marsh Rd. - Basin 1. Wet pond detention. No increase in TP load with road improvement.	13.3	2839 / Big Creek	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Ongoing /	Structural BMPs-Quantifiable load reductions
PAL15 - Lake Minneola Shores Ditch Reconstruction	Lake Minneola Shores-CR 561A / Ditches in Minneola Shores (CR 561A) were recontoured, had paved bottoms removed, and ditch blocks were added. Project provides for capture of runoff and enhanced infiltration.	Unknown	2839 / Palatlakaha River	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Complete / 2004	Structural BMPs-Load reductions not quantified
PAL16 - Lakeshore Drive Clermont Retrofit	Lakeshore Dr. in Clermont / Exfiltration system constructed. Required recontouring of ditches and reworking of road shoulder. Project provides for capture of runoff and enhanced infiltration.	Unknown	2839 / Palatlakaha River	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$180,000	Complete / 2005	Structural BMPs-Load reductions not quantified
PAL17 - Elbert Street and Virginia Street Swale	Elbert St. (Lake Minnehaha) and Virginia St. (Lake Minneola) in Clermont / Swale and swale blocks added. Projects will provide capture of runoff and enhanced infiltration.	Unknown	2839 / Palatlakaha River	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$100,000	Pending / Projected start 2008	Structural BMPs-Load reductions not quantified

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PAL18 - DisstonAvenue and Bike Trail	Forrest Subdivision / Installation of piping, catch basins, sidewalk replacement, driveway repair, relocated existing water lines needed for existing stormwater pond in Forrest Subdivision. Improvements to existing stormwater treatment system that will better protect water resources.	Unknown	2839 / Palatlakaha River	City of Minneola / MS4 Phase II / FLR04E111 / --	City of Minneola / Minneola stormwater fund / --	$80,132.50	Ongoing / Ongoing	Basic stormwater management program implementation
PAL19 - The Crescent	Installation of new curb and gutter, road surface, new inlet basin, sod, as improvements for existing pond. Improvements to existing stormwater treatment system that will better protect water resources.	Unknown	2839 / Palatlakaha River	City of Minneola / MS4 Phase II / FLR04E111 / --	City of Minneola / DEP grant / DEP	$740,000	Complete / complete	Basic stormwater management program implementation
PAL20 - Firestone/WaterFord Landing	Waterford Landing Subdivision / Install piping, manholes, open and repair road, concrete flume as part of improvements for existing pond in Waterford Landing Subdivision.	Unknown	2839 / Palatlakaha River	City of Minneola / MS4 Phase II / FLR04E111 / --	City of Minneola / Minneola stormwater fund / --	$91,077	Ongoing / Ongoing	Basic stormwater management program implementation
PAL21 - Lower Palatlakaha River Basin Study	Lower reaches of Palatlakaha River and connected lakes. / Basin study of Lower Palatlakaha River Basin. Basin drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities. PEC is performing study.	Not applicable	2839 / Palatlakaha River	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$323,211	Ongoing / Ongoing	Special studies and planning efforts
PAL22 - Groveland Septic Tank LDR	GSACSC within Groveland city limits / Septic tanks within Green Swamp are required to be pumped every five years. Land Development Regulation addresses ground and surface water protection.	Potential for preventing future loading of nutrients	2839 / Palatlakaha River	-- / -- / -- / --	City of Groveland / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
Lake Harris Sub-basin								
HAR01 - Lakeshore Drive Stormwater Project	Near Venetian Gardens Canals - East Dixie Ave. Leesburg / Stormwater detention pond. Removes nutrient loading from Venetian Canals and Lake Harris.	2.20	2838A / Lake Harris	City of Leesburg Environmental Services / MS4 Phase II / FLR04E110 / --	City of Leesburg / Leesburg - 34.5% ;LCWA - 34.5% ;Legislature - 31% / LCWA / DEP	$185,756	Complete / 7/1/2003	Structural BMPs-Quantifiable load reductions
HAR02 - Lake Harris Conservation Area	North shore of Lake Harris / Restoration of former muck farm. Chemical treatment of soil (alum) to bind phosphorus containing compounds for nutrient control. Aquatic and wetland habitat restoration. Reduce and manage nutrient outflow to Lake Harris to feasible loading of 1.1 kg/ha/yr TP, or about 1 lb. per acre..	6665	2838A / Lake Harris	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / Ad valorem; legislative appropriation / --	$550,000	Ongoing / Ongoing	Restoration and water quality improvement project

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HAR03 - Harris Bayou Conveyance Project	Harris Conservation Area to Lake Griffin / Establish water flow connection to Lake Griffin. Modification of hydrodynamics to accommodate higher flows of water.	Unknown	2838A / Lake Harris	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / Ad valorem; legislative appropriation / --	$5,000,000	Ongoing / Projected completion 12/31/2007	Restoration and water quality improvement project
HAR04 - SR 500 US 441-System A	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System A. Dry retention pond. No increase inTP load with road improvement.	12.91	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR05 - SR 500 US 441-System B1	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System B1. Dry retention pond. No increase in TP with road improvement.	17.95	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR06 - SR 500 US 441-System B2	Lake Harris / US 441 from 4.0 miles southwest of College Dr. to Lake Shore Blvd. - System B2. Wet pond detention. No increase in TP load with road improvement.	9.58	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR07 - SR 500 US 441-Basin 1	Lake Harris / SR 500 - US 441 Leesburg - Basin 1. No increase inTP load with road improvement.	12.52	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR08 - SR 500 US 441-Basin 3	Lake Harris / SR 500 - US 441 Leesburg - Basin 3. No increase inTP load with road improvement.	11.02	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR09 - SR 500 US 441-Basin 4	Lake Harris / SR 500 - US 441 Leesburg - Basin 4. No increase in TP with road improvement.	3.92	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR10 - SR 500 US 441-Basin 5	Lake Harris / SR 500 - US 441 Leesburg - Basin 5. No increase in TP with road improvement.	21.85	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR11 - SR 500 US 441-Basin 6	Lake Harris / SR 500 - US 441 Leesburg - Basin 6. No increase in TP with road improvement.	4.5	2838A / Lake Harris	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Complete / complete	Structural BMPs- Quantifiable load reductions
HAR12 - Lake Harris and Little Lake Harris Basin Study	Lake Harris / Little Lake Harris drainage basin. / Lake Harris and Little Lake Harris drainage evaluation, per county's stormwater program. Precursor to stormwater retrofit and restoration activities.	Not applicable	2838A / Lake Harris	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Ongoing / Ongoing	Special studies and planning efforts

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HAR13 - Hollondel Road Stormwater Pond	Lake Harris Basin / Stormwater pond. SJRWMD is assisting with purchase of property. Design of pond is next step.	150	2838A; 2838B / Lake Harris; Little Lake Harris	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment; SJRWMD / SJRWMD	$140,000 design cost	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified
HAR14 - Dead River Road Stormwater Park	Lake Harris Basin / Stormwater park. Lake County Public Works is partnering with Public Lands to purchase property.	Unknown	2838A; 2838B; 2817C / Lake Harris; Dead River; Little Lake Harris	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment / Lake County Public Lands	Not available	Ongoing / Ongoing	Structural BMPs-Load reductions not quantified
Lake Griffin Sub-basin								
GRIF01 - Lake Griffin Emeralda Marsh Restoration	Emeralda Marsh Conservation Area (northeast marshes) north of Haines Creek / Lake Griffin Emeralda Marsh restoration: To be managed for wetland habitat restoration, planting; alum treatment to bind phosphorus containing compounds in sediments; manage excess nutrient outflow; and remove TSS. Manage nutrient outflow to Lake Griffin to feasible loading of 1.1 kg/ha/yr TP, or about 1 lb. per acre.	41,450	2814A / Lake Griffin	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRWMD Ad valorem; Legislative appropriation / --	$15,000,000 for land acquisition	Ongoing / Ongoing	Restoration and water quality improvement project
GRIF02 - Gizzard Shad Harvest	Lake Griffin in-lake removal of fish / Gizzard shad removal from Lake Griffin by commercial fishermen. Expanded to Lake Dora and Lake Beauclair, with possible future expansion to other lakes in Harris Chain. Remove and export nutrients via fish. Reduce recycling of nutrients from sediments and reduce sediment resuspension (TSS). Stabilize bottom to reduce TSS.	Unknown	2814A / Lake Griffin	-- / -- / -- / Upper Ocklawaha River SWIM Plan	SJRWMD / SJRWMD Ad valorem; Legislative appropriation; LCWA / --	$1,000,000 spent since 2002 harvest	Ongoing / Ongoing	Restoration and water quality improvement project
GRIF05 - Lazy Oaks Retrofit	Lazy Oaks community located on western side of Lake Griffin, on shore of lake. / Lake Griffin basin retrofit projects. Exfiltration trench. Rental cottages in Lazy Oak community and single-family residential development on western side of Lake Griffin. Steep slopes convey stormwater as sheetflow over paved surface within Lazy Oaks. Adjacent subdivision with fairly large lots. Stormwater from 4-acre area conveyed by roadside swales to 12-inch outfall pipe into Lake Griffin. Exfiltration system will retain 80% of annual runoff volume, corresponding to 0.28 to 0.45 inches of runoff volume. 490 feet of exfiltration	19	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / - -	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - LCWA stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004	Structural BMPs-Quantifiable load reductions

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	trench proposed.							
GRIF06 - Griffwood Community Retrofit	Griffwood Community Mobile Home Park located on western side of Lake Griffin. / Lake Griffin basin retrofit projects. Exfiltration trench. Site has steep slopes and dense development. Exfiltration with drainage inlets located in roadway at bottom of hill. Exfiltration system designed to treat first 0.5 inch of runoff, which represents 76% of annual runoff volume. System comprises 440 feet of 3-foot exfiltration system.	33.00	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - LCWA stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2004	Structural BMPs-Quantifiable load reductions
GRIF07 - Brittany Estates Retrofit	Brittany Estates Mobile Home Park community located on southern side of Lake Griffin / Lake Griffin basin retrofit project. Exfiltration trench and expansion of existing retention pond. Densely populated mobile home park with steep slopes. Existing dry detention pond at bottom of hill that overflowed during heavy storms. Roads have inverted crown configuration that convey stormwater. Exfiltration system and larger dry detention pond to treat runoff. Exfiltration will treat first 0.5 inch of runoff from 4.65-acre upper contributing basin, representing 76% of annual runoff volume. 221 feet of 3-foot exfiltration pipe. Lower 5.1-acre basin fitted with 240 feet of 3-foot exfiltration pipe. Shallow berm along Lake Griffin to direct runoff to larger redesigned dry detention pond. Existing 6-inch outfall pipe replaced with control structure, headwall, and new pipe.	12.50	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment - 50%; Legislature - 50% (4 project total: $185,851 - Lake County Stormwater assessment; $185,851 - LCWA stormwater grant) / LCWA / DEP	design* - $16,759.25 construction* - $92,925.75 (4 project total: design - $67,037, construction - $371,703)	Complete / 2005	Structural BMPs-Quantifiable load reductions
GRIF08 - Canal Street Retrofit	Canal St. / Stormwater retrofit, construct 2.4-acre pond.	Unknown	2814A / Lake Griffin	City of Leesburg Environmental Services / MS4 Phase II / FLR04E110 / --	Leesburg / Leesburg - 75%; LCWA - 25% / LCWA	$200,000	Ongoing / 7/1/2007	Structural BMPs-Load reductions not quantified
GRIF10 - Whispering Pines Regional Stormwater Retrofit	Whispering Pines Basin / Stormwater retrofit. Construction of 2 stormwater ponds. Expected 66% reduction in TP.	130	2814A / Lake Griffin	City of Leesburg Environmental Services / MS4 Phase II / FLR04E110 / --	Leesburg / Leesburg - 50%; LCWA - 50% / LCWA / DEP	$1.5 million	Ongoing / Projected completion 12/1/2007	Structural BMPs-Quantifiable load reductions
GRIF12 - Lake Griffin State Park Retrofit	Lake Griffin State Park / Stormwater retrofit.	11.0	2814A / Lake Griffin	--/ --/ --/ --	DEP / DEP - 50%; LCWA - 50% / LCWA	$82,535	Complete / 6/1/2004	Structural BMPs-Quantifiable load reductions

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GRIF13 - SR 500 US 441-Basin 100	Lake Griffin / US 441 from West of Griffin Road to East of Perkins Street - Basin 100. Wet Pond Detention. No increase in TP load with road improvement.	54.66	2814A / Lake Griffin	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008	Structural BMPs-Quantifiable load reductions
GRIF14 - SR 500 US 441-Basin 200	Lake Griffin / US 441 from West of Griffin Road to East of Perkins Street - Basin 200. Wet Pond Detention. No increase in TP load with road improvement.	74.06	2814A / Lake Griffin	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008	Structural BMPs-Quantifiable load reductions
GRIF15 - SR 500 US 441-Basin 2	Lake Griffin / SR 500 / US 441 Leesburg - Basin 2. No increase in TP load with road improvement.	9.59	2814A / Lake Griffin	DOT, District 5 / MS4 Phase II / FLR04E024 / --	DOT, District 5 / Florida Legislature / --	Not available	Pending / Projected start 9/2008	Structural BMPs-Quantifiable load reductions
GRIF16 - Picciola Road ditches	Picciola Road - unincorporated Lake County / Recontouring of ditches. Addition of ditch blocks.	Unknown	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Pending / construction planned for 2007	Structural BMPs-Load reductions not quantified
GRIF17 - Harbor Oaks retrofit	Harbor Oaks / Exfiltration system installed.	Unknown	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$200,000	Pending / construction planned for 2007	Structural BMPs-Load reductions not quantified
GRIF18 - Lakeside Village Retrofit	Lake side Village / Underdrain system placed in recontoured ditches located along shoreline.	Unknown	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$400,000	Complete / May 2007	Structural BMPs-Load reductions not quantified
GRIF20 - Lake Griffin Marina Improvements	Lake Griffin Marina / Swale improvements planned.	Unknown	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$150,000	Pending / construction planned for 2008	Structural BMPs-Load reductions not quantified
GRIF21 - CR 466B Swale Improvements	CR 466B / Swale improvements planned for 2008.	Unknown	2814A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	Not available	Pending / construction planned for 2008	Structural BMPs-Load reductions not quantified
GRIF22 - Mid-Florida Lakes Mobile Home Park Retrofit	Mid-Florida Lake Mobile Home Park located east of Lake Griffin along Haines Creek. / Exfiltration trenches. Exfiltration trench will operate as offline retention system.	42.00	2817A / Lake Griffin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment - 50%;LCWA - 35%; Legislature - 4% / LCWA / DEP	$390,000	Complete / 9/2005	Structural BMPs-Quantifiable load reductions
LADYL01 - Support of Lake County Watershed Action Volunteers	Within jurisdiction of Lady Lake / WAV is a public education and participation program serving residents of Lake Lake and is a Phase II MS4 requirement. Potential for increasing community participation in BMPs that protect water resources.	Not applicable	2814A / Lake Griffin	Town of Lady Lake / MS4 Phase II / FLR04E105 / --	Town of Lady Lake / Town of Lady Lake / --	$7,500 per year	Ongoing / Ongoing	Education and outreach efforts

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LADYL02 - Street Sweeping	Within jurisdiction of Lady Lake / Town-wide street sweeping to remove dirt and debris. The benchmark frequency shall be quarterly or as needed. Removal of debris and potential pollutants, prevents their entry into lakes. The performance benchmark shall be 250 cubic yards of material removed annually.	Not applicable	2814A / Lake Griffin	Town of Lady Lake / MS4 Phase II / FLR04E105 / --	Town of Lady Lake / Town of Lady Lake / --	$25,000 per year	Ongoing / Ongoing	Basic stormwater management program implementation
LADYL03 - Storm Water System Maintenance	Within jurisdiction of Lady Lake / Townwide curb and gutter cleaning and catch basin vacuuming. Remove pollutants and debris before entering storm sewer system. The benchmark frequency for this routine maintenance shall be quarterly or as needed.	Not applicable	2814A / Lake Griffin	Town of Lady Lake / MS4 Phase II / FLR04E105 / --	Town of Lady Lake / Town of Lady Lake / --	Not available	Ongoing / Ongoing	Basic stormwater management program implementation
LEESBURG01 - Street Sweeping	Leesburg city limits / Sweeping of city-maintained streets to remove dirt, vegetation, and debris. The benchmark frequency shall be monthly covering an estimated 170 miles of pavement each month. The performance benchmark for removal shall be 50 cubic yards of debris collected and disposed of each month.	Unknown	2814A / Lake Griffin	City of Leesburg Environmental Services / MS4 Phase II / FLR04E110 / --	City of Leesburg Environmental Services / Leesburg Stormwater Utility Fee / --	$125,000 per year	Ongoing / Ongoing	Basic stormwater management program implementation
GRIF04 - Lake Griffin Basin Drainage Evaluation	Lake Griffin Basin / Lake Griffin basin drainage evaluation, per county's stormwater program. Inventory of stormwater outfalls (type, condition, location, amount of discharge) that discharge to lakes. Precursor to stormwater retrofit and restoration activities. BCI contracted to assess and inventory stormwater management features and outfalls, delineate drainage subbasins, estimate and prioritize pollutant loads by subbasin, and develop conceptual projects that address pollutant load reductions.	Not applicable	2814A; 2817A / Lake Griffin; Haynes Creek Reach	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Public Works - 50%; DEP - 50% / --	$92,410	Complete / 2003	Special studies and planning efforts
Upper Ocklawaha Basin								
NUTRIENT01 - Ridge Citrus BMP Implementation and Compliance	Upper Ocklawaha Basin / Suite of BMP practices that address nutrient and irrigation management for Ridge citrus. Implementation of Chapter 5E-1.023, F.A.C., Notice of Intent, Procedures for Landowners and Leaseholders to Submit a Notice of Intent to Implement Nitrogen Best Management Practices. Management of agricultural runoff reduces nutrient loadings. Adoption by rule of document, *Nitrogen Best Management*	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Ongoing	Agricultural BMPs

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	Practices (BMPs) for Florida Ridge Citrus.							
NUTRIENT05 - Statewide Cow/calf BMP Manual Development and Implementation	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for cow/calf agriculture operations. Reduce nutrient loadings in runoff from cow/calf agriculture operations.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be Ongoing	Agricultural BMPs
NUTRIENT06 - Statewide Equine BMP Manual Development and Implementation	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for horse management. Management of agricultural runoff reduces nutrient loadings.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing	Agricultural BMPs
NUTRIENT07 - Statewide BMP Manual for Container Grown Plants	Upper Ocklawaha Basin / Revision and adoption of manual that addresses BMPs for container-grown plants. Management of agricultural runoff reduces nutrient loadings.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing	Agricultural BMPs
NUTRIENT08 - Statewide Sod Operations BMP Manual Development and Adoption	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for sod operations. Reduce nutrient loadings in runoff from agricultural operations.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Early 2008 for manual adoption; implementation will be ongoing	Agricultural BMPs
NUTRIENT09 - Silviculture Best Management Practices Implementation and Compliance	Upper Ocklawaha Basin silviculture lands / BMPs for silviculture applied to industrial, public, and private lands. Silviculture BMP implementation and compliance. Silviculture BMPs were established in mid-1970s in response to Clean Water Act, and revised most recently in 2004. These BMPS are minimum standards for protecting and maintaining water quality and wildlife habitat during forestry activities. BMPs address fertilization, and new projects include annual basinwide BMP Survey and targeted training.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Division of Forestry / Not available / Private landowners	Not available	Ongoing / Implementation ongoing	Agricultural BMPs
NUTRIENT10 - Statewide BMP Manual for In-ground Nurseries	Upper Ocklawaha Basin / Development and rule adoption of manual that addresses BMPs for in-ground nurseries. Management of agricultural runoff reduces nutrient loadings.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Pending / 2010 for manual adoption; implementation will be ongoing	Agricultural BMPs
Lake County Area of Basin								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
LC01 - Golf Course Resource Management Plan	Lake County - countywide / Golf course resource management plans are applicable to unincorporated portion of Lake County. They apply to new and existing golf courses. Regulatory approach that will provide protection to ground and surface waters.	Not applicable	Lake_county / Lake County unincorporated area; Upper Ocklawaha Basin	-- / -- / -- / Lake County Environmental Services	Lake County Environmental Services / Lake County / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
LC02 - Lake County Shoreline Protection Guide	Lake County - countywide / Lakefront property owner guide. Guide for lakefront land owners on water resource issues, including shoreline protection, stormwater BMPs, erosion, and aquatic plants. Outreach program targeted at county residents. Inform property owners of better land management practices to improve water quality protection.	Not applicable	Lake_county / Lake County-wide; Upper Ocklawaha Basin	-- / -- / -- / Lake County Environmental Services	Lake County Environmental Services / Lake County / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
LC03 - Lake County Water Resource Atlas	Lake County - countywide / Web-based outreach education program focused on water resource issues. Web-based outreach program targeted at residents of Lake County. Objective is to inform residents about water resource issues including TMDLs, stormwater, water quality, etc. Helps to promote good stewardship and wise use of water resources.	Not applicable	Lake_county / Lake County-wide; Upper Ocklawaha Basin	Lake County Environmental Services / MS4 Phase II / FLR04E106 / --	Lake County Environmental Services / Lake County / Lake County Stormwater; LCWA	$90,000	Ongoing / Ongoing	Education and outreach efforts
LC05 - Support of Watershed Action Volunteers Program	Lake County - countywide / WAV Program is outreach program to residents of Lake County. WAV is public education and participation program for residents of Lake County that enhances knowledge and awareness of stormwater management. Part of MS4 Phase II public education requirement.	Not applicable	Lake_county / Lake County-wide; Upper Ocklawaha Basin	Lake County Stormwater / MS4 Phase II / FLR04E106 / --	Lake County Public Works / Lake County Stormwater Assessment / --	$20,000 per year	Ongoing / Ongoing	Education and outreach efforts
Marion County Area of Basin								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
MARION01 - Springshed Protection Program	Rainbow and Silver Springsheds / Prevent further degradation of water quality of Rainbow and Silver Springs and reduce or eliminate existing sources of pollution. Marion County Board of County Commissioners is conducting hearings on amendments to County's Comprehensive Plan that would establish primary and secondary springs protection zones; limit expansion of existing, or development of new, uses and activities in these zones; address wastewater disposal issues; encourage Florida-friendly landscaping; provide additional stormwater runoff treatment; and encourage use of low-impact development (LID) techniques.	Not applicable	Marion_County / Rainbow and Silver Springs drainage basins; Ocklawaha River	-- / -- / -- / Marion County Springshed Protection Program	Marion County Planning Department / / Marion County Clean Water Program; SWFWMD	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
MARION02 - Clean Farms Initiative	Marion County - countywide / Clean Farms Initiative is designed to assist Marion County farm owners and managers with implementation of BMPs, and to recognize them for their cooperative efforts. Clean Farms Initiative promotes BMPs for animal waste and nutrient management on agricultural lands. Initiative was begun by passage of Resolution 04-R-384, by Marion County Board of County Commissioners, recognizing importance of agriculture to county's history and economy, while also recognizing need to protect water resources. As part of Initiative, more than 7,500 surveys and brochures were mailed in October 2006 to owners of agricultural land, ranging from large operations of several hundred acres to small tracts of land with fewer than a dozen animals. Survey measures current manure management and fertilization practices. Results of survey, and input from focus groups held in February and March 2007, will be used to direct Initiative's next steps aimed at protecting and preserving water resources.	Unknown	Marion_County / Marion County wide- Ocklawaha River; Lake Yale and Lake Griffin drainage basins	--/ --/ --/ Marion County Clean Water Program	Marion County Clean Water Program / Marion County Clean Water Assessment; General Revenue; SWFWMD grant / Marion County Planning Department ; Marion County Extension Service; Marion County Soil and Water Commission; SWFWMD	$15,000	Ongoing / Ongoing	Agricultural BMPs

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
MARION04 - Marion County Aquifer Vulnerability Assessment (MCAVA)	Marion County - countywide / Identification of vulnerable areas of aquifer. Project provides scientifically defensible water resource management and protection tool that will facilitate planning of human activities to help in minimizing adverse impacts on ground water quality. Aquifer vulnerability maps are displayed in classes of relative vulnerability (one area is more vulnerable than another). Maps benefit local government, planners and developers in guiding growth into more appropriate areas (e.g., ground water recharge areas) and improve site selection for expanding existing or establishing new wellfields.	Not applicable	Marion_County / Marion County wide- Ocklawaha River; Lake Yale and Lake Griffin drainage basins	-- / -- / -- / --	Marion County Clean Water Program / Marion County Clean Water Assessment / DEP / SWFWMD / SJRWMD / UF	$82,850	Ongoing / Projected completion August 2007	Special studies and planning efforts
MARION5 - Marion County Low Impact Development Practices	Marion County - countywide / Encourage adoption of low-impact development practices to preserve and protect water resources. To foster LID not only within Marion County's springs protection zones, but throughout county, Clean Water Program conducted day-long seminar for developers, engineers, landscape architects, Seminar shared LID options and discussed impact of LID on water resources.	Unknown	Marion_County / Marion County wide- Ocklawaha River; Lake Yale and Lake Griffin drainage basins	Marion County Clean Water Program / MS4 Phase II / FLR04E021 / --	Marion County Clean Water Program / Marion County Clean Water Assessment / University of Florida	$82,850	Complete / March 2007	Regulations, ordinances, and guidelines
Orange County Area of Basin								
ORANGE02 - Orange County Clean Lakes Initiative Program	Unincorporated Orange County located within Lake Apopka, Lake Beauclair, and Lake Carlton drainage basins / Financial assistance (Incentive program) for homeowners who voluntarily install berms and swales or restore shoreline/littoral zone with native vegetation. Up to $1,000 reimbursement and waiver of permit fee to qualified applicants.	Unknown	Orange_county / Orange County wide; Lake Apopka, Lake Carlton, Lake Beauclair	--I / -- / -- / --	OCEPD / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
ORANGE03 - Orange County Surface Water Protection Code	Unincorporated Orange County / Orange County Code, Chapter 15, Articles II and IV. Orange County Air and Water Pollution Control Act provides protection and regulation of pollution and contamination of air, soil, and water resources of Orange County.	Unknown	Orange_county / Orange County wide; Lake Apopka; Lake Carlton; Lake Beauclair	OCEPD / MS4 Phase I / FLS000011 / --	OCEPD / Not available / --	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
ORANGE06 - Support of Watershed Action Volunteers in Orange County	Orange County - countywide / WAV Program is public education and participation program for residents of Orange County. Part of MS4 Phase I public education requirement.	Not applicable	Orange_county / Orange County wide	OCEPD / MS4 Phase I / FLS000011 / --	OCEPD / Not available / -	$12,000	Ongoing / Ongoing	Education and outreach efforts
ORANGE07 - Orange County Water Resource Atlas	Orange County - countywide / Web-based outreach education program focused on water resource issues. Web-based outreach program targeted at residents of Orange County. Objective is to inform residents about water resource issues, including TMDLs, stormwater, water quality, etc.	Not applicable	Orange_county / Orange County wide	OCEPD / MS4 Phase I / FLS000011 / --	OCEPD / Not available / City of Winter Garden and City of Apopka	Annual maintenance fee for countywide atlas is $57,650.	Ongoing / Ongoing	Education and outreach efforts
ORANGE08 - Orange County Parks Phosphorus (measured as phosphate) Fertilizer Use Reduction	Orange County Parks, including Trimble, Roosevelt, Nichols, Magnolia Park, Chapin Station, Winter Garden Station, and County Line Station. / OCEPD and Parks Department agreed to reduce use of phosphorus fertilizers for each new lawn care and maintenance contract issued on all park facilities. Agreement includes use of reduced phosphorus (measured as phosphate) between 0-5% on turf areas (athletic fields, recreational and waterfront parks). Higher percentages of phosphorus are allowable in localized areas (i.e. flower beds, trees and shrubs) needing greater amounts onan as needed basis. Prohibition on use of fertilizers, pesticides—specifically herbicides—within 10 feet of shoreline. Application of weed controls directly rather than by broadcast methods. Limitation of nitrogen (measured as water soluble organic nitrogen) to less than 0.5 lb. per 1,000 square feet. The parks fertilizer program contracts with landscape companies will be adjusted for 2008 to reflect the changes that will occur as the result of passage by DACS of the Urban Turf Fertilizer Rule (5E-1.003 F.A.C.), that goes into effect on Dec. 31, 2007.	Unknown	Orange_county / Orange County wide	--/ -- / -- / --	OCEPD / Not available / Orange County Parks Department	Not available	Ongoing / Ongoing	Regulations, ordinances, and guidelines
Additional Projects in Basin that Were Not Adopted								

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
ORANGE05 - Orange County Water Quality Monitoring Program	Orange County - countywide / Quarterly sampling of Lakes Apopka, Carlton, Ola, Johns, and Beauclair.	Not applicable	Countywide / Lakes Apopka, Johns, Ola, Carlton, and Beauclair	-- / -- / -- / --	OCEPD / Not available / --	Not available	Ongoing / Ongoing	Not adopted
LC04 - Lake County Water Quality Monitoring Program	Lake County - countywide / Lake County Environmental Services performs chemical water quality analysis on about 50 sites in Lake County, 4 times per year. County maintains master database of all water quality data.	Not applicable	Lake_county / Upper Ocklawaha Basin	-- / -- / -- / --	Lake County Environmental Services / Not available / --	Not available	Ongoing / Ongoing	Not adopted
MARION03 - Watershed Management Plans	In Fiscal Year 2003–04, Watershed Management Plan (WMP) was developed in cooperation with SWFWMD to assist in identifying and addressing water quality issues. WMP will be managed by Clean Water Program in effort to maintain NPDES compliance.	Not applicable	Marion_county / Marion County countywide-Ocklawaha River; Lake Yale and Lake Griffin drainage basins	-- / -- / -- / --	Marion County Clean Water Program / Marion County Clean Water Assessment / SWFWMD	$10,000 for 5 years	Pending / Unknown	Not adopted
NUTRIENT02 - Leatherleaf Fern BMP Implementation and Compliance	Upper Ocklawaha Basin / Suite of BMP practices that address nutrient and irrigation management for production of leatherleaf fern. Implementation of Rule 5E-1.023, F.A.C., Notice of Intent, Procedures for Landowners and Leaseholders to Submit a Notice of Intent to Implement Nitrogen Best Management Practices. / Management of agricultural runoff reduces nutrient loadings. Adoption by rule of document, *Irrigation and Nutrient Management Practices for Commercial Leatherleaf Fern Production in Florida*.	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Ongoing	Not adopted
NUTRIENT03 - Interim Measure for Container-grown Plants Implementation and Compliance	Upper Ocklawaha Basin / Suite of BMP practices that address nutrient and irrigation management for production of container-grown plants. Implementation of Rule 5E-1.023, F.A.C., Notice of Intent, Procedures for Landowners and Leaseholders to Submit a Notice of Intent to Implement Nitrogen Best Management Practices. / Management of agricultural runoff reduces nutrient loadings. Adoption by rule of document, *Interim Measures for Florida Producers of Container-grown Plants.*	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Ongoing	Not adopted

Project Number - Project Name	General Location / Description	Estimated TP Load Reduction (lbs/yr)	WBID / Waterbody Name	Permitted Entity / Permit Type / Permit Number or if Not Permit Related / Program	Lead Entity / Funding Source / Project Partners	Project Cost	Project Status / Completion Date or Anticipated Completion Date	Adopted Table Category
NUTRIENT04 - Vegetable and Agronomic Crops BMP Implementation and Compliance	Upper Ocklawaha Basin / Suite of BMP practices that address nutrient and irrigation management for vegetable and agronomic crops. Implementation of Rule 5M-8, F.A.C, Notice of Intent, Best Management Practices for Florida Vegetable and Agronomic Crops. / Management of agricultural runoff reduces nutrient loadings. Adoption by rule of document, *Water Quality/Quantity Best Management Practices for Florida Vegetable and Agronomic Crops.*	Unknown	Basin_wide / Upper Ocklawaha Basin	-- / -- / -- / --	DACS, Office of Agricultural Water Policy / Not available / Private landowners	Not available	Ongoing / Ongoing	Not adopted

APPENDIX I. DESCRIPTION OF WATER QUALITY MONITORING STATIONS FOR BMAP FOLLOW-UP

TABLE I-1. DESCRIPTIONS OF TREND MONITORING NETWORK SAMPLING STATIONS

WATERBODY	ORGANIZATION	AGENCY CODE	STATION NUMBER	NAME	LONGITUDE	LATITUDE	STATUS	FREQUENCY	MAP ID
ABC	LCWA	LCWA	Downstream_lock	Lock and Dam Downstream	81.68417	28.71944	Active	Weekly	1
ABC	LCWA	LCWA	end_abc	End of Apopka-Beauclair Canal	81.67611	28.76667	Active	Weekly	2
ABC	LCWA	LCWA	Upstream_lock	Lock and Dam Upstream	81.68444	28.72167	Active	Weekly	3
Lake Beauclair	LCWA	LCWA	Lbeau	Lake Beauclair	81.66611	28.77194	Active	Weekly	4
ABC	Lake County Water Resource Mgt.	21FLLCPC	ORA2	Apopka-Beauclair Canal @ Structure	81.68528	28.72333	Active	Quarterly	5
Haynes Creek	Lake County Water Resource Mgt.	21FLLCPC	ORC1	Haynes Creek @ Structure	81.78250	28.87139	Active	Quarterly	6
Haynes Creek	Lake County Water Resource Mgt.	21FLLCPC	ORC6	Haynes Creek @ Mouth to Lake Griffin	81.82917	28.89028	Active	Quarterly	7
Lake Beauclair	Lake County Water Resource Mgt.	21FLLCPC	ORA5	Beauclair Lake Center	81.66111	28.77222	Active	Quarterly	8
Lake Dora	Lake County Water Resource Mgt.	21FLLCPC	ORA6	Dora Lake East Lobe Center	81.66111	28.79444	Active	Quarterly	9
Lake Dora	Lake County Water Resource Mgt.	21FLLCPC	ORA8	Dora Lake West Lobe Center	81.71944	28.79167	Active	Quarterly	10
Lake Eustis	Lake County Water Resource Mgt.	21FLLCPC	ORB7	Eustis Lake South Center	81.74167	28.83056	Active	Quarterly	11
Lake Eustis	Lake County Water Resource Mgt.	21FLLCPC	ORB9	Eustis Lake North Center	81.71667	28.86111	Active	Quarterly	12
Lake Griffin	Lake County Water Resource Mgt.	21FLLCPC	ORD1	Griffin Lake South Lobe Center	81.85278	28.83611	Proposed	Quarterly	13
Lake Griffin	Lake County Water Resource Mgt.	21FLLCPC	ORD3	Griffin Lake Center West of Treasure Island	81.85000	28.86389	Active	Quarterly	14
Lake Griffin	Lake County Water Resource Mgt.	21FLLCPC	ORD4	Griffin Lake North Lobe Center	81.84444	28.90833	Active	Quarterly	15
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	ORB2	Little Lake Harris North	81.75278	28.73333	Active	Quarterly	16
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	ORB3	Harris Lake South Lobe Center	81.80278	28.76111	Active	Quarterly	17
Lake Harris	Lake County Water	21FLLCPC	ORB5	Harris Lake North Lobe	81.79444	28.80556	Active	Quarterly	18

Waterbody	Organization	Agency Code	Station Number	Name	Longitude	Latitude	Status	Frequency	Map ID
	Resource Mgt.			Center					
Lake Yale	Lake County Water Resource Mgt.	21FLLCPC	ORE3	Center of Lake Yale	81.73840	28.91610	Active	Quarterly	19
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRB1	Palatlakaha River @ Hwy 50 Bridge	81.78389	28.55556	Active	Monthly	20
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRC3	Cherry Lake @ Center	81.81444	28.59722	Active	Quarterly	21
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRC5	Palatlakaha River @ Hwy 19 Bridge	81.85611	28.57972	Active	Monthly	22
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRC8	Palatlakaha River @ Bridges Rd. Structure	81.88528	28.67972	Active	Monthly	23
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRC9	Palatlakaha River @ CR48 Bridge	81.87500	28.74806	Active	Monthly	24
Haynes Creek	Lake County WAV	21FLWAV	Haynes Creek-WAV	Haynes Creek near Shoreline	81.77830	28.86730	Active	Monthly	25
Lake Yale	Lake County WAV	21FLWAV	Lake Yale-WAV	Yale Lake at North Shore	81.74240	28.92590	Active	Monthly	26
Little Lake Harris	Lake County WAV	21FLWAV	Little Lake Harris-WAV	Little Lake Harris on West Shoreline	81.76500	28.72430	Active	Monthly	27
Trout Lake	Lake County WAV	21FLWAV	LKTROUT EUS	Trout Lake Eustis @ Nature Center Pier	81.68417	28.86889	Active	Monthly	28
Lake Beauclair	OCEPD	21FLORAN	A48	Lake Beauclair	81.65482	28.77472	Active	Quarterly	29
Lake Carlton	OCEPD	21FLORAN	A49	Lake Carlton	81.65849	28.75854	Active	Quarterly	30
Lake Ola	OCEPD	21FLORAN	A29	Center of Lake Ola	81.63392	28.75390	Active	Quarterly	31
ABC	SJRWMD	21FLSJWM	ABC	Apopka-Beauclair Canal Upstream of Lock	81.68466	28.72232	Active	Monthly	32
ABC	SJRWMD	21FLSJWM	BBC	Apopka-Beauclair Canal 1000 ft. from Lake Entrance	81.67739	28.76335	Active	Monthly	33
Dead River	SJRWMD	21FLSJWM	DRVR	Dead River, Center between Eustis and Harris, under Power Wires	81.76635	28.81307	Active	Monthly	34
Dora Canal	SJRWMD	21FLSJWM	DCNL	Dora Canal, approx. 100m North of Hwy 19 Bridge, Center	81.74049	28.80208	Active	Monthly	35
Haynes Creek	SJRWMD	21FLSJWM	02238000	Haynes Creek at Lisbon	81.78396	28.87194	Active	Monthly	36
Haynes Creek	SJRWMD	21FLSJWM	DEPHCA	Haynes Creek below 'Z' Discharge Pump Side,	81.82928	28.89200	Active	Monthly	37

Waterbody	Organization	Agency Code	Station Number	Name	Longitude	Latitude	Status	Frequency	Map ID
				East of Confluence w/Lake Griffin					
Haynes Creek	SJRWMD	21FLSJWM	DEPHCB	Haynes Creek above 'V' Discharge Structure	81.79916	28.88110	Active	Monthly	38
Helena Run/Lake Harris	SJRWMD	21FLSJWM	HRMA	Helena Run at Confluence of Bugg Spring Run	81.89612	28.76339	Active	Monthly	39
Lake Apopka	SJRWMD	21FLSJWM	CLA	Lake Apopka Center Station	81.62491	28.62497	Active	Twice/month	40
Lake Apopka	SJRWMD	21FLSJWM	NLA	Lake Apopka North	81.60470	28.66171	Active	Monthly	41
Lake Apopka	SJRWMD	21FLSJWM	SLA	Lake Apopka East of Gourd Neck Springs, Mouth of Gourd	81.65060	28.56744	Active	Monthly	42
Lake Beauclair	SJRWMD	21FLSJWM	BCE	Canal Entrance to Lake Beauclair	81.67184	28.77069	Active	Monthly	43
Lake Carlton	SJRWMD	21FLSJWM	CARL	Lake Carlton, Center	81.65778	28.76008	Active	Monthly	44
Lake Denham	SJRWMD	21FLSJWM	DNEY	Lake Denham East End in Center of Lake	81.90636	28.76592	Active	Monthly	45
Lake Dora	SJRWMD	21FLSJWM	DOR	Lake Dora, Center Lobe	81.69768	28.78937	Active	Monthly	46
Lake Dora	SJRWMD	21FLSJWM	DORE	Lake Dora, Center of East Pool	81.65685	28.79285	Active	Monthly	47
Lake Eustis	SJRWMD	21FLSJWM	20020368	Lake Eustis Center	81.73315	28.84307	Active	Monthly	48
Lake Griffin	SJRWMD	21FLSJWM	20020381	Lake Griffin, Center of Lake near Treasure Island	81.84978	28.86336	Active	Twice/month	49
Lake Griffin	SJRWMD	21FLSJWM	LGNA	Lake Griffin, North End, Midway East and West	81.84337	28.92157	Active	Twice/month	50
Lake Griffin	SJRWMD	21FLSJWM	LGS	Lake Griffin, Center of South Pool 1000 yds. W of Picciola Point	81.86046	28.83230	Active	Twice/month	51
Lake Harris	SJRWMD	21FLSJWM	HAR	Lake Harris Center	81.80595	28.77013	Active	Monthly	52
Lake Harris	SJRWMD	21FLSJWM	LLHARRIS	Little Lake Harris Center	81.76026	28.73374	Active	Monthly	53
Lake Yale	SJRWMD	21FLSJWM	LYC	Lake Yale, Center	81.73430	28.91530	Active	Monthly	54
Ocklawaha River	SJRWMD	21FLSJWM	MBU	At Moss Bluff; Upstream of the Lock	81.88143	29.07886	Active	Monthly	55
Palatlakaha River	SJRWMD	21FLSJWM	20020321	Cherry Lake @ Center	81.81404	28.59873	Active	Bimonthly	56
Palatlakaha River	SJRWMD	21FLSJWM	PRVR	Palatlakaha River at Hwy 48 Bridge	81.87485	28.74803	Active	Monthly	57
Trout Lake	SJRWMD	21FLSJWM	TRTL	Trout Lake, Center	81.68293	28.86640	Active	Monthly	58

Waterbody	Organization	Agency Code	Station Number	Name	Longitude	Latitude	Status	Frequency	Map ID
Yale-Griffin Canal	SJRWMD	21FLSJWM	YGCCA	Yale-Griffin Canal, west of Emeralda Island Rd.	81.80413	28.91032	Active	Monthly	59
Lake Apopka	OCEPD	21FLORAN	LA17	Lake Apopka (East)	81.58472	28.63250	Active	Quarterly	60
Lake Apopka	OCEPD	21FLORAN	LA31	Lake Apopka(Southeast)	81.58389	28.57917	Active	Quarterly	61
Lake Apopka	OCEPD	21FLORAN	LA12	Lake Apopka (South)	81.63000	28.56333	Active	Quarterly	62
Lake Apopka	OCEPD	21FLORAN	LA10	Lake Apopka (west)	81.65028	28.57111	Active	Quarterly	63
Lake Apopka	OCEPD	21FLORAN	LA19	Lake Apopka (Wast-central)	81.64333	28.61972	Active	Quarterly	64
Lake Apopka	OCEPD	21FLORAN	LA20	Lake Apopka (North)	81.63417	28.64667	Active	Quarterly	65
Lake Apopka	OCEPD	21FLORAN	LA5	Lake Apopka (Northeast)	81.59417	28.66778	Active	Quarterly	66
Lake Ola	SJRWMD	21FLSJWM	LOLA	Lake Ola, Center	81.63455	28.75356	Active	Quarterly	67

TABLE I-2. DESCRIPTIONS OF SOURCE MONITORING NETWORK SAMPLING STATIONS

CONTRIBUTES TO	ORGANIZATION	AGENCY CODE	STATION NUMBER	STATION NAME	LONGITUDE	LATITUDE	STATUS	FREQUENCY	MAP ID
Lake Beauclair	LCWA		Flowout	Floway Outlet	81.67889	28.67361	Active	Weekly	1
Lake Beauclair	LCWA		Hurley	Hurley Discharge	81.68389	28.75500	Active	Weekly	2
Lake Beauclair	LCWA		end_abc	End of Apopka-Beauclair Canal	81.67611	28.76667	Active	Weekly	3
Lake Apopka	Lake County Water Resource Mgt.	21FLLCPC	LKJOHNW	Johns Lake west center	81.66194	28.52944	Active	Quarterly	4
Lake Apopka	Lake County Water Resource Mgt.	21FLLCPC	ORA1GN	Apopka Lake @ Gourd Neck Springs	81.67917	28.56694	Active	Quarterly	5
Lake Apopka	Lake County Water Resource Mgt.	21FLLCPC	SPAPOPKA	Apopka Springs (aka gourdneck)	81.68083	28.56667	Active	Quarterly	6
Lake Beauclair	Lake County Water Resource Mgt.	21FLLCPC	ORA2	Apopka-Beauclair Canal @ Structure	81.68528	28.72333	Active	Quarterly	7
Lake Griffin	Lake County Water Resource Mgt.	21FLLCPC	ORC1	Haines Creek @ Structure	81.78250	28.87139	Active	Quarterly	8
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	PRC9	Palatlakaha River @ CR48 Bridge	81.87500	28.74806	Active	Quarterly	9
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPBLUE	Blue Springs aka Yahala	81.82778	28.74861	Active	Quarterly	10
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPBUGG	Bugg Spring	81.90167	28.75194	Active	Quarterly	11
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPHOLIDAY	Holiday Spring	81.81778	28.74056	Active	Quarterly	12
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPDOUBLERUN	Double Run Spring	81.74222	28.67972	Active	Quarterly	13
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRA2	Big Creek @ State Park Gage Station	81.74056	28.44778	Active	Quarterly	14
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRA3	Little Creek @ Lake Nellie Rd. Gage Station	81.75750	28.46111	Active	Quarterly	15
Palatlakaha River	Lake County Water Resource Mgt.	21FLLCPC	PRC3	Cherry Lake @ Center	81.81444	28.59722	Active	Quarterly	16
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPSUNEDEN	Sun Eden Spring	81.82000	28.74444	Active	Quarterly	17

Contributes to	Organization	Agency Code	Station Number	Station Name	Longitude	Latitude	Status	Frequency	Map ID
Lake Harris	Lake County Water Resource Mgt.	21FLLCPC	SPSANDY	Sandy Spring	81.81000	28.74500	Active	Quarterly	18
Lake Apopka	Lake County WAV	21FLWAV	Johns Lake NW-WAV	Johns Lake Northwest Shoreline	81.66010	28.53890	Active	Monthly	19
Lake Griffin	Lake County WAV	21FL WAV	Haynes Creek-WAV	Haynes Creek near Shoreline	81.77830	28.86730	Active	Monthly	20
Lake Apopka	OCEPD	21FLORAN	A50E	Center of John's Lake East Lobe	81.63555	28.53285	Active	Quarterly	21
Lake Apopka	OCEPD	21FLORAN	A50W	Center of John's Lake West Lobe	81.66056	28.52964	Active	Quarterly	22
Palatlakaha River	Polk County Natural Resources Division	21FLPO	LKLowery1	Lake Lowery Center	81.67700	28.13000	Active	Quarterly	23
Lake Apopka	SJRWMD	21FLSJWM	APOPKA SPRING	Center of Apopka Springs in Gourd Neck	81.67722	28.56667	Active	Quarterly	24
Lake Apopka	SJRWMD	21FLSJWM	NSPMP1	North Shore Restoration Area Unit 1 Pump into Lake Level Canal at Interceptor Rd.	81.63372	28.71288	Active	Twice/month	25
Lake Apopka	SJRWMD	21FLSJWM	NSWEIRW	North Shore Restoration Area at Duda Weir West Site	81.67111	28.72194	Active	Twice/month	26
Lake Apopka	SJRWMD	21FLSJWM	NSWEIRE	North Shore Restoration Area at Duda Weir East Site	81.66151	28.68285	Active	Twice/month	27
Lake Apopka	SJRWMD	21FLSJWM	WQDC2	West Marsh Discharge into C2 Canal	81.70099	28.68146	Active	Weekly	28
Lake Apopka	SJRWMD	21FLSJWM	NSPMPSFE	North Shore Restoration Area Sand Farm Pump East Side Site	81.63424	28.71403	Active	Twice/month	29
Lake Apopka	SJRWMD	21FLSJWM	NSZPT	North Shore Restoration Area Unit 2 Alum Injection Site	81.59182	28.66904	Active	Twice/month	30
Lake Beauclair	SJRWMD	21FLSJWM	ABC	Apopka-Beauclair Canal Upstream of Lock	81.68466	28.72232	Active	Monthly	31
Lake Dora	SJRWMD	21FLSJWM	BCE	Canal Entrance to Lake Beauclair	81.67184	28.77070	Active	Monthly	32

Contributes to	Organization	Agency Code	Station Number	Station Name	Longitude	Latitude	Status	Frequency	Map ID
Lake Eustis	SJRWMD	21FLSJWM	DCNL	Dora Canal, approx 100m North of Hwy 19 Bridge, Center	81.74049	28.80208	Active	Monthly	33
Lake Eustis	SJRWMD	21FLSJWM	DRVR	Dead River, Center between Eustis and Harris, under Power Wires	81.76635	28.81307	Active	Monthly	34
Lake Eustis/Trout Lake	SJRWMD	21FLSJWM	PINEMW	Pine Meadows W Side at Discharge to Hicks Ditch (record staff gauge)	81.66470	28.88728	Nonambient	Bimonthly	35
Lake Griffin	SJRWMD	21FLSJWM	DEPHCB	Haines Creek above 'V' Discharge Structure	81.79916	28.88110	Active	Monthly	36
Lake Griffin	SJRWMD	21FLSJWM	LYC	Lake Yale, Center	81.73430	28.91530	Active	Monthly	37
Lake Griffin	SJRWMD	21FLSJWM	EMFCA	Center of Eustis Muck Farm (Area 7)	81.78559	28.92129	Nonambient	Monthly	38
Lake Griffin	SJRWMD	21FLSJWM	LFNA	Long Farm, North Pool	81.78333	28.90806	Nonambient	Monthly	39
Lake Griffin	SJRWMD	21FLSJWM	SNKSVA	SN Knight S, 'V' Gravity Discharge (Sample from Retention Area Side of Structure)	81.80822	28.88200	Nonambient	Monthly	40
Lake Griffin	SJRWMD	21FLSJWM	SNKNA	SN Knight N, Center of Site in Open Water	81.81032	28.91169	Nonambient	Monthly	41
Lake Griffin	SJRWMD	21FLSJWM	LBCA	Lowrie Brown Farm, South Pool (Area 4)	81.82621	28.87485	Nonambient	Monthly	42
Lake Griffin	SJRWMD	21FLSJWM	YGCAA	Yale-Griffin Canal, East of Confluence with Lake Griffin	81.82407	28.90982	Active	Monthly	43
Lake Griffin	SJRWMD	21FLSJWM	HBLG	Proposed Gravity Discharge from Harris Bayou to Lake Griffin (not yet established)	0.00000	0.00000			44
Lake Griffin	SJRWMD	21FLSJWM	02238000	Haines Creek at Lisbon	81.78396	28.87190	Active	Monthly	45
Lake Harris	SJRWMD	21FLSJWM	PRVR	Palatlakaha River at Hwy 48 Bridge	81.87485	28.74803	Active	Monthly	46

Contributes to	Organization	Agency Code	Station Number	Station Name	Longitude	Latitude	Status	Frequency	Map ID
Lake Harris	SJRWMD	21FLSJWM	Double Run Spring	Howey Height Tributary at Double Run Road	81.74194	28.67889	Active	Biannually	47
Lake Harris	SJRWMD	21FLSJWM	Blue Spring Yal Run	Blue Springs near Yalaha	81.82806	28.74861	Active	Biannually	48
Lake Harris	SJRWMD	21FLSJWM	Bugg Spring Run	Bugg Spring Run below Chain Link Fence	81.90167	28.75250	Active	Triannually	49
Lake Harris	SJRWMD	21FLSJWM	Holiday Springs Dstm	Holiday Springs in Yalaha	81.81806	28.73167	Active	Biannually	50
Lake Harris	SJRWMD	21FLSJWM	SNKLP	SN Knight Leesburg, Discharge Pump on Lake Harris Levee	81.81568	28.81185	Nonambient	Monthly	51
Ocklawaha River	SJRWMD	21FLSJWM	MBU	At Moss Bluff; Upstream of the Lock	81.88143	29.07886	Active	Monthly	52
Palatlakaha River	SJRWMD	21FLSJWM	20020321	Cherry Lake @ Center	81.81404	28.59873	Active	Bimonthly	53
Trout Lake	SJRWMD	21FLSJWM	HICKDN	Hicks Ditch Downstream Side of East Road Culvert	81.66511	28.88790	Active	Bimonthly	54
Lake Carlton	SJRWMD	21FLSJWM	LOLA	Lake Ola, Center	81.63455	28.75360	Active	Quarterly	55

APPENDIX J. 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.

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

Background: The condition of waters in the absence of human-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.

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

Biological oxygen demand (BOD): The amount of dissolved oxygen (DO) used by aquatic microorganisms.[2]

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

Continuous deflective separation unit (CDS): A patented stormwater management device that uses the available energy of the storm flow to create a vortex to separate 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 waterbody segment (such as drinking water, swimming, or fishing).

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.

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[2] Microorganisms such as bacteria are responsible for decomposing organic waste. When organic matter such as dead plants, leaves, grass clippings, manure, sewage, or even food waste is present in a water supply, bacteria begin the process of breaking down the waste. When this happens, aerobic bacteria consume much of the available DO, robbing other aquatic organisms of the oxygen they need to live. BOD is a measure of the oxygen used by microorganisms to decompose this waste. If there is a large quantity of organic waste in the water supply, a lot of bacteria will be present working to decompose this waste. In this case, the demand for oxygen will be high (due to all the bacteria); consequently, the BOD level will be high. As the waste is consumed or dispersed through the water, BOD levels will begin to decline.

Nitrates and phosphates in a body of water can contribute to high BOD levels. Nitrates and phosphates are plant nutrients and can cause plant life and algae to grow quickly. When plants grow quickly, they also die quickly. This contributes to the organic waste in the water, which is then decomposed by bacteria, resulting in a high BOD level. When BOD levels are high, DO levels decrease, because bacteria are consuming the oxygen that is available in the water. Since less DO is available in the water, fish and other aquatic organisms may not survive.

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.

Effluent: Wastewater that flows into a receiving stream by way of a domestic or industrial discharge point.

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

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

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

Flocculent: A liquid that contains loosely aggregated, suspended particles.

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

Karst: An area of irregular limestone in which erosion has produced fissures, sinkholes, underground streams, and caverns.

Land development regulations (LDRs): Ordinances enacted by governing bodies for the regulation of any aspect of development, including 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.

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

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

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 that 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).

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

Nonpoint source (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. NPSs include atmospheric deposition and runoff or leaching from agricultural lands, urban areas, unvegetated lands, on-site sewage treatment and disposal systems, and construction sites.

Outfall: The place where a sewer, drain, or stream discharges.

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 the 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.

Polycyclic aromatic hydrocarbons (PAHs): Hydrocarbon compounds with multiple benzene rings. PAHs are typical components of asphalts, fuels, oils, and greases.

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 stormwater runoff, releasing it by infiltration and /or evaporation.

Reuse: The deliberate application of reclaimed water for a beneficial purpose. Criteria used to classify projects as “reuse” or “effluent disposal” are contained in Section 62-610.810, F.A.C.

Rough fish: A fish that is neither a sport fish nor an important food fish.

Runoff curve: A calculated number representing the percentage of rainfall that 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 the separation of solid and liquid components of wastewater, to provide the 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.

Spring protection zones: The geographic area around a spring in which land use and activities are limited, in order to reduce the pollutant load to the spring.

STORET: The EPA'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 that hits the ground and is not evaporated, percolated or transpired into vegetation, but rather flows over the ground surface seeking a receiving waterbody.

Submersed: Growing or remaining under water.

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

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.

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. Before 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 instream water quality conditions.

Total nitrogen (TN): TN is the combined measurement of nitrogen in nitrate (NO_3), nitrite (NO_2), ammonia, and organic compounds found in water, measured in milligrams per liter. 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 bioavailable 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 as phosphate (PO_4), other inorganic phosphorus compounds, and organic phosphorus compounds found in water. It is one of the primary nutrients regulating algal and macrophyte growth in natural waters, particularly in fresh water. While it is essential to the growth of plants and other organisms in aquatic systems, excessive amounts increase the rate of plant growth and cause accelerated eutrophication and algal blooms. Phosphorus is a limiting nutrient in many ecosystems, meaning that its availability controls the growth rate of plants and other organisms. Ortho-phosphate, the form in which almost all inorganic 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 TN, 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 industry and sewage facilities.

Wastewater: The combination of liquid and pollutants from residences, commercial buildings, industrial plants, and institutions, together with any ground water, surface runoff, or leachate that may be present.

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

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

Water quality standards: (1) Standards comprising 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 Rules 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 (e.g., 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 water quality in the basin, which are most important, and how they will be addressed.

APPENDIX K. BIBLIOGRAPHY OF KEY REFERENCES AND WEB SITES

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Web Sites

TABLE K-1. STORMWATER AND WATER QUALITY PROTECTION WEB SITES*

LOCAL AND REGIONAL SITES	
Apopka	http://www.apopka.net
Clermont	http://clermont.govoffice.com/
Eustis *Public Services*	http://www.eustis.org/ http://www.eustis.org/depts/pserv.htm
Fruitland Park	http://www.fruitlandpark.org/
Groveland	http://www.groveland-fl.gov/
Leesburg	http://www.leesburgflorida.gov/environmental/index.aspx
Minneola	http://www.minneola.us/
Mount Dora *Public Works/Stormwater*	http://www.ci.mount-dora.fl.us/ http://www.ci.mount-dora.fl.us/index.asp?Type=B_BASIC&SEC={5931C4B3-C786-4A88-B4B7-BEE827081F64}
Ocoee *Public Works/Stormwater*	http://www.ci.ocoee.fl.us/ http://www.ci.ocoee.fl.us/PW/Stormwater/Stormwater.asp
Tavares *Public Works*	http://www.tavares.org/ http://www.tavares.org/publicworks.html
Umatilla	http://www.umatillafl.org/
Winter Garden	http://www.cwgdn.com/
LCWA	http://www.lcwa.org
Lake County *Environmental Services* *Water Resources Atlas*	http://www.lakegovernment.com http://www.lakegovernment.com/departments/environmental_services/ http://www.lake.wateratlas.usf.edu/
Marion County	http://www.marioncountyfl.org/
Orange County *Public Works/Stormwater* *Water Atlas*	http://www.orangecountyfl.net/cms/default.htm http://www.orangecountyfl.net/cms/DEPT/pw/stormwater/default.htm http://www.orange.wateratlas.usf.edu/
Polk County *Natural Resources Division* *Water Atlas*	http://www.polk-county.net/ http://www.polk-county.net/county_offices/natural_resources/index.aspx http://www.polk.wateratlas.usf.edu/
Town of Astatula	http://www.townofastatula.com/
Town of Howey-in-the-Hills	http://www.howeyinthehills.org/
Town of Lady Lake	http://www.ladylake.org/
Wekiva River Commission	http://www.ecfrpc.org/main/Main.asp?SubCategoryID=45&CategoryID=4
SJRWMD Programs *Lake Apopka acquisition and restoration* *Upper Ocklawaha acquisition and restoration* *Outreach information*	http://www.sjrwmd.com/programs.htmlhttp://sjr.state.fl.us/programs/programs.html http://www.sjrwmd.com/programs/upperocklawahariver.html http://www.sjrwmd.com/programs/lakeapopka.html http://www.sjrwmd.com/programs/outreach.htmlhttp://sjr.state.fl.us/programs/outreach/overview.html
STATE SITES	
General Portal for Florida	http://www.myflorida.com

DEP *Watershed Management* *TMDL Program* *BMPs, public information,* *NPDES Stormwater Program* *Nonpoint Source funding assistance* *Recreation and Parks* *Invasive Plant Management* *Ocklawaha 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/parks/ http://www.dep.state.fl.us/lands/invaspec/2ndlevpgs/Aquaticplnts.htm. http://plants.ifas.ufl.edu/guide http://www.dep.state.fl.us/water/basin411/ocklawaha/assessment.htm
DACS Office of Agricultural Water Policy	http://www.floridaagwaterpolicy.com/
DACS 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/
National Hurricane Center:	http://www.nhc.noaa.gov/
U.S. EPA, Office of Water *EPA Region 4 (Southeast US)* *Clean Water Act history* *"After the Storm" Weather Channel special*	http://www.epa.gov/water http://www.epa.gov/region4 http://www.epa.gov/Region5/water/cwa.htm http://www.epa.gov/weatherchannel/
U.S. Geological Survey: Florida Waters	http://sofia.usgs.gov/publications/reports/floridawaters/#options

***Note:** Non-DEP Web sites containing information on water quality problems may not reflect DEP determinations of impairment made under rule criteria.