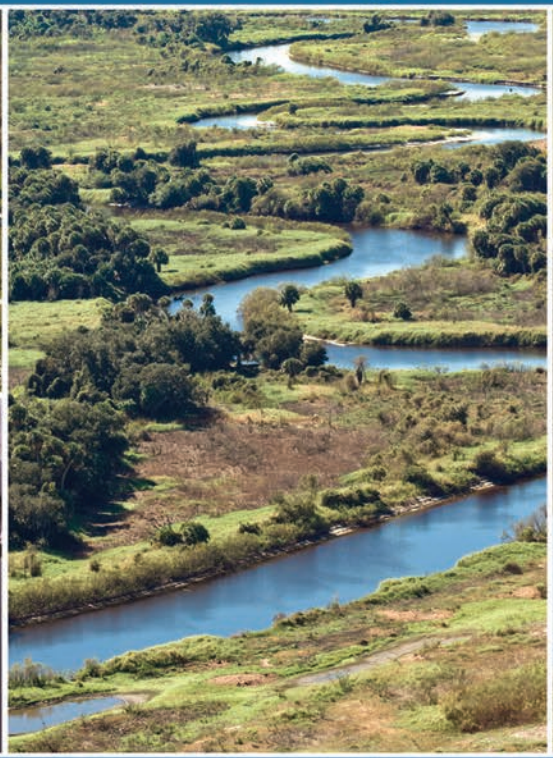
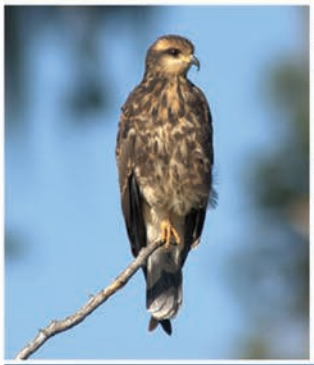
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Planning Document/Appendices


LOWER KISSIMMEE BASIN
WATER SUPPLY PLAN

2014

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

2014

LOWER KISSIMMEE BASIN

Water Supply Plan

Acknowledgements

The South Florida Water Management District recognizes and thanks the Water Resources Advisory Commission Regional Water Supply Workshop participants for their contributions, comments, advice, information, and assistance throughout the development of this *2014 Lower Kissimmee Basin Water Supply Plan.*

Furthermore, the South Florida Water Management District expresses appreciation to all staff who contributed to the development and production of this plan.

For further information about this document, please contact:

Chris Sweazy
South Florida Water Management District
Orlando Service Center
1707 Orlando Central Parkway, Suite 200
Orlando, FL 32809
Telephone: (407) 858-6100 x3822
Email: csweazy@sfwmd.gov

sfwmd.gov

Executive Summary

The South Florida Water Management District's (SFWMD or District) strategic goal for each regional water supply plan is to identify options for an adequate supply of water to meet existing and future reasonable-beneficial uses while ensuring protection of the natural systems. This document is the District's first water supply plan for the Lower Kissimmee Basin (LKB). It provides population and water demand estimates and projections, identifies local and regional efforts completed since the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update), reviews water supply development issues, and identifies options to meet water demands through the 2035 planning horizon.

The LKB Water Supply Planning Area includes portions of Okeechobee, Highlands, and Glades counties, which were formerly included in the Kissimmee Basin Water Supply Planning Area. Since the 2005–2006 KB Plan Update, the Kissimmee Basin Water Supply Planning Area was divided into the LKB and Upper Kissimmee Basin planning areas. The Upper Kissimmee Basin is included in the Central Florida Water Initiative (CFWI) Planning Area. A water supply plan for the CFWI area is being developed by a collective effort of the three water management districts that have jurisdiction in the area – South Florida Water Management District, Southwest Florida Water Management District, and St. Johns River Water Management District and other state agencies, utilities, and stakeholders.

The LKB Planning Area is generally defined as the drainage basins of the Kissimmee River south of the S-65A Structure, Taylor Creek/Nubbin Slough, Lake Istokpoga–Indian Prairie Basin, and Fisheating Creek. This area includes the city of Okeechobee, the Seminole Tribe of Florida's Brighton Reservation, and extensive agricultural lands including portions of the Lake Okeechobee Service Area north of the lake. Lake Istokpoga, Lake Okeechobee, the Kissimmee River, and extensive canal networks and related water works are in the region. The western and northern shore of Lake Okeechobee forms the southeastern boundary of the LKB Planning Area.

This 2014 LKB Plan was developed in an open, public forum with agricultural interests, water supply utilities, local governments, environmental organizations, the Seminole Tribe of Florida, and other stakeholders through the SFWMD's Water Resources Advisory Commission. The process to develop the population and water demand estimates and projections began in 2010. Meetings and workshops were held with water users, local governments, utilities, agriculture and other industry representatives, environmental representatives, and agencies to solicit input, provide information about planning results, and receive comments on the draft plan.

FUTURE WATER DEMAND

Total average water demand in the LKB Planning Area is projected to increase more than 15 percent to 222 million gallons per day (MGD) by 2035. Agricultural Self-Supply is the largest water use category and is projected to remain so through 2035 when the demand is expected to be 185 MGD or 83 percent of the planning area's total water demand. Total water use is projected to increase 30 MGD over 2010 water demands.

Irrigated agricultural acreage is projected to increase from about 142,000 acres in 2010 to approximately 151,000 acres in 2035. The estimated 2010 acres includes nearly 75,000 acres of permitted, improved pasture that were not included in the 2005–2006 KB Plan Update. Much of this projected agricultural growth has already been permitted in the basin.

While the population served by Public Water Supply (PWS) and Domestic Self-Supply (DSS) in the planning area increased by more than 5,300 people between 2000 and 2010, the volume of water used decreased slightly during that period. The population of the planning area is expected to continue to increase, growing from an estimated 52,967 in 2010 to 65,356 in 2035. Total PWS and DSS water demands are expected to increase from 4.9 MGD in 2010 to 6.0 MGD by 2035.

The remaining water use categories, Industrial/Commercial/Institutional Self-Supply, Power Generation Self-Supply, and Recreational/Landscape Self-Supply, are projected to grow modestly from 24.5 MGD to 31.0 MGD by 2035.

PROTECTION OF NATURAL SYSTEMS

The natural surface water systems of the LKB Planning Area include Lake Okeechobee, Lake Istokpoga, and the Kissimmee River and its floodplains. The water supply needs for these natural systems limit water available for allocation and are addressed through regulatory mechanisms (such as minimum flows and levels [MFLs], water reservations, and restricted allocation areas) and water resource development projects. Construction of ecosystem restoration projects is vital to the health of the region's water resources, including elements identified in MFL recovery and prevention strategies. Protection of the LKB natural systems has been addressed through a number of rules including restricted allocation area criteria for the Lake Okeechobee Service Area (LOSA), the Indian Prairie Basin, and the Lake Istokpoga MFL.

In addition, the SWFWMD established MFLs for several lakes just west of the planning area. The evaluation of projected increases in groundwater withdrawals within the SFWMD were evaluated and found to have no increased impact on MFL lakes within the SWFWMD that have been identified as affected by water use.

Lake Okeechobee

In the Lake Okeechobee Service Area, local conditions limit the volume of available fresh water. Specifically, Lake Okeechobee and hydraulically connected water bodies are limited sources as a result of the United States Army Corps of Engineers' (USACE) implementation of the 2008 Lake Okeechobee federal regulation schedule. The schedule change is intended to operate the lake at lower levels than recent regulation schedules to reduce the risk that the lake's dike might fail, as well as impacts to the lake ecology.

Studies supporting the 2008 Lake Okeechobee Regulation Schedule change assessed impacts on water supply performance. The analysis projected a decline in the physical level of certainty of agricultural users reliant on lake water supplies, from a 1-in-10 year to a 1-in-6 year drought return frequency. The new schedule also was expected to cause Lake Okeechobee to exceed its minimum flows and levels (MFL) criteria more frequently. In response, SFWMD developed a MFL recovery strategy in 2008. As one part of that strategy, SFWMD adopted regulatory criteria to limit future additional withdrawals from Lake Okeechobee and connected water bodies to protect the lake and prevent further erosion to the level of certainty for existing legal users.

The USACE has started the rehabilitation of the Herbert Hoover Dike. The initial step—construction of a 21.4-mile cutoff wall component in Reach 1—was completed in 2012, and satisfies the majority of the risk reduction goals. As part of this risk reduction approach, the 32 water control structures (culverts) operated by the USACE will be replaced, removed, or abandoned by 2019. Rehabilitation of Reaches 2 and 3 is scheduled for completion by 2022. The USACE has indicated it will consider revisions to the lake regulation schedule at that time. Any increase in the lake's regulation schedule as a result of the repairs will likely be evaluated by the USACE through a National Environmental Policy Act analysis of multiple objectives including flood protection, water supply, and the ecological health of the lake and downstream ecosystems.

Lake Istokpoga and the Indian Prairie Basin

Lake Istokpoga and its canals have long been used to meet agricultural water demands in the Indian Prairie Basin. During normal rainfall years, the water demands from the lake are sustainable with releases made for flood control. However, during drought years and when the preceding winter and spring rainfall is lacking, releases from the lake become problematic and efforts are made to maintain the Lake Istokpoga minimum operating schedule. During these years, the District has had to ration the available supply.

The Seminole Tribe of Florida has surface water entitlement rights in accordance with the 1987 Water Rights Compact among the Seminole Tribe of Florida, State of Florida, and SFWMD (Second Amendment to the Seventeenth Annual Work Plan) and subsequent additional documents addressing the compact entitlement provisions. One of these documents is an agreement between the Tribe and the SFWMD that ensures water delivery to the Brighton Reservation, which is in the Indian Prairie Basin. The agreement outlines

releases from Lake Istokpoga and withdrawals from Lake Okeechobee when the water level in Lake Istokpoga is low

Because of water shortages in the Lake Istokpoga-Indian Prairie Basin area, the District established a restricted allocation area in the Indian Prairie in the early 1980's. This restricted the use of additional surface water in the area. In December 2005, the District's Governing Board adopted a minimum flow and level (MFL) rule for Lake Istokpoga and the associated canal systems. The prevention strategy for this MFL included the previously established restricted allocation area. These regulations are intended to reduce the potential of the District declaring a water shortage for the basin and ensuring water delivery for the Brighton Reservation.

Kissimmee Basin

The Kissimmee Basin forms the headwaters of Lake Okeechobee and the Everglades with the Kissimmee River contributing about half of the inflow to the lake. In the 1960s, the river was channelized into the C-38 Canal, which caused extensive environmental damage. In response, the Kissimmee River Restoration Project is a multi-phase project with the goal of reestablishing the river and floodplain system's ecological integrity while maintaining existing flood protection. The District is integrating the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region, including the Kissimmee Chain of Lakes Long-Term Management Plan, Kissimmee Basin Water Reservations, and the Lake Okeechobee Watershed Protection Program. The Kissimmee River Basin Water Reservation, which includes the Kissimmee Chain of Lakes and the Kissimmee River and its floodplain, is on the District's 2014 Priority Water Bodies List and Schedule for future adoption. The District anticipates adoption of the reservation rule by December 2015. This reservation may create water supply limitations from this source in the future.

WATER SOURCES

The LKB Planning Area historically has relied on surface water from Lakes Istokpoga and Okeechobee, their connected canals, and fresh groundwater from the surficial and Floridan aquifer systems as the primary water sources for urban, agricultural, and industrial uses. It is anticipated that these uses will continue. However, restricted allocation area criteria limit increased allocations from Lake Okeechobee and Lake Istokpoga and the hydraulically connected canals.

Fresh groundwater sources (i.e., surficial, intermediate, and Floridan aquifers) and surface water sources (i.e., Lake Istokpoga, Lake Okeechobee, canals) are considered traditional water sources whereas nontraditional or alternative water sources include brackish groundwater, reclaimed water, and water stored in aquifer storage and recovery (ASR) systems and reservoirs. It appears the projected water demand of the LKB Planning Area can be met using traditional ground and surface water sources. At individual locations, alternative sources and conservation may be appropriate.

CONCLUSION

This water supply plan provides an assessment of the water demands and available sources for the LKB Planning Area through 2035. With the advent of District regulations effectively limiting most of the surface water resources in the planning area, there has been a shift to an increased reliance on groundwater from the surficial and Upper Floridan aquifers. Based upon the estimated locations of the proposed increases in withdrawals from these wells, there appears to be adequate supply to meet the meet the 1-in-10 year drought demands for most water users in the basin during the planning horizon. This level of certainty is reduced to a 1-in-6 year drought condition for those surface water users located within the Lake Okeechobee Service Area. Meeting the 1-in-10 year level of service for this area is not likely within the next five years due to the interrelationship of the federal and state projects outlined in this plan and current operations under the 2008 Lake Okeechobee Regulation Schedule. The SFWMD anticipates any additional water from Lake Okeechobee resulting from operational changes or a revised regulation schedule could return the lake to MFL prevention status, enhance the level of certainty to existing permitted users, and support other environmental objectives.

Successful implementation of this 2014 LKB Plan requires close coordination with agricultural stakeholders, local governments, and utility water supply planning entities. Collaboration with stakeholders is also essential for directing the implementation of the preceding recommendations and guidance. This partnering should ensure that water resources in the LKB Planning Area continue to be prudently managed and available to meet future demand.

Future LKB plan updates will address the progress of the water resource development projects based on project sequencing, project funding, and implementation partnerships as applicable. Until this occurs, this 2014 LKB Plan continues to rely upon existing programs and regulations and their correlation with water supply demands and available sources.

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PLANNING DOCUMENT

APPENDICES

Tables

Figures

Acronyms and Abbreviations

2000 KB Plan	*Kissimmee Basin Water Supply Plan*
2005–2006 KB Plan Update	*2005–2006 Kissimmee Basin Water Supply Plan Update*
2008 LORS	2008 Lake Okeechobee Regulation Schedule
2014 LKB Plan	*2014 Lower Kissimmee Basin Water Supply Plan*
ac-ft	acre-feet
AFSIRS Model	Agricultural Field Scale Irrigation Requirements Simulation Model
AGR	Agricultural Self-Supply
Applicant's Handbook	*Applicant's Handbook for Water Use Permit Applications*
ASR	aquifer storage and recovery
AWS	Alternative Water Supply
BEBR	Bureau of Economic and Business Research
bls	below land surface
BMP	best management practice
CERP	Comprehensive Everglades Restoration Plan
CFWI	Central Florida Water Initiative
District	South Florida Water Management District
DSS	Domestic Self-Supply
DWM	Dispersed Water Management
ET	evapotranspiration
F.A.C.	Florida Administrative Code
F.S.	Florida Statutes
FAS	Floridan aquifer system
FAWN	Florida Automated Weather Network
FDACS	Florida Department of Agriculture and Consumer Services
FDEO	Florida Department of Economic Opportunity

FDEP	Florida Department of Environmental Protection
FPL	Florida Power & Light
FRESP	Florida Ranchlands Environmental Services Pilot
FY	Fiscal Year
GIS	Geographic Information System
GPD	gallons per day
GPM	gallons per minute
IAS	intermediate aquifer system
ICI	Industrial/Commercial/Institutional Self-Supply
ICU	intermediate confining unit
IMWID	Istokpoga Marsh Watershed Improvement District
KB	Kissimmee Basin
KBMOS	Kissimmee Basin Modeling and Operations Study
LFA	Lower Floridan aquifer
LKB	Lower Kissimmee Basin
LKBGWM	Lower Kissimmee Basin Groundwater Model
LOER Program	Lake Okeechobee and Estuary Recovery Program
LOPP	Lake Okeechobee Protection Plan
LOSA	Lake Okeechobee Service Area
MFL	minimum flows and levels
MG	million gallons
mg/L	milligrams per liter
MGD	million gallons per day
MIL	Mobile Irrigation Lab
NE-PES	Northern Everglades – Payment for Environmental Services
NGVD	National Geodetic Vertical Datum of 1929
OCI	Okeechobee Correctional Institute
OUA	Okeechobee Utility Authority
PCUR	per capita use rate
PWR	Power Generation Self-Supply
PWS	Public Water Supply

RAA	restricted allocation area
REC	Recreational/Landscape Self-Supply
RO	reverse osmosis
S.R.	state road
SAS	surficial aquifer system
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
STA	stormwater treatment area
STOF	Seminole Tribe of Florida
Support Document	*2011–2014 Water Supply Plan Support Document*
SWFWMD	Southwest Florida Water Management District
TDS	total dissolved solids
TECO	Tampa Electric Company
Tribe	Seminole Tribe of Florida
UF/IFAS	University of Florida/Institute of Food and Agricultural Services
UFA	Upper Floridan aquifer
UKB	Upper Kissimmee Basin
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDA-NASS	United States Department of Agriculture–National Agriculture Statistics Service
USDA-NRCS	United States Department of Agriculture–Natural Resources Conservation Service
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
Water CHAMP	Water Conservation Hotel and Motel Program
WaterSIP	Water Savings Incentive Program
WRAC	Water Resources Advisory Commission
WTP	water treatment plant
WWTF	wastewater treatment facility

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

2014

LOWER KISSIMMEE BASIN

Water Supply Plan

Planning Document

1
Introduction

The South Florida Water Management District (SFWMD or District) develops or updates regional water supply plans to provide for current and future water needs while protecting central and south Florida's water resources. This *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan) assesses 2010 and projected water needs and water sources to meet those needs through 2035 for the portions of Glades, Okeechobee, and Highlands counties located within the Lower Kissimmee Basin (LKB) Planning Area. This 2014 LKB Plan presents population estimates, water demands and projections, water resource and water supply development projects, and related water supply planning information for the 2010–2035 planning horizon. Designed to be a planning guide for local governments and other water users, this water supply plan provides a framework for water supply planning and management decisions in the LKB Planning Area.

TOPICS

- Plan Description
- Legal Authority and Requirements
- Objectives
- Planning Process
- Planning Area Description
- Factors Impacting the 2014 LKB Plan
- Progress
- Outlook on Climate Change
- Planning for the Next 20 Years

PLAN DESCRIPTION

Since the publication of the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update, SFWMD 2006), the Kissimmee Basin (KB) Planning Area was divided into the LKB and Upper Kissimmee Basin (UKB). As previously mentioned, the LKB includes portions of Glades, Okeechobee, and Highlands counties. The portions of Polk, Osceola, and Orange counties that were in the KB Planning Area are now in the UKB. Water planning for the UKB is part of a cooperative and parallel effort known as the Central Florida Water Initiative (CFWI), which also includes portions of the St. Johns River Water Management District (SJRWMD) and Southwest Florida Water Management District (SWFWMD). The CFWI will generate a separate water supply plan that is the collective effort of the SFWMD, SJRWMD, SWFWMD, Florida Department of Environmental Protection (FDEP), utilities, and other stakeholders.).

This 2014 LKB Plan consists of two documents: a combined Planning Document with Appendices and the *2011–2014 Water Supply Plan Support Document* (Support Document) (SFWMD 2014b). The Planning Document and Appendices focus on the LKB Planning Area

while the Support Document addresses issues related to all five SFWMD regional planning areas. The Support Document contains background material such as relevant legislation, rainfall information, and information on water resource technologies. These documents are available on-line through http://www.sfwmd.gov/watersupply.

LEGAL AUTHORITY AND REQUIREMENTS

The legal authority and requirements for water supply planning are included in Chapters 373, 403, and 187, Florida Statutes (F.S.). In accordance with Florida's Water Protection and Sustainability Program, regional water supply plans and local government comprehensive plans must ensure that adequate potable water facilities are constructed and concurrently available with new development. The water supply planning region identified in this plan shall be considered a Water Resource Caution Area for the purposes of Section 403.064, F.S., and affected parties may challenge the designation pursuant to Section 120.569, F.S.

GOAL AND OBJECTIVES

The goal for this water supply plan is to identify water supply sources and future projects to meet existing and future reasonable-beneficial uses during a 1-in-10 year drought condition through 2035 while sustaining water resources and natural systems.

The objectives for the 2005–2006 KB Plan Update were reviewed and modified to develop the following objectives for this 2014 LKB Plan:

1. **Water Supply** – Identify sufficient water resource and water supply development options to meet 2035 demands during a 1-in-10 year drought event.
2. **Natural Systems** – Protect and enhance the environmental systems including the Everglades, Kissimmee River, and other federal, state, and locally identified natural resource areas.
3. **Conservation** – Promote increased levels of conservation and improve efficiency of existing and future water use.
4. **Linkage with Local Governments** – Provide information to support local government comprehensive plans. Promote compatibility of plan with tribal and local government land use decisions.
5. **Compatibility and Linkage with Other Efforts –** Promote compatibility and integration with the following:
   - Other state and federal water resource initiatives in the planning region
   - Existing and proposed environmental projects
   - Modifications to operating schedules for the regional systems, including Lake Okeechobee
   - Water use permitting process, minimum flow and level (MFL) criteria, and water reservations

PLANNING PROCESS

This 2014 LKB Plan describes how anticipated water supply needs will be met in the LKB Planning Area through 2035. The planning process used to develop this plan is outlined in **Table 1**.

Table 1. Planning process for developing the 2014 LKB Plan.

PLANNING PROCESS			
1	2	3	4
Planning and Assessment	**Data Collection, Analysis, and Issue Identification**	**Evaluation of Water Resources and Water Source Options**	**Identify Water Resource and Water Supply Development Projects**
The process incorporated extensive public participation and coordination with tribal and local governments, the Florida Department of Environmental Protection, Florida Department of Agriculture and Consumer Services, and other appropriate state and federal agencies. A review of previous planning efforts in the region and documentation of activities since the approval of the 2005–2006 KB Plan Update were key starting points.	Using the 2005–2006 KB Plan Update as a foundation, developing this plan involved collecting the latest information about population, water demand, (**Chapter 2**), water resources, water conservation, and land use. Groundwater and surface water evaluations and a review of regulatory information, and other related data (**Chapter 3**) confirmed the validity of previously identified issues and helped identify new issues.	The next phase of the planning process involved reviewing existing solutions or developing new solutions to address the identified issues (**Chapter 4**). In areas where projected demand exceeds available supplies, solutions included alternative water supplies and water conservation (**Chapter 5**).	Water supply development projects completed since the previous water supply plan were reviewed (**Chapter 6**).The need for future water supply development projects was examined; none are required because the 2035 projected demands are able to be met with the current infrastructure.

Public Participation

Public participation is a key component in the water supply planning process. Public participation for this plan was primarily conducted under the auspices of the SFWMD's Water Resources Advisory Commission (WRAC). The WRAC serves as an advisory body to the District's Governing Board and is the primary forum for conducting public workshops,

presenting information, and receiving public input on water resource issues affecting central and south Florida. Commission members represent environmental, urban, tribal, recreational, local government, and agricultural interests from each of the District's water supply planning areas.

The SFWMD held WRAC Issue Workshops during the water supply planning process. Stakeholders representing a variety of interests in the LKB—agriculture, tribal, industry, environmental protection, utilities, local government planning departments, and state and federal agencies—were invited to attend the workshops. During the workshops, participants reviewed information and provided comments regarding projected demands compiled by SFWMD staff.

Individual meetings were also held with local government planning departments, utilities, the Seminole Tribe of Florida, other planning agencies, and agricultural industry representatives to discuss water demand projections and coordinate planning processes.

PLANNING AREA DESCRIPTION

The LKB Planning Area consists of four tributary basins: Kissimmee River (south of Structure S-65A), Taylor Creek/Nubbin Slough, Lake Istokpoga–Indian Prairie/Harney Pond, and Fisheating Creek (**Figure 1** and **Figure 2**). The planning area covers approximately 1,805 square miles. To the northeast of the planning area is the SJRWMD and to the east is the SFWMD's Upper East Coast Planning Area. The western boundary is adjacent to the SWFWMD. Additional information about the physical features of the LKB Planning Area is provided in the Support Document.

The following characteristics describe the LKB Planning Area:

- Agriculture dominates the economic and water use patterns in the region. More than 140,000 acres were devoted to agricultural activities in 2010 with citrus being the largest commodity. Most of the projected increase in water demand by 2035 will support agriculture.
- Population is projected to increase 23 percent, from an estimated 52,967 in 2010 to about 65,356 by 2035. The City of Okeechobee has the largest population.
- The Seminole Tribe of Florida's Brighton Indian Reservation is centrally located within the planning area.
- The region has extensive natural systems including watersheds for Lake Istokpoga, portions of the Kissimmee River, and substantial portions of the headwaters for Lake Okeechobee. A number of environmental restoration projects are expected to occur within the basin during the planning horizon.

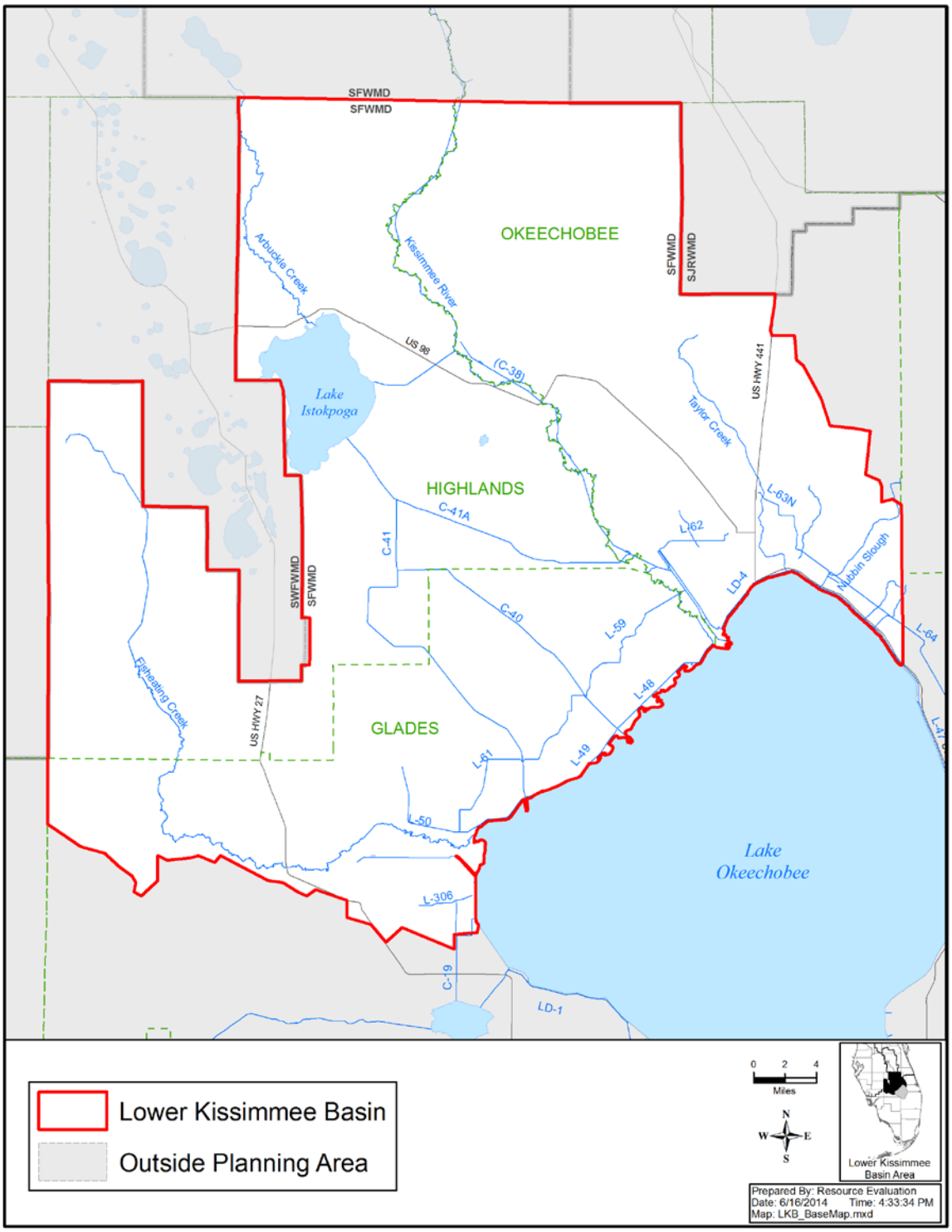


Figure 1. Lower Kissimmee Basin Water Supply Planning Area.

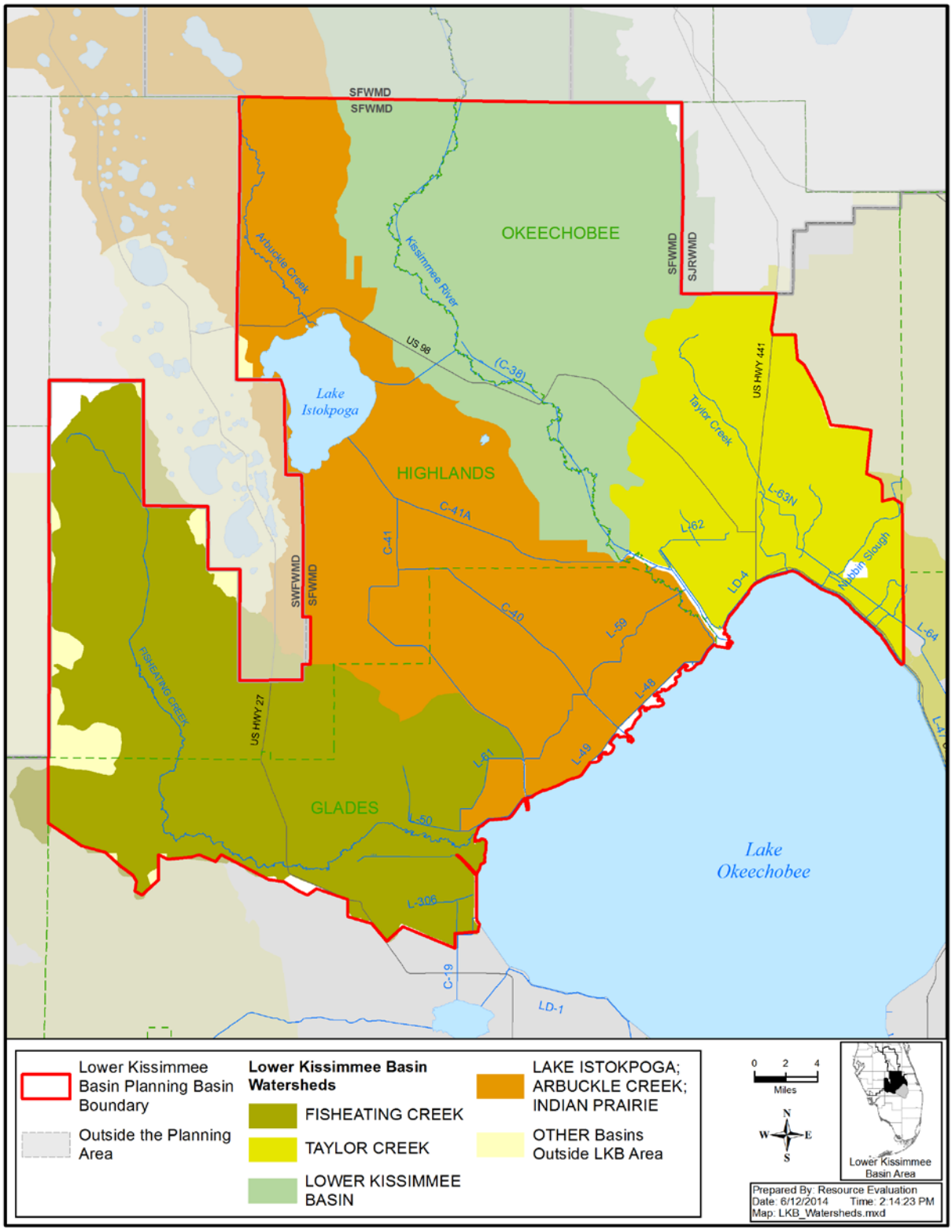


Figure 2. Major watersheds within the LKB Planning Area.

Water Demand

Total water demand in an average year is expected to increase from 192 MGD in 2010 to 222 MGD in 2035. Agricultural activities are projected to remain the LKB Planning Area's single largest water use category through 2035. Average demand for Agricultural Self-Supply (AGR) is expected to increase from 162 million gallons per day (MGD) in 2010 to 185 MGD by 2035, representing more than 83 percent of the region's gross demand. Projections for most crop types in the region are expected to remain at their 2010 levels with the exception of continuing declines in citrus and the introduction of strawberry, blueberry, and biofuel production crops.

The 2014 LKB Plan uses the 2010 United States census information as part of the baseline data to make population-related projections for the LKB Planning Area through 2035. The planning area population is expected to increase modestly from 52,967 residents in 2010 to 65,356 by 2035. This population projection is based on Bureau of Economic and Business Research growth projections from July 2011. These projections reflect the LKB Planning Area's rural and agricultural character. The estimated Public Water Supply (PWS) and Domestic Self-Supply (DSS) demands combined was 4.91 MGD in 2010 and projected to increase to 6.02 MGD by 2035. Population and water demand estimates are discussed in detail in **Chapter 2** and **Appendix A**.

Overview of Lower Kissimmee Basin Water Resources

Determining the availability of water needed to meet projected demand requires consideration of the area's available water resources. The primary sources of water throughout the LKB Planning Area are groundwater and surface water. To a much lesser extent, reclaimed water is also used. The following is a brief description of the groundwater and surface water sources and their historic use. **Chapter 3** and **Chapter 5** discuss the evaluation of these resources in more detail. In addition, information related to the LKB Planning Area and its water resources is included in the Support Document.

Groundwater Sources

The LKB Planning Area uses water from three hydrogeologic units: the surficial aquifer system (SAS), intermediate aquifer system (IAS), and Floridan aquifer system (FAS). The FAS is the primary groundwater source and includes the Upper and Lower Floridan aquifers. **Figure 3** shows the cross-section of these hydrogeologic units within the UKB and LKB planning areas.

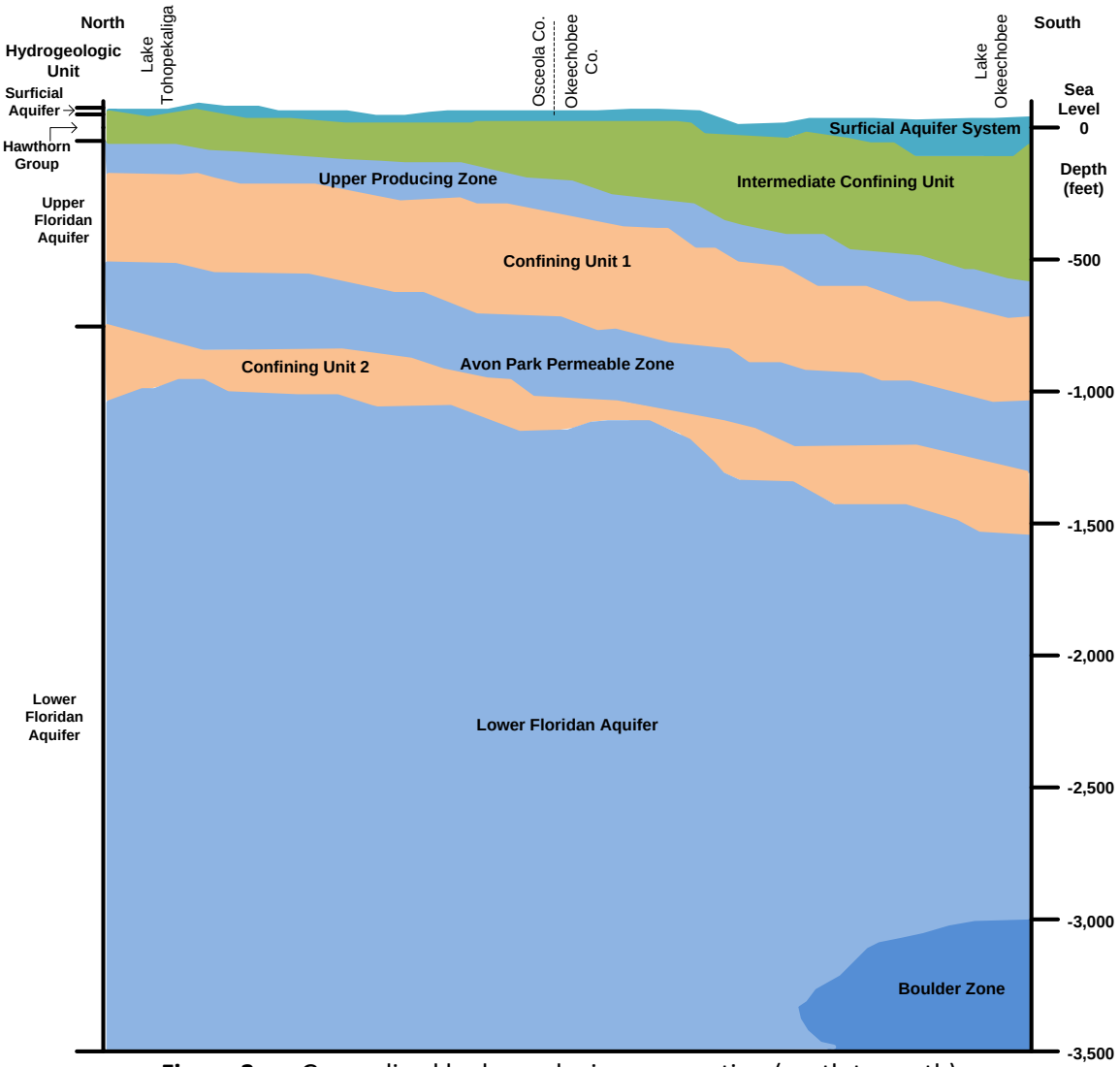


Figure 3. Generalized hydrogeologic cross-section (north to south) of the Upper and Lower Kissimmee Basin planning areas.

Surficial Aquifer System

The SAS, an unconfined aquifer, produces small quantities of good-to-fair quality water. Within the LKB Planning Area, it is used for PWS, Domestic Self-Supply (DSS), lawn irrigation, and small-scale agricultural irrigation. Okeechobee County Utilities and the Seminole Tribe operate SAS wellfields.

Intermediate Aquifer System / Intermediate Confining Unit

The IAS acts as a semiconfining unit between the SAS and FAS in the LKB Planning Area. While a few locally occurring water producing zones within the IAS exist, they generally do not produce large amounts of water. For example, some portions of southern Okeechobee County and the far western portion of the planning area along the Lake Wales Ridge have wells that exhibit moderate yields from the IAS due to local sand beds in the aquifer. The IAS's confining properties are less effective in some locations closer to the ridge due to geologic features that allow an enhanced connection between the SAS and FAS.

Floridan Aquifer System

The FAS is a high-yield aquifer that provides substantial volumes of good quality water for a wide variety of uses within the LKB Planning Area. The FAS is the primary groundwater producing aquifer in the area and is often broken into upper and lower sections due to a less productive horizon separating the two aquifers. The yield of the Upper Floridan aquifer (UFA) is sufficient and of suitable quality for PWS and AGR. The water quality and aquifer yield deteriorate southward near Lake Okeechobee. The UFA is further divided by confining units into the upper producing zone and the Avon Park permeable zone. These zones can also vary in water yield and quality. The water quality within the Lower Floridan Aquifer (LFA) is thought to be saline throughout most of the LKB Planning Area. The production characteristics of the LFA are less documented but it is thought to be able to yield large quantities of water.

Surface Water Sources

Hydrologically, the entire LKB Planning Area lies within the Lake Okeechobee Watershed and consists of four tributary basins: Kissimmee River, Taylor Creek/Nubbin Slough, Lake Istokpoga–Indian Prairie/Harney Pond, and Fisheating Creek (**Figure 2**). With the exception of Fisheating Creek, all major inflows to Lake Okeechobee are controlled by gravity-fed or pump-driven water control structures.

Surface waters from Lake Istokpoga and Lake Okeechobee are significant water sources for water users in Okeechobee, Glades, and Highlands counties. Historically, these lakes have met the agricultural demands of the Indian Prairie Basin, which is located between the lakes. A water budget analysis completed as part of the *Kissimmee Basin Water Supply Plan* (SFWMD 2000b), changing lake regulation schedules, and a number of water shortages in the Indian Prairie Basin and the Lake Okeechobee Watershed demonstrated the need to limit further withdrawals of water from Lake Istokpoga and Lake Okeechobee. **Chapter 3** and the Support Document provide more detail on the recent regulatory actions that have limited additional supply from these lakes.

Lower Kissimmee River Basin

The Kissimmee River is the longest surface water feature in the LKB and contributes close to 50 percent of the total flow to Lake Okeechobee (SFWMD, FDEP, and FDACS 2011). The portion of the river between the S-65 and S-65E structures is the focus of restoration and protection efforts. Lake Istokpoga is connected to the Kissimmee River by the Istokpoga Canal. The flow from this canal to the river is controlled by the S-67 Structure. The portion of the Istokpoga Canal spanning the Kissimmee River floodplain is also undergoing restoration.

Taylor Creek / Nubbin Slough

Taylor Creek and Nubbin Slough are interconnected basins that drain into Lake Okeechobee from the north and northeast. The Nubbin Slough Basin includes three tributaries: Lettuce Creek, Henry Creek, and Mosquito Creek, which, along with Nubbin Slough, are intercepted by the L-63, L-64, and C-59 canals and enter Lake Okeechobee through the S-191 Structure.

Two pilot projects for the construction and operation of stormwater treatment areas (STAs) in the Lake Okeechobee Watershed are being conducted in the Taylor Creek and Nubbin Slough basins. These STAs are a major component of the Lake Okeechobee Protection Plan (LOPP), which seeks to restore and protect Lake Okeechobee by achieving and maintaining compliance with water quality standards in the lake and its tributaries.

Lake Istokpoga – Indian Prairie Basin

The Indian Prairie Basin, located in the northeastern corner of Glades County and the southeastern corner of Highlands County, drains the northwestern portions of the Lake Okeechobee Watershed. Four canals, C-39A, C-41A, C-40 (Indian Prairie Canal), and C-41 (Harney Pond Canal), connect Lake Istokpoga to Lake Okeechobee. As previously mentioned, the Istokpoga Canal connects Lake Istokpoga to the Kissimmee River through the S-67 Structure. Major tributaries to Lake Istokpoga are Josephine Creek and Arbuckle Creek, located west and north of the lake, respectively.

Fisheating Creek

The Fisheating Creek Basin originates in western Highlands County and flows south through Cypress Swamp into Glades County. From central Glades County, the water leaves the creek channel and flows east through Cowbone Marsh into Lake Okeechobee. Recent studies in the Fisheating Creek Watershed have focused on creating water storage and improving water quality discharges to Lake Okeechobee. These are discussed in detail in **Chapter 3**.

Fisheating Creek

Lake Okeechobee

Lake Okeechobee is a key component of the south Florida hydrologic system. The lake is critical for flood control during wet seasons and water supply during dry seasons. Its other functions include navigation, fisheries, and wildlife habitat.

The SFWMD's Lake Okeechobee Basin consists of several agricultural irrigation basins surrounding Lake Okeechobee and includes areas southeast of the L-59, L-60, and L-61 canals within the LKB Planning Area. Surface water withdrawals from Lake Okeechobee and all surface water hydraulically connected to the lake are currently limited due to restricted allocation area criteria.

PROGRESS SINCE THE 2005–2006 KB PLAN UPDATE

Following the original *Kissimmee Basin Water Supply Plan* (SFWMD 2000b), significant progress was made identifying surface water availability in the Lake Istokpoga–Indian Prairie Basin and by advancing the understanding of groundwater availability in the basin. This was included in the 2005–2006 KB Plan Update. Several of the projects were not within the LKB Planning Area, but the findings and data are relevant as they provide useful information for LKB groundwater models. Programs having a direct influence on the LKB water resources since the 2005–2006 KB Plan Update include:

Kissimmee River Restoration Project and Initiatives

- In partnership with the United States Army Corps of Engineers (USACE), three of five phases of the Kissimmee River Restoration Project are complete. Work on the final two phases is scheduled to begin in 2015. The District is integrating the restoration project with various management strategies for the Kissimmee Basin and Northern Everglades region, including the Kissimmee Chain of Lakes Long-Term Management Plan, Kissimmee Basin Water Reservation, and the Lake Okeechobee Watershed Protection Program. The Kissimmee River Restoration Project will culminate with the implementation of a new regulation schedule, called the Headwaters Revitalization Schedule, to guide operation of the S-65 Structure.

Restoration work on the Kissimmee River

Modeling and Hydrologic Studies

- The Kissimmee Basin Modeling and Operations Study (KBMOS) was a District initiative to identify alternative water control structure operating criteria for the Kissimmee Basin and its associated water resource projects. The goal of KBMOS was to achieve a more acceptable balance between flood control, water supply, aquatic plant management, and natural resources for the Kissimmee Chain of Lakes, as well as reduce impacts on Lake Okeechobee.. These efforts were put on hold in October 2013, due to Kissimmee River Restoration Project cost-sharing issues between the SFWMD and the USACE. In November 2013, the SFWMD and USACE agreed to instead move forward implementing the Headwaters Revitalizations Schedule as outlined in the 1996 Headwaters Revitalization Report. The system will be operated for several years and it will then be determined if further refinements are needed to meet river restoration hydrologic targets.
- Between 2006 and 2013, the District and its partners completed the following hydrogeologic investigations relevant to the LKB Planning Area:
    - The United States Geological Survey (USGS) study *Hydrogeology and Groundwater Quality of Highlands County, Florida* (Spechler 2010)
    - The USGS and District report *Synthesis of the Hydrogeologic Framework of the Floridan Aquifer System and Delineation of a Major Avon Park Permeable Zone in Central and Southern Florida* (Reese and Richardson 2007)
    - Construction of a Lower Floridan aquifer test well in southeastern Polk County in partnership with Polk County Utilities (2010)
    - A hydrogeologic investigation of the Lower Floridan aquifer at Site B located in southern Polk County (2013)
    - Construction and testing of an Upper Floridan aquifer monitor well at the L-63N Canal Aquifer Storage and Recovery site near Okeechobee, Florida (2008)
- The Fisheating Creek Feasibility Study is being conducted by the SFWMD, FDEP, and Florida Department of Agriculture and Consumer Services (FDACS). The goal of the study is to identify the most appropriate mix of features to improve the hydrology and water quality in the watershed to reduce nutrient loads entering Lake Okeechobee. Phase I of the Fisheating Creek Feasibility Study was completed in March 2009. Implementation of Phase II will identify alternative sites for water quality improvement and to meet storage and water quality goals for the Fisheating Creek Sub-watershed.
- The Lower Kissimee Basin Groundwater Model (LKBGWM) was updated for use in this water supply plan.
- The District constructed an exploratory well (OKF-105) in Okeechobee County near the S-65C structure to evaluate the hydrogeologic conditions of the FAS for

water supply and aquifer storage and recovery (ASR) potential and as a high quality data source for groundwater model calibration.

Regulatory Protection and Water Quality Efforts

- In 2007, the USACE designated the Herbert Hoover Dike to be a Class I risk, the highest risk for dam failure. The construction of a 21.4-mile cutoff wall in Reach 1 was completed in 2012. The 32 water control structures (culverts) operated by the USACE are being replaced, removed, or abandoned with a scheduled completion in 2019. Rehabilitation of an additional section of the dike is planned to be completed by 2022.

Herbert Hoover Dike

- The USACE implemented the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) to address concerns about the integrity of the Herbert Hoover Dike surrounding Lake Okeechobee as well as high water impacts to the lake ecology. This regulation schedule is designed to maintain lake levels at a lower elevation, between 12.5 and 15.5 feet in relation to the National Geodetic Vertical Datum of 1929 (NGVD), than previous regulation schedules (USACE 2007). Analyses for the supplemental environmental impact statement for 2008 LORS indicated that existing legal users in the Lake Okeechobee Service Area (LOSA) would experience more frequent water shortages than those experienced under the previous schedule. The analysis projected a decline in the physical level of certainty of agricultural users reliant on lake water supplies, from a 1-in-10 year to a 1-in-6 year drought return frequency.

- Analyses indicated that implementation of 2008 LORS would cause MFL criteria for Lake Okeechobee to be violated. Therefore, the SFWMD changed the Lake Okeechobee MFL status from prevention to recovery. In October 2008, the SFWMD adopted restricted allocation criteria for the LOSA as part of the lake's MFL recovery strategy.

- Shortly after implementation of 2008 LORS, the SFWMD updated its Water Shortage Management Plan (Rule 40E-21, Florida Administrative Code [F.A.C.]) to ensure equitable distribution of available water resources among all permitted water users of the lake during times of water shortage.

- Adaptive protocols for Lake Okeechobee operations were updated in 2010 (SFWMD 2010) in response to 2008 LORS implementation. The protocols provide guidance to staff and the District's Governing Board when making recommendations to the USACE about Lake Okeechobee water releases when

lake levels are in the base flow and beneficial use bands of the regulation schedule. Adaptive protocols are designed to identify "win-win" or "win-neutral" situations in which one or more environmental resources may benefit from a lake release and where minimal or no adverse effects on meeting permitted agricultural and urban water supply needs or impacts on Seminole Tribe of Florida water rights are anticipated.

- In June 2014, the District Governing Board reinitiated rule development to reserve water for the Kissimmee River Basin (Kissimmee River, its floodplain, and the Kissimmee Chain of Lakes). The initial effort culminated in 2009 prior to rule adoption. The reservation was relisted on the 2014 Priority Water Bodies List and Schedule and adoption is expected by December 2015.
- In December 2005, the District's Governing Board adopted an MFL for Lake Istokpoga (Rule 40E-8.351, F.A.C.). The rule was established in the Florida Administrative Code in January 2006 (see **Chapter 3** for more details).

Water Storage

- Numerous studies evaluating ASR technology have been completed as part of the Comprehensive Everglades Restoration Plan (CERP). Additional District efforts continue to expand the understanding of regional-scale ASR implementation. Details about the District's efforts to explore ASR technologies can be found in **Chapter 4**.

ASR test well

Water Conservation

- In September 2008, the SFWMD adopted the Comprehensive Water Conservation Program to foster demand management and save water throughout the District.
- The Districtwide Year-Round Landscape Irrigation Conservation Measures Rule became effective in March 2010 (Chapter 40E-24, F.A.C.). Consistent with the Comprehensive Water Conservation Program, the rule limits landscape irrigation to two days per week in Okeechobee and Highlands counties and three days per week in Glades county.
- The Water Savings Incentive Program (WaterSIP) provides cost-sharing funds for non-capital projects, such as the purchase and installation of high-efficiency indoor plumbing fixtures, outdoor irrigation retrofits, and automatic distribution system line-flushing devices. Utilities, municipalities, property owner associations, and large water users may participate in this ongoing

program. Funds from WaterSIP helped support a program to replace indoor plumbing fixtures in Highlands County in Fiscal Year (FY) 2006.

- Additional information about water conservation programs can be found in **Chapter 5**.

Alternative Water Supply

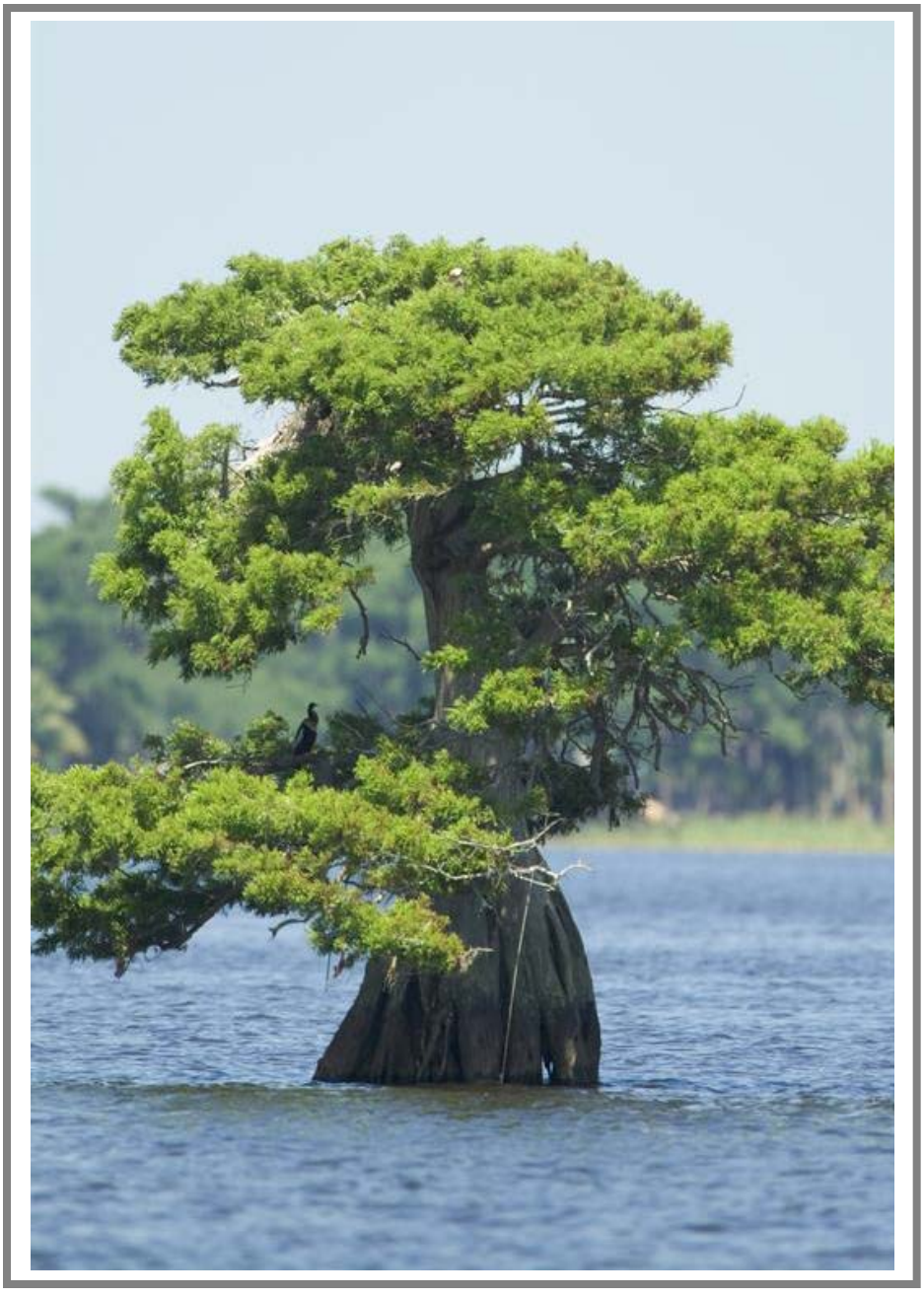
- Through the Alternative Water Supply (AWS) Funding Program, the District assisted water users in developing alternative water supply projects, including reclaimed water, surface water, storm water capture and storage, ASR, and desalinated brackish or saline water. Within the LKB Planning Area, between FY 2006 and FY 2013, the District helped fund six AWS projects, saving an estimated 2.9 MGD. These projects included stormwater retrofit and reclaimed water expansion efforts. More information on the AWS Program is available in **Chapter 6**.

OUTLOOK ON CLIMATE CHANGE

Because a reliable and economical supply of water is necessary for a strong Florida economy, climate change and its effects on hydrologic conditions should be considered in water supply planning. Long-term data and modeling have been used to predict changes to air temperatures, weather patterns (including the frequency and intensity of rain), droughts, evapotranspiration rates, stream flow, sea levels, and other parameters that will affect water availability and water quality. Florida is especially vulnerable to the effects of climate change and sea level rise due to its low topography. Additional discussion of climate change is provided in **Chapter 3**.

WATER SUPPLY PLANNING FOR THE NEXT 20 YEARS

The stronger statutory link between local governments' comprehensive plans and the SFWMD's regional water supply plans, data sharing, and collaborative planning are credited with strengthening the water supply planning process. Updates to local governments' water supply facilities work plans, comprehensive plans, and the SFWMD's next 5-year water supply plan update will continue to refine 20-year Public Water Supply demand estimates and projections. Based on Chapter 570, F.S., the FDACS will develop the agricultural demand projections. These will be considered for use in future water supply plans prepared by all water management districts. Moreover, the SFWMD's Water Supply Planning staff closely coordinates with Water Use Permitting staff during the water supply planning process. Coordination also increased through implementation of the Florida Department of Environmental Protection 2012 guidance memorandum addressing coordination between water management districts' water supply planning and permitting staff regarding projects included in water supply plans.



2

Demand Estimates and Projections

This chapter provides a summary of water demand estimates and projections for the Lower Kissimmee Basin (LKB) Planning Area by water use categories for the planning horizon of 2010 through 2035. These water demand projections were developed through a process coordinated with stakeholders from agriculture, industry, local governments, utilities, the Seminole Tribe of Florida, and other interested groups. A detailed discussion of data collection and analysis conducted in support of this *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan) can be found in **Appendix A**.

TOPICS

- Net versus Gross Demand
- Water Use Categories
- Population and PWS Trends
- Estimated Water Demands
- Summary
- Projections in Perspective

Previous estimates and projections for the Kissimmee Basin Planning Area were published in the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update, SFWMD 2006). For this 2014 LKB Plan, data from the year 2010 were used as the baseline to estimate demand projections. This baseline provides a starting point from which to assess future water demands and determine whether new water supply development projects are required to meet the water needs of this planning area over the planning horizon. The baseline was developed from various sources including the 2010 United States Census (U.S. Census Bureau 2010), aerial photography land use identification, industry reports on crop production, irrigation system efficiency data, historical water use, and the South Florida Water Management District (SFWMD or District) Water Use Regulatory Database. Projections from the baseline were made using additional data, including the University of Florida's Bureau of Economic and Business Research (BEBR) county-level population projections, site-specific variables, and regional climatic conditions.

Water demand trends in the LKB Planning Area are largely driven by population and agriculture. The population within the LKB Planning Area continues to increase, which has broad impacts on water demand. Total irrigated agriculture in this planning area is anticipated to increase slightly with the introduction of new crops. While citrus acres continue to decline because of citrus greening and canker, agricultural acreage is expected to increase.

NET VERSUS GROSS WATER DEMAND

Water demand can be described as either gross or net values. Gross water demand is the total amount of water required and accounts for treatment, distribution, and irrigation system losses. Gross water demand is also referred to as raw water or water withdrawal demand and is commonly associated with water use permits. Net demand is the volume of water needed by an end user/customer or agricultural activity and does not include treatment or delivery system inefficiencies. Net water demand represents the user/customer demand or plant growth requirements to sustain yield. Gross demands are most typically used because the value reflects the actual water required to be produced to meet the projected need and is the value most often referred to in this plan. Both gross and net water demands are calculated in million gallons per day (MGD) and are presented in **Appendix A** for each water use category.

DESCRIPTIONS OF WATER USE CATEGORIES

Water demands for 2010 and projections through 2035 are estimated in five-year increments for each of the following six water supply categories established by the Florida Department of Environmental Protection (FDEP):

- **Public Water Supply (PWS)** – Water supplied by water treatment facilities for potable use (drinking quality) with projected average pumpages equal to or greater than 100,000 gallons per day (GPD) or 0.1 MGD.
- **Domestic Self-Supply (DSS)** – Water used by households served by small utilities (less than 0.1 MGD) or private wells.
- **Agricultural Self-Supply (AGR)** – Water used for commercial crop irrigation, nurseries, livestock watering, pasture, and aquaculture.
- **Industrial/Commercial/Institutional Self-Supply (ICI)** – Self-supplied water consumed by business operations of 0.1 MGD or more.
- **Recreational/Landscape Self-Supply (REC)** – Water used for irrigation of golf courses, parks, cemeteries, large common areas (such as homeowner associations and commercial developments), and other self-supplied irrigation uses with demands of 0.1 MGD or greater.
- **Power Generation Self-Supply (PWR)** – Water consumed by power plants in the production of electricity, excluding use of seawater sources.

Projections for each water use category are based on demand under average annual rainfall conditions and anticipated growth in the LKB Planning Area through 2035. As water use is impacted by weather, particularly rainfall, demands for 1-in-10 year drought conditions are estimated and projected. A 1-in-10 year drought event is a rainfall deficit that would have a 10 percent probability of occurring during any given year. Section 373.709(2)(a), Florida Statutes (F.S.), states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event. **Appendix A** presents both net and gross demands under average rainfall year and 1-in-10

year drought conditions through the 2035 planning horizon. **Appendix A** also contains additional details about the methods to estimate and project water demands for each water use category. For PWS and DSS, permanent population and, for PWS, demand by each utility are provided. For AGR, irrigated acreage and demand for each crop type are provided. Although not quantified in this chapter, environmental demand is addressed through resource protection criteria (**Chapter 3**).

Figure 4 compares estimated water use by category in the LKB Planning Area in 2010 to projections for 2035.

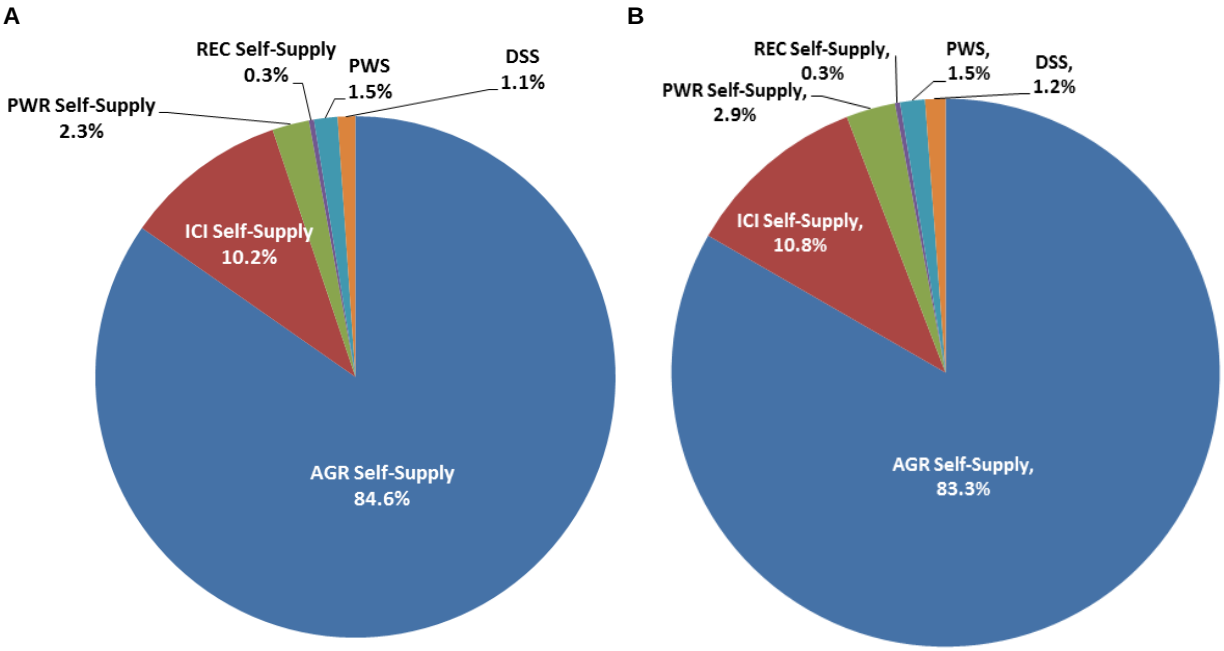


Figure 4. **A.** Water use by category in 2010; **B.** Projected water use by category in 2035.

POPULATION AND PWS WATER USE TRENDS

Population estimates for this plan include permanent populations of the portions of Highlands, Glades, and Okeechobee counties in the LKB Planning Area. Overall, the population is expected to increase by 12,389 residents, or about 23 percent, by the year 2035. The part of Okeechobee County within the LKB will experience the region's greatest increase in population with 8,280, or almost 22 percent, more residents. The population of the sections of Glades and Highlands counties in the LKB Planning Area will increase by 1,368 (34 percent) and 2,741 (26 percent) residents respectively over the planning horizon.

Estimates of population growth in this plan are slightly higher than previously projected. Comparison of the 2025 population projections in this 2014 LKB Plan to the 2005–2006 KB Plan Update shows an increase in basinwide population of about 3 percent or 1,989 people.

ESTIMATED WATER DEMAND

Public Water Supply and Domestic Self-Supply

PWS is water supplied by water treatment facilities to homes, office and retail facilities, schools, institutions, and similar users for potable use (drinking quality). Utilities with projected average pumpage equal to or greater than 0.1 MGD through 2035 are included in the PWS category. Water used by households or facilities served by small utilities (less than 0.1 MGD) or individual wells are categorized as DSS.

Developing PWS water demand projections for the LKB Planning Area was a multistep process. The first step was creating updated maps showing the areas currently served by each utility (PWS service areas). An additional map was prepared for utilities planning to expand their service area by 2035. Populations were then assigned to the currently served areas using census block data from the 2010 United States Census to establish a draft 2010 PWS utility population (U.S. Census Bureau 2010). These 2010 populations were then projected to change at the medium BEBR county growth rate to provide a preliminary 2035 population projection for each PWS utility service area (BEBR 2011). When utility service area populations were expected to change at rates that were different from the BEBR county rates, the population projections were adjusted appropriately. Throughout the process, the service area maps and draft projections were discussed with each utility to coordinate final projections. DSS populations represent the difference between the county population in the planning area and the PWS utility service area populations for the same county. Projections were also coordinated with the surrounding water management districts to ensure consistency in county population distributions.

The population information was combined with 2009–2010 historic water use information from each major utility to develop a per capita use rate (PCUR). The PCUR and population projections were used to develop a projected PWS gross water demand for each utility. The PCURs for DSS within each LKB county were assumed to be the same as the state average PCUR reported by the FDEP. Water conservation measures were not factored into the demand projections used in this plan; rather, water conservation is considered a water source option and is discussed in **Chapter 5**.

Table 2 provides a summary of the population estimates for the portions of each county located in the LKB Planning Area, and **Table 3** lists the estimated and projected PWS and DSS water demand for 2010 and 2035.

Table 2. Permanent resident population in the LKB Planning Area, 2010–2035.

County Area	2010 Estimated Population			2035 Projected Population		
	PWS	DSS	Total	PWS	DSS	Total
LKB Highlands	3,230	7,258	10,488	4,074	9,155	13,229
LKB Glades	2,758	1,233	3,991	3,636	1,724	5,359
LKB Okeechobee	23,327	15,161	38,488	27,936	18,831	46,768
Total	**29,315**	**23,652**	**52,967**	**35,646**	**29,710**	**65,356**

Source: U.S. Census, 2010.

Table 3. Average PWS and DSS water demands in the LKB Planning Area in MGD, 2010 and 2035.

	2010 Estimated	2035 Demand
LKB Glades County PWS	0.21	0.29
LKB Glades County DSS	0.11	0.15
LKB Glades County Total	0.32	0.44
LKB Highlands County PWS	0.33	0.38
LKB Highlands County DSS	0.65	0.81
LKB Highlands County Total	0.98	1.19
LKB Okeechobee County PWS	2.26	2.71
LKB Okeechobee County DSS	1.35	1.68
LKB Okeechobee County Total	3.61	4.39
LKB Planning Area Total	4.91	6.02

Note: Perceived discrepancies in table totals are due to rounding.

Agricultural Self-Supply

Agriculture is the largest water use category in the LKB Planning Area and the main crops include citrus, sugar cane, sorghum, small vegetables, and berries. Cow/calf operations are also common in the area. Agriculture is expected to continue as a key industry in the area despite economic challenges and damage from hurricanes and diseases, such as citrus canker and greening. The agricultural acreage of 141,821 acres in 2010 is projected to increase to 151,304 acres by 2035. The respective water use is 162.5 MGD in 2010 and projected to be 185.0 MGD in 2035.

AGR includes water used for commercial crop irrigation, livestock watering, irrigating pasture, and aquaculture. In the 2005–2006 KB Plan Update, agricultural acreage was projected to increase about 8 percent over the planning horizon in the three counties of the

LKB Planning Area. In this 2014 LKB Plan, similar growth is anticipated with increases in sorghum, strawberry, and blueberry crops.


Citrus grove in Highlands County

Agricultural water use projections are based on the following commercially grown crop categories as generally developed by the FDEP for use in water supply plans: 1) citrus, 2) other fruits and nuts, 3) vegetables, melons and berries, 4) field crops, sugarcane and sorghum, 5) sod, 6) greenhouse/nursery, 7) irrigated pasture, and 8) miscellaneous uses, such as cattle water and aquaculture.

Agricultural acreage and associated water demand are challenging to project because of changes in land use patterns, water management projects, environmental restoration activities, domestic macroeconomic developments (such as the pace of recovery in the housing market), global commodity market forces influencing supply and demand, weather, and disease issues that can impact distribution, acreage, and production/yield over the planning horizon. The proposed addition of nearly 9,800 acres of sorghum for the production of biofuel by 2035 is an example of such changing crops. Intensive research into occurance and treatment of citrus greening, canker, and other diseases is being conducted by a variety of agencies and industry groups. The results of this research could affect the number of acres in citrus production in the future. During this planning period, agricultural acreage in the LKB Planning Area is not expected to fluctuate due to the conversion of agricultural land use to residential projects that has affected other parts of Florida.

Agricultural water demand was determined using estimated irrigated acreage, crop and soil types, growing seasons, and irrigation methods. AGR demand calculations for this plan were made using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model. The model calculates water demands under average rainfall and 1-in-10 year drought conditions based upon local historic daily rainfall and evaporation data (Smajstrla 1990).

Acreage projections were compared to the data and methods contained in the land use projection analysis completed by the SFWMD. Agricultural acreage estimates from the United States Department of Agriculture (USDA) and the SFWMD Water Use Regulatory Database were also used to inform and reveal key patterns and confirm or revise previous analyses where warranted. Agricultural industry experts reviewed and provided input for the agricultural acreage estimates and their comments were considered in the overall analysis. Industry information sources included the following:

- USDA – National Agricultural Statistics Service (USDA–NASS)
- Florida Department of Agriculture and Consumer Services (FDACS)
- SFWMD Water Use Regulatory Database
- Local agricultural extension offices
- University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS)

- USDA – Natural Resources Conservation Service (USDA–NRCS)
- Florida Department of Economic Opportunity (FDEO)
- Florida Farm Bureau and other SFWMD agricultural stakeholders
- SFWMD acreage estimates developed as part of GIS agricultural land use/crop type analysis

Within the LKB Planning Area, the counties of Okeechobee, Glades, and Highlands steadily increased citrus production acreage from the late 1960s to 2000. After 2000 however, citrus production in these counties leveled off or decreased slightly. In the LKB Planning Area, total irrigated active citrus acreage is expected to decrease from approximately 35,000 acres in 2010 to just over 26,000 acres in 2035. Citrus greening and canker have affected groves throughout the area. However, the lands are not remaining fallow but are being converted to other crops. In Highlands County, a permit modification was requested to convert 9,800 acres of former citrus to sorghum, which is expected to be used for biofuel production. Strawberries have expanded in the LKB Planning Area. The Greenhouse/Nursery category is expected to see a small increase in planted acres.

Overall, total agricultural acres are expected to increase by 9,483 acres by 2035 and total AGR water demand is projected to increase by 22.5 MGD or 13.8 percent. **Table 4** shows the acreage and gross irrigation requirements under average rainfall conditions by crop type for 2010 and 2035. The increase in demand is due to overall expansion of acres in agricultural production as well as conversion of citrus and existing crops to crops with higher water use demand. More detailed information, including both gross and net irrigation demands by crop type under average rainfall and 1-in-10 year drought conditions for five-year increments from the 2010 baseline through the 2035 planning horizon is available in **Appendix A**.

Table 4. Estimated agricultural irrigated acreages and average-year gross water demands by crop type for 2010 and 2035.

	2010		2035	
Category	**Acres**	**Demand (MGD)**	**Acres**	**Demand (MGD)**
Citrus	35,487	38.8	26,187	29.0
Sugarcane and Sorghum	13,919	38.4	23,719	57.8
Vegetables, Melons, and Berries	8,313	14.1	16,573	25.4
Field Crops: Other	1,207	3.4	1,162	3.2
Greenhouse/Nursery	3,609	7.7	4,377	9.5
Sod	4,525	12.8	4,525	12.8
Irrigated Pasture	74,762	37.8	74,762	37.8
Miscellaneous		9.5		9.5
Total	141,821	162.5	151,304	185.0

Note: Perceived discrepancies in table totals are due to rounding.

Industrial / Commercial / Institutional Self-Supply

As in the 2005-2006 KB Plan Update, population growth rates for each county were used to project ICI growth. ICI demands are projected to increase by approximately 4.4 MGD from 2010 to 2035. This self-supplied use category includes industrial and commercial facilities for production processing, manufacturing, and technical needs such as concrete, citrus and vegetable processing, and mining operations. Some industrial, commercial, and institutional facilities receive water from PWS utilities and are therefore included under the PWS category. Information from the SFWMD Water Use Regulatory Database was used to estimate 2010 water demand. It is presumed that growth in ICI water demands will remain proportional to the county population growth. Currently the largest amount of ICI use is in Glades County for the operation of the Palmdale sand mine.

Interest in biofuel/ethanol production has increased in the LKB Planning Area. Water demands discussed in this section relate only to fuel generation and not its agricultural production (i.e., sorghum).

Table 5 shows the estimates of existing and future water demand for ICI use through the 2035 planning horizon.

Table 5. Water demand (MGD) for ICI within the LKB Planning Area.

County Area	2010	2015	2020	2025	2030	2035
LKB Glades	12.1	12.7	13.2	13.8	14.3	14.9
LKB Highlands	4.6	4.8	5.0	5.2	5.4	5.6
LKB Okeechobee	2.8	2.9	3.0	3.1	3.2	3.4
Total	**19.5**	**20.4**	**21.2**	**22.1**	**23.0**	**23.9**

Recreational / Landscape Self-Supply

Gross water demand for REC is projected to increase minimally from 2010 to 2035. The 2010 demand was 0.61 MGD and the projected 2035 demand is 0.65 MGD. Water demands in this category include landscape and golf course irrigation as well as water needs for parks, homeowner associations with common areas or consolidated irrigation systems, and areas with green space such as cemeteries, parks, and ball fields. Recreational and landscape demands supplied by PWS utilities are included in the PWS demand. Estimated landscape and golf course acreages for 2010 were determined through permits found in the SFWMD Water Use Regulatory Database.

Landscape and golf course growth were projected separately because their rates of expansion are calculated differently. Landscape areas are estimated to grow at a rate proportional to the population growth. Golf course acreage is projected to change at a lesser rate related to market fluctuations. Additionally, the associated demand for golf courses

may be met with the use of reclaimed water for irrigation. The estimated growth rates were reviewed by local planning officials and industry professionals where available.

Table 6 presents the estimated increase in REC uses from 2010 to 2035. **Appendix A** provides additional detail on how each of these water demands estimates were made.

Table 6. Water demand (MGD) for REC within the LKB Planning Area.

County Area	2010	2015	2020	2025	2030	2035
LKB Glades	0	0	0	0	0	0
LKB Highlands	0.20	0.20	0.21	0.21	0.21	0.22
LKB Okeechobee	0.40	0.41	0.41	0.42	0.42	0.43
LKB Planning Area Total	**0.61**	**0.61**	**0.62**	**0.63**	**0.64**	**0.65**

Note: Perceived discrepancies in table totals are due to rounding.

Power Generation Self-Supply

Within the LKB Planning Area, water used by thermoelectric power plants is primarily for cooling purposes. Other water use occurring at power plant facilities includes boiler make-up water and ancillary uses, such as domestic-type use by employees. The Tampa Electric Company (TECO) is the only power company currently operating within or just outside the LKB Planning Area. TECO operates a small power station in Highlands County near the City of Sebring. In 2010, this facility withdrew between 0.1 MGD and 0.5 MGD of fresh water for power generation and cooling purposes. Use of water at the facility is demand-driven and the recent economic downturn has caused extreme fluctuations in use of the power station, which makes estimating future use difficult. The facility is currently permitted for 1.0 MGD. Water use reported in **Table 7** represents an estimate of potential use at the facility assuming reasonable population growth for Highlands County. According to TECO, the plant is currently on standby and will be used in the future as demands require operation.

The Indiantown Cogeneration Plant is in Martin County but relies on surface water from the L-63N Canal (Taylor Creek) in Okeechobee County. **Table 7** includes the water that is and is projected to be used by this plant in Okeechobee County.

Florida Power & Light (FPL) has proposed constructing a new facility in northeast Okeechobee County just outside the LKB within the St. Johns River Water Management District (SJRWMD). If approved, FPL expects water demands may increase to 9 MGD by 2019 and gradually increase to a total projected demand of 27 MGD by 2035. Demands for this potential facility are not included in this plan.

Table 7. Water demand (MGD) for PWR within the LKB Planning Area.

County Area	2010	2015	2020	2025	2030	2035
LKB Glades	0.0	0.0	0.0	0.0	0.0	0.0
LKB Highlands	0.15	0.25	0.45	0.65	0.85	1.05
LKB Okeechobee	4.3	4.4	4.6	4.9	5.1	5.3
LKB Planning Area Total	4.4	4.6	5.1	5.5	5.9	6.4

SUMMARY OF DEMAND ESTIMATES

In 2010, average annual gross water demand for all categories in the LKB Planning Area totaled roughly 192 MGD. By 2035, the projected average annual gross water demands are expected to total 222 MGD, an increase of approximately 16 percent. **Table 8** presents the estimated 2010 and 2035 average water demands for all water use categories.

Average annual estimates are used to demonstrate general projected trends, including these key highlights:

- PWS and DSS gross demands are expected to increase by 22 percent, from 4.9 MGD in 2010 to 6.0 MGD by 2035. PWS will remain one of the smallest water use categories in the LKB Planning Area in 2035.
- AGR gross demands are projected to increase from 162.5 MGD in 2010 to 185.0 MGD by 2035. The growth is related to the projected conversion of existing crops to crops with a higher water use demand and increased acres
- ICI gross demand is anticipated to increase 4.4 MGD over the planning horizon. The projected growth is related to population growth in the planning area.
- REC gross demands are projected to remain generally flat.
- PWR gross demands are anticipated to increase by 2.0 MGD by 2035.

Table 8. Estimated average water demands for all water use categories for 2010 and 2035.

	PWS	DSS	AGR	ICI	REC	PWR	Total
Estimated 2010 (MGD)	2.8	2.1	162.5	19.5	0.61	4.4	192.0
Projected 2035 (MGD)	3.4	2.6	185.0	23.9	0.65	6.4	222.0
% Change	21.4%	23.8%	13.8%	22.6%	6.6%	45.5%	15.6%
% of Projected 2035 Total	1.5%	1.2%	83.3%	10.8%	0.3%	2.9%	100.0%

DEMAND PROJECTIONS IN PERSPECTIVE

The demand projections presented in this 2014 LKB Plan are based on the best information available. These projections reflect trends, circumstances, and industry intentions that change over time. Like any predictive tool based on past assumptions, there is uncertainty and a margin for error.

Table 9 shows the 2025 average gross demands projected for this area in the 2005–2006 KB Plan Update compared to the 2035 demands projected in this 2014 LKB Plan.

Table 9. Water demands under average rainfall conditions projected in the 2005–2006 KB Plan Update versus this 2014 LKB Plan.

Water Use Category	Projected 2025 Demand from 2005–2006 KB Plan Update (MGD)	Projected 2035 Demand (MGD)	Percent Difference
PWS	4.9	3.4	-30.6%
DSS	4.1	2.6	-36.6%
AGR*	96.4	185.0	92.0%
ICI	9.7	23.9	146.4%
REC	0.5	0.7	30.0%
PWR	0.0	6.4	
Total	**115.6**	**222.0**	**92.0%**

*Did not include irrigated pasture in the 2005–2006 KB Plan Update. Irrigated pasture represents an estimated 20% of total agricultural demand.

The 2035 AGR demands are projected to increase by about 92 percent as compared to the 2025 AGR demands in the 2005–2006 KB Plan Update. There are a number of reasons for this. Nearly 75,000 acres of irrigated pasture are now included in the water supply plan. This pasture represents about 20 percent of the 2035 AGR projected demand. Additionally, the potential conversion of 9,800 acres of citrus to sorghum was not anticipated in the previous plan update. ICI demands are also expected to increase. This is related to sand mine expansion and growth in proportion to expected population increases. As noted, the other use categories have demands that are increasing minimally. In summary, the agricultural industry has and will continue to be the predominate water use category in this region, accounting for over 80 percent of the demands.

3

Water Resource Analyses – Current and Future Conditions

This chapter provides an overview and status of the water resources within the Lower Kissimmee Basin (LKB) Planning Area. Water supply to meet the demands described in **Chapter 2** is largely dependent on the availability of water resources. Understanding the relationship and effect of meeting water demands via withdrawals from water resources is critical to water supply planning. The issues identified in this chapter potentially affect the use of existing water resources and development of new supplies to meet projected water demands through 2035 in the LKB Planning Area.

TOPICS

- Summary of Issues
- Regulatory Protection
- Overview of Water Resources
- Evaluation and Analysis
- Climate Change

Additionally, this chapter summarizes the protections afforded to water resources through regulatory criteria and reviews water resource evaluations that support the water supply planning strategies outlined in this *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan).

SUMMARY OF 2014 LKB PLAN ISSUES

Several issues are expected to affect the availability of water in the LKB Planning Area over the planning horizon of this water supply plan. These issues include regulatory limitations on surface waters from Lake Istokpoga and Lake Okeechobee, future water needs of the Kissimmee River Restoration Project, and the effects of groundwater withdrawals on Lake Wales Ridge water bodies.

Past analyses demonstrated that surface water from Lakes Istokpoga and Okeechobee and their hydraulically connected canals is unavailable beyond current permitted capacities due to potential impacts on wetlands, endangered species, and existing legal water users. Regulations have been put in place for these surface water bodies that limit further increased withdrawals. This also includes downstream connections to these lakes that require releases of water to meet water demands.

The Kissimmee Chain of Lakes is north of the LKB Planning Area and is the headwaters of the Kissimmee River. Water delivered from Lakes Kissimmee, Cypress, and Hatchineha of the Kissimmee Chain of Lakes is needed to meet the hydrologic requirements of the Kissimmee River Restoration Project, which aims to restore ecological integrity to the Kissimmee River and its floodplain, while providing an equivalent pre-project level of flood control. The South Florida Water Management District (SFWMD or District) is developing a water reservation rule.

This proposed rule will prevent water needed for the protection of fish and wildlife from being allocated to consumptive uses. Adoption of the reservation rule is expected by December 2015.

Analyses of the LKB Planning Area indicate that groundwater in conjunction with currently permitted surface water is adequate to meet existing and future needs of the LKB Planning Area during a 1-in-10 year drought condition. However, surface water users within the Lake Okeechobee Service Area (LOSA) have only a 1-in-6 year drought level of certainty.

Several lakes along the Lake Wales Ridge in Highlands County, such as Lakes Placid, June in Winter, and Jackson, which are under the jurisdiction of the Southwest Florida Water Management District (SWFWMD), have established minimum flows and levels (MFL). These lakes may have enhanced connections to the underlying aquifer systems. Due to these connections, there is the potential that increasing water supply withdrawals from the Upper Floridan aquifer could affect water levels in the lakes.

Additional water supply considerations for the region include:

- Complying with the water supply agreement in the Water Rights Compact with the Seminole Tribe of Florida
- Declining water levels and increasing chloride concentrations in the Upper and Lower Floridan aquifer

REGULATORY PROTECTION OF WATER RESOURCES

The purpose of Chapter 373, Florida Statutes (F.S.), is to manage Florida's water resources to ensure their sustainability. The SFWMD developed water resource protection standards consistent with the legislative direction. The levels of harm—*harm*, *significant harm*, and *serious harm*—are relative resource protection terms, each playing a role in the ultimate goal of achieving a sustainable water resource. For instance, programs regulating surface water management and water use permitting must prevent harm to the water resource.

To ensure the sustainability of Florida's water resources, Chapter 373, F.S., provides water management districts with several water resource protection tools, as described in **Table 10**. A diagram showing the conceptual relationship among the water resource protection standards and the levels of harm is provided in **Figure 5**.

Table 10. Summary of statutory resource protection tools.

Tool	Description
Water Use Permitting	The right to use water is authorized by permit. The conditions of permit issuance are more specifically enumerated in Chapter 40E-2, Florida Administrative Code (F.A.C.). In order to provide reasonable assurances that the conditions of permit issuance are met, applicants must also meet the technical criteria in the *Applicant's Handbook for Water Use Permit Applications* (SFWMD 2014a). The technical criteria used to evaluate the quantity and the proposed water uses' impact on the source include: • Saltwater intrusion • Wetland and other surface water body impacts • Pollution • Impacts to off-site land uses • Interference with existing legal users • MFLs and their regulatory components
Minimum Flows and Levels	MFL criteria are the flows or levels at which the specific water resource would experience significant harm from further withdrawals. If water flows or levels are below the MFL criteria, or projected to fall below the MFL criteria within the next 20 years, the SFWMD must expeditiously implement a recovery or prevention strategy (Section 373.0421[2], F.S.). These strategies may include the construction of new or improved water storage facilities, development of additional water supplies, implementation of water conservation, etc. The strategy is to be developed in concert with the water supply planning process and coincide with the 20-year planning horizon for the area.
Water Reservations	A water reservation sets aside water for the protection of fish and wildlife or the public health and safety. When a volume of water is reserved, it is not available for allocation to consumptive uses (Section 373.223[4], F.S.). Water reservations can be developed based on existing water availability and/or consideration of future water supplies made available by water resource projects. The Water Resources Development Act of 2000 requires the SFWMD to use its reservation or allocation authority to protect water made available by Comprehensive Everglades Restoration Plan projects as necessary for the natural system. Any volume of water not necessary for the protection of fish and wildlife or public health and safety may be certified as available and allocated to consumptive uses.
Water Shortage	Water shortages are declared by the District's Governing Board when available groundwater or surface water is not sufficient to meet users' needs or when conditions require temporary reduction in total use within the area to protect water resources from serious harm. The SFWMD's Water Shortage Plans are contained in Chapters 40E-21 and 40E-22, F.A.C. The plans seek to protect the water resources of the SFWMD from serious harm; assure equitable distribution of available water resources among all water users during times of shortage consistent with the goals of minimizing adverse economic, social, and health related impacts; provide advance knowledge of the means by which water apportionments and reductions will be made during times of shortage; and promote greater security for water use permittees.

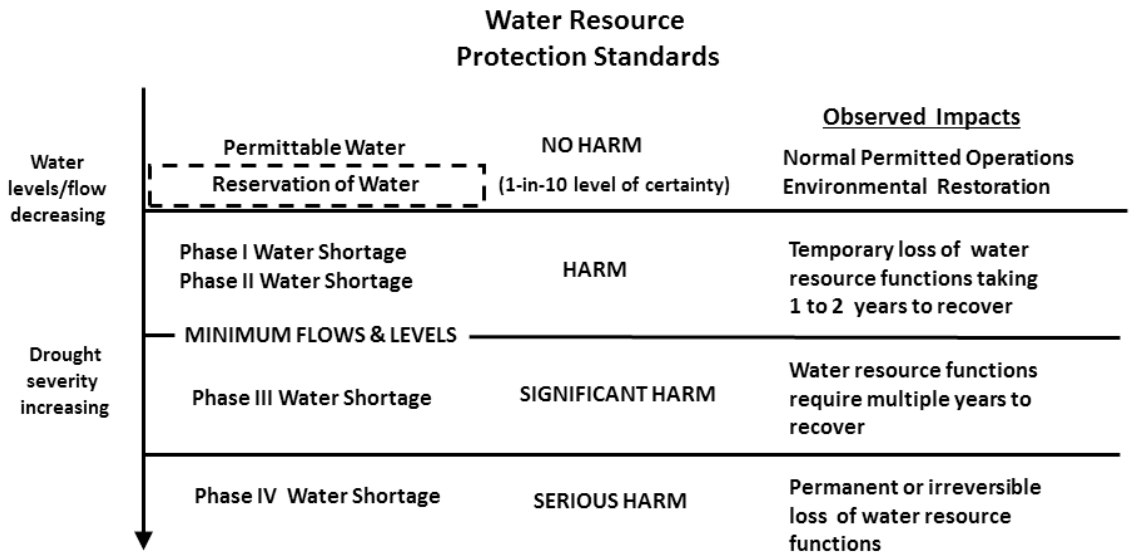


Figure 5. Conceptual relationship among water resource protection standards at various levels of harm.

Changes to Water Use Permitting

During the 2000 water supply planning process, key regional issues affecting water resource management, and strategies for resolving them, were identified. Consumptive use permitting rules were subsequently revised regarding the 1-in-10 year drought event level of certainty, resource protection criteria, water shortage triggers, saltwater intrusion, special designations, and permit duration. A series of rulemaking efforts was completed in September 2003, resulting in amendments to Chapters 40E-1, 40E-2, 40E-5, 40E-8, 40E-20, and 40E-21, Florida Administrative Code (F.A.C.) and the *Basis of Review for Water Use Permit Applications within the South Florida Water Management District* (since replaced by the *Applicant's Handbook for Water Use Permit Applications* [Applicant's Handbook, SFWMD 2014a]). Among the most significant changes were amendments to permit duration, permit renewal, wetland protection, supplemental irrigation requirements, saltwater intrusion, aquifer storage and recovery, and model evaluation criteria.

LOSA permit renewals began in 2009, with most permits issued by 2011. Other irrigation permit renewals in the LKB Planning Area began in 2008 and most permits were issued by 2010. Many of the renewed permits are for 20-year durations. The processing of permit applications, and the associated data and analysis to support and evaluate them, benefited the evaluation of current conditions for this plan.

Additional Protection Afforded Water Resources

The SFWMD continues to fulfill its statutory obligation to identify key water bodies for which MFLs should be developed or updated. Section 373.042(2), F.S., requires each of the five water management districts to provide an annual MFL priority list and schedule to the Florida Department of Environmental Protection (FDEP). The statute was modified in 2013

to require identification of proposed reservations. The SFWMD's 2014 Priority Water Bodies List and Schedule (Edwards 2014) complied with these statutory changes to include both MFL and reservation water bodies and is available in the *2014 South Florida Environmental Report* (www.sfwmd.gov/sfer).

The priority list is based on the importance of the waters to the state or region and the existence of, or potential for, significant harm to the water resources or ecology of the state or region, and includes those waters that are experiencing or may reasonably be expected to experience adverse impacts.

In addition, the SFWMD considers the CERP project schedule and the related federal and state requirements to protect water for the natural system using its reservation or allocation authority. The United States Army Corps of Engineers (USACE) has verified that federal requirements have been met for several CERP projects by virtue of the SFWMD's adoption of water reservations and restricted allocation area rules. Taken together, these rules afford protection for water resources across significant portions of the planning area.

Minimum Flows and Levels

MFL criteria define the point at which further withdrawals will result in significant harm to the water resources or the ecology of the area. These criteria are applied individually to affected water bodies and define the minimum flow or level for surface water bodies, or minimum level of groundwater in aquifers. When setting MFL criteria, the District Governing Board considers changes and structural alterations to watersheds, surface waters and aquifers, and the effects such changes or alterations have had, and the constraints such changes or alterations have placed on the hydrology of an affected watershed, surface water, or aquifer (Section 373.0421[1], F.S.).

When the SFWMD establishes an MFL, it must determine whether the existing flow or level in the water body is below or projected to fall below the MFL criteria within the next 20 years. If it will, the SFWMD must develop and expeditiously implement a recovery or prevention strategy. The strategy, when appropriate, should include development of additional water supplies, water conservation, and other efficiency measures consistent with the provisions of Sections 373.0421 and 373.709, F.S.

The SFWMD develops a recovery strategy when a water body currently exceeds the MFL criteria. The goal of a recovery strategy is to achieve the established MFL as soon as practicable. The recovery strategy must include the provision of sufficient water supplies for all existing and projected reasonable-beneficial uses and may include the development of additional supplies, construction of new or improved storage facilities, and implementation of conservation or other efficiency measures.

A prevention strategy is developed when the MFL criteria is not currently violated, but is projected to be exceeded within the next 20 years. The goal of a prevention strategy is for the water body to continue to meet the established MFL in the future.

Within the Lower Kissimmee Basin, MFL criteria have been adopted for two water bodies: Lake Istokpoga (Rule 42E-8.351, F.A.C.; SFWMD 2005) and Lake Okeechobee (Rule 40E-8.221[1], F.A.C.; SFWMD 2000a). A prevention strategy has been adopted for Lake Istokpoga (Rule 40E-8.421[7], F.A.C.) and a recovery strategy has been adopted for Lake Okeechobee (Rule 40E-8.421[2], F.A.C.). The prevention and recovery strategies for these water bodies are described in **Appendix B**. More details and the status of these projects and programs can be found later in this chapter and in **Chapter 4**. Further details on MFLs are available on SFWMD's website at www.sfwmd.gov/mfls.

Water Reservations

Section 373.709(2)(h), F.S., requires regional water supply plans to include water reservation rules adopted for the planning area. A water reservation rule sets aside a volume of water for the protection of fish and wildlife or public health and safety. When water is reserved, it is unavailable to be allocated for consumptive uses. Water reservations are established based on existing water availability and/or consideration of future water supplies that water resource projects make available. The Water Resources Development Act of 2000 and Section 373.470, F.S. require increased water supplies identified in CERP project implementation reports to be reserved or allocated by the SFWMD.

A water reservation rule defines the volume of water being set aside for the associated natural system and any unreserved water remaining is available for allocation to consumptive uses. To date no reservations have been established for any water bodies in the LKB Planning Area. However, the SFWMD is in the process of developing a water reservation rule for the Kissimmee River, its floodplain, and the Kissimmee Chain of Lakes. Five water reservations have been adopted for water bodies in other planning areas of the SFWMD. These are Fakahatchee Estuary, Picayune Strand, the North Fork of the St. Lucie River (in support of the CERP Indian River Lagoon–South Project), Nearshore Central Biscayne Bay, and Caloosahatchee River (C-43) West Basin Storage Reservoir. Further details on water reservations are available at www.sfwmd.gov/reservations and in Chapter 40E-10, F.A.C.

Restricted Allocation Area Criteria

Restricted allocation area (RAA) criteria limit allocations from water resources (e.g., lakes, wetlands, and canals) in defined geographic areas. RAA criteria for specific areas of the SFWMD are listed in Section 3.2.1 of the Applicant's Handbook (SFWMD 2014a), which is incorporated by reference into Chapter 40E-2, F.A.C. RAA criteria may be established as part of MFL recovery or prevention strategies required in Section 373.0421(2), F.S. **Figure 6** shows the locations of water bodies in the LKB Planning Area for which RAA criteria have been adopted.

Due to limited surface water availability, the Indian Prairie Basin is designated a RAA (Rule 40E-2.091, F.A.C.; Section 3.2.1[A], Applicant's Handbook). The RAA criteria for the Lake Istokpoga–Indian Prairie Canal System states that no additional surface water will be allocated from District-controlled surface water bodies over and above existing allocations,

and no increase in surface water pump capacity will be recommended. The rule was implemented to minimize the potential that the District would declare additional water shortages for the basin during periods of drought. The RAA for Lake Istokpoga also ensures water for delivery to the Seminole Tribe of Florida's Brighton Reservation pursuant to the Water Rights Compact and implementing agreements.

In October 2008, the District Governing Board adopted RAA criteria for the LOSA (Section 3.2.1[F], Applicant's Handbook). These criteria limit surface water withdrawals from Lake Okeechobee and all surface water hydraulically connected to the lake. The change in permit criteria was necessitated by the impacts to water supply and increased exceedances of the lake MFL criteria from implementation of the 2008 Lake Okeechobee Regulation Schedule (2008 LORS). When repairs by the USACE to the Herbert Hoover Dike are complete and the lake's regulation schedule is revised, the expectation is that the resulting schedule will raise lake levels. The additional water held in the lake is expected to return the lake from MFL recovery status to MFL prevention status, enhance the level of certainty to existing permitted users now receiving less than 1-in-10 level of certainty, and support environmental objectives. In the meantime, these criteria are part of the MFL recovery strategy for the lake.

Water Shortage Rules

In accordance with Sections 373.175 and 373.246, F.S., water shortages are declared to prevent serious harm from occurring to water resources. Serious harm is defined as the long-term loss of water resource functions resulting from a change in surface water or groundwater hydrology, which can result in long-term, irreversible, or permanent loss of water resource functions (Rule 40E-8.021[30], F.A.C.).

The Water Shortage Plan laid out in Chapter 40E-21, F.A.C., is applied to manage water use when insufficient groundwater or surface water is available to meet user needs or when conditions require temporary reduction in use. Chapter 40E-22, F.A.C., contains regional water shortage plans and restrictions related to specific water bodies, including Lake Istokpoga and Lake Okeechobee. Further information on water shortage management is available in the *2011–2014 Water Supply Plan Support Document* (SFWMD 2014b).

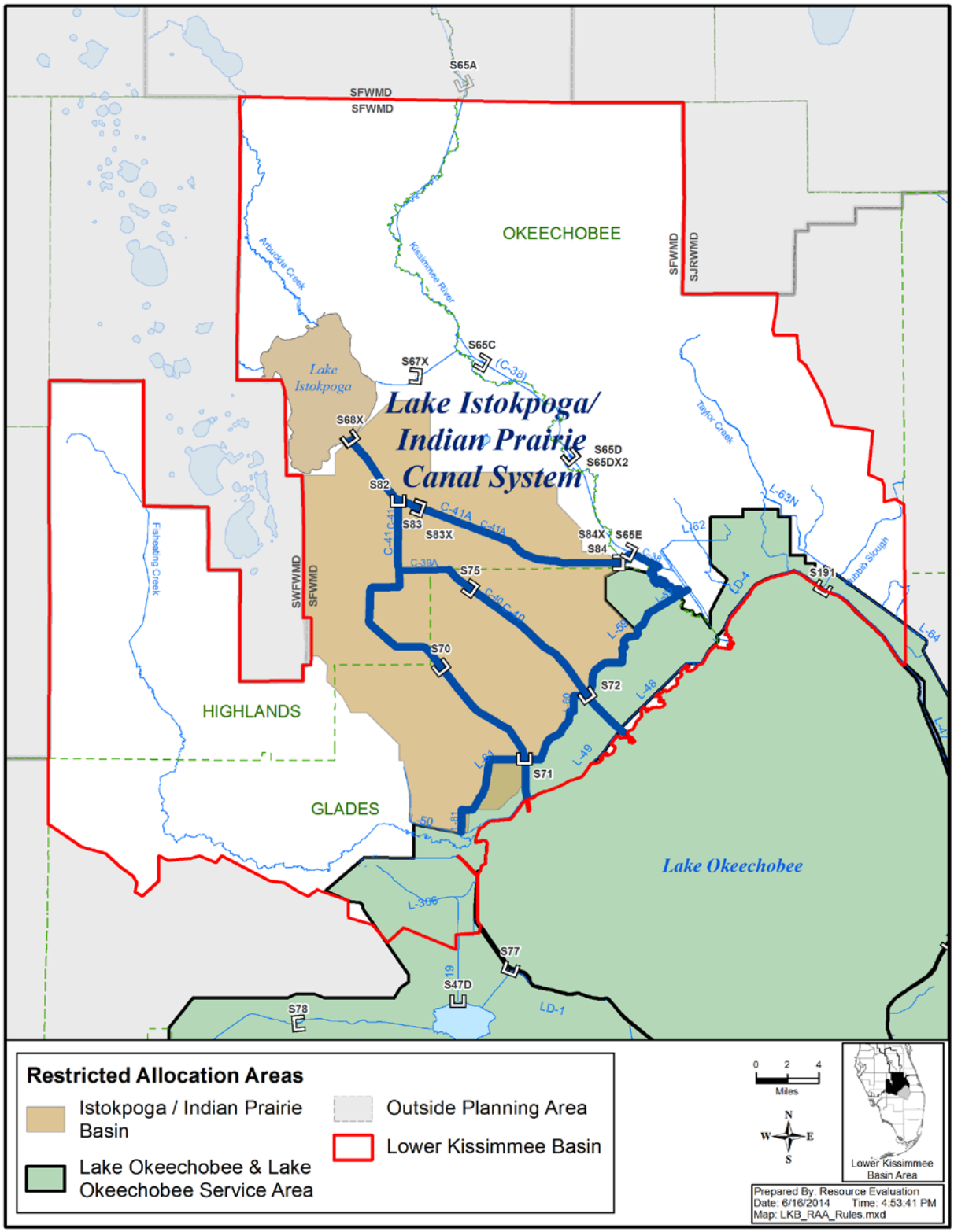


Figure 6. Restricted allocation areas in the LKB Planning Area.

Water Rights Compact Among the Seminole Tribe of Florida, the State of Florida, and the South Florida Water Management District

The Seminole Tribe of Florida (Tribe), the State of Florida, and the SFWMD executed a Water Rights Compact in 1987. The compact provides a framework for harmonizing the relationship among the Tribe, the State of Florida, and the District on water resource issues. Of particular importance for this 2014 LKB Plan are the compact's provisions concerning the water entitlement for the Tribe's Brighton Reservation in Glades County.

The Brighton Reservation water entitlement was further detailed in an agreement executed by the Tribe and the SFWMD in November 1992. This agreement outlines surface water control strategies to assure maximum reliability for delivering the water entitlement set forth in the 1987 compact.

The agreement also outlines the schedule of releases from Lake Istokpoga and operation schedules for pump stations G-207 and G-208. These pumps withdraw water from Lake Okeechobee and deliver it to the southern portion of the Indian Prairie Basin when the water level in Lake Istokpoga is low and a water shortage has been or may be declared. Securing a dependable source of water for the reservation is particularly important given the Tribe's federal surface water entitlement rights.

SWFWMD MFLs in Highlands County

The SWFWMD has determined that several lakes within its jurisdiction along the Lake Wales Ridge are showing signs of stress. These lakes are in the Southern Water Use Caution Area (SWUCA) and lie in Highlands County to the west of the LKB Planning Area. In 2006, the SWFWMD developed lake level protection criteria and a recovery strategy for these lakes to address concerns over declining lake levels. The SWFWMD's Governing Board adopted MFLs for lakes Angelo, Anoka, Denton, Jackson, June in Winter, Letta, Little Jackson, Lotela, Placid, Tulane, and Verona between 2006 and 2009 (**Figure 7**). Reevaluation of the MFLs for lakes Jackson, Letta, Little Jackson, and Lotela is planned for Fiscal Year 2015. The SWFWMD's priority water bodies scheduled for MFL adoption in Fiscal Year 2016 include lakes Damon, Pioneer, Pythias, and Viola. Currently lakes Angelo, Anoka, Denton, Jackson, Letta, Little Jackson, Lotela, Tulane, and Verona are considered to be in recovery. The remaining lakes are in prevention.

Previous studies by the SWFWMD have concluded that Floridan aquifer groundwater levels have an enhanced relationship with the water levels observed in these lakes due to the underlying karst connectivity. Several of these existing MFL lakes are near the boundary between the SFWMD and SWFWMD, making it likely that increased groundwater withdrawals within the SFWMD could contribute to changes in lake levels within the SWFWMD.

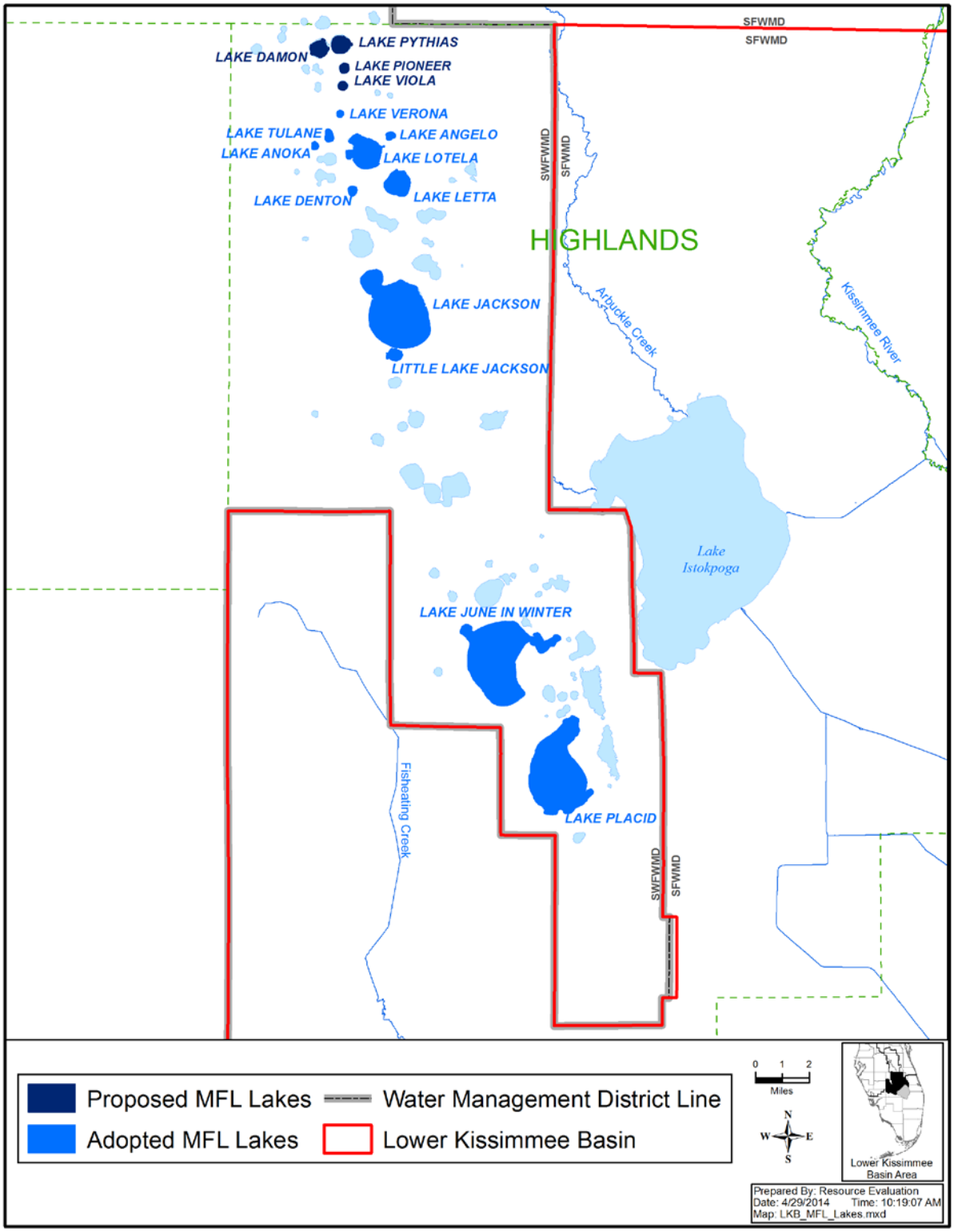


Figure 7. MFL lakes in the SWFWMD adjacent to LKB Planning Area.

OVERVIEW OF MAJOR WATER RESOURCES

Major water resources of the LKB Planning Area include Lake Istokpoga and its associated canals, Lake Okeechobee and its hydraulically connected surface water bodies, the Kissimmee River, the surficial aquifer system, and the Floridan aquifer system.

Lake Istokpoga and Indian Prairie System

Lake Istokpoga covers 27,692 acres and is the fifth largest lake in Florida. The lake is generally shallow, averaging only 4 to 6 feet in depth and its water levels are maintained in accordance with the USACE regulation schedule (**Figure 8**). Surface water from Lake Istokpoga and its associated canals have been a primary water source to meet agricultural irrigation demands in the Indian Prairie Basin (Highlands, Glades, and Okeechobee counties), including the Brighton Reservation. The Lake Istokpoga–Indian Prairie Basin is defined as those areas with access to the C-40, C-41, and C-41A canals and Lake Istokpoga, either directly or via other canals. The Istokpoga Canal is an additional canal/river that connects Lake Istokpoga to the Kissimmee River through the S-67 Structure.

Lake Istokpoga

The Istokpoga Marsh Watershed Improvement District (IMWID) is located southeast of Lake Istokpoga. The IMWID began in 1962, prior to water management district regulatory requirements. It consists of about 22,000 acres, has a 28-mile internal canal system that provides water supply and drainage, and obtains water from Lake Istokpoga. The IMWID withdraws water from Lake Istokpoga pursuant to an agreement with the SFWMD. Additionally, about 10,000 acres of agricultural lands within the IMWID have SFWMD individual water use permits.

Most of the irrigation demands in the portions of Highlands and Glades counties within the Indian Prairie Basin are traditionally met with surface water from Lake Istokpoga. Historically, water availability has been limited during periods of drought resulting from a lack of storage capacity in the watershed and challenges of flood control management that cause temporary water shortages. As seen in **Figure 9**, the water levels in Lake Istokpoga have been maintained in accordance with the regulation schedule since December 2005. Issues of water availability have generally occurred when a late summer drought has caused rainfall to be insufficient to maintain the lake above Zone C of the schedule (**Figure 8**). During these periods, the District issued water shortage declarations and rationed the available supply. As stated previously, a RAA was implemented that restricts additional surface water allocations in this basin to help manage water supplies. Since implementing the RAA, additional water demand in the area has been met through water conservation and allocations of groundwater, which is subject to permitting requirements but not impacted by the RAA criteria.

A violation of the Lake Istokpoga MFL occurs when surface water levels fall below 36.5 feet in relation to the National Geodetic Vertical Datum of 1929 (NGVD) for 20 or more weeks within a calendar year more than once every four years. Since adoption of the Lake Istokpoga MFL in 2005, there have been no exceedances or violations of MFL criteria (**Figure 9**). However, during the 2006–2011 period, water shortage restrictions were implemented each year within the downstream Indian Prairie Basin.

Lake Istokpoga MFL Prevention Strategy

The present prevention strategy for Lake Istokpoga consists of continuing the current operational plan and regulation schedule, and planning and operation of extreme lake drawdowns for environmental purposes in a manner that avoids an MFL violation. It should be noted that Rule 40E-8.421(7), F.A.C., states "if significant changes to the Lake's water level management occurs due to new information, altered operational plans, or regulation schedule, a re-evaluation of the minimum level criteria will be conducted." This reevaluation will occur as part of the next Lake Istokpoga MFL update, or sooner, if significant changes to lake management are proposed.

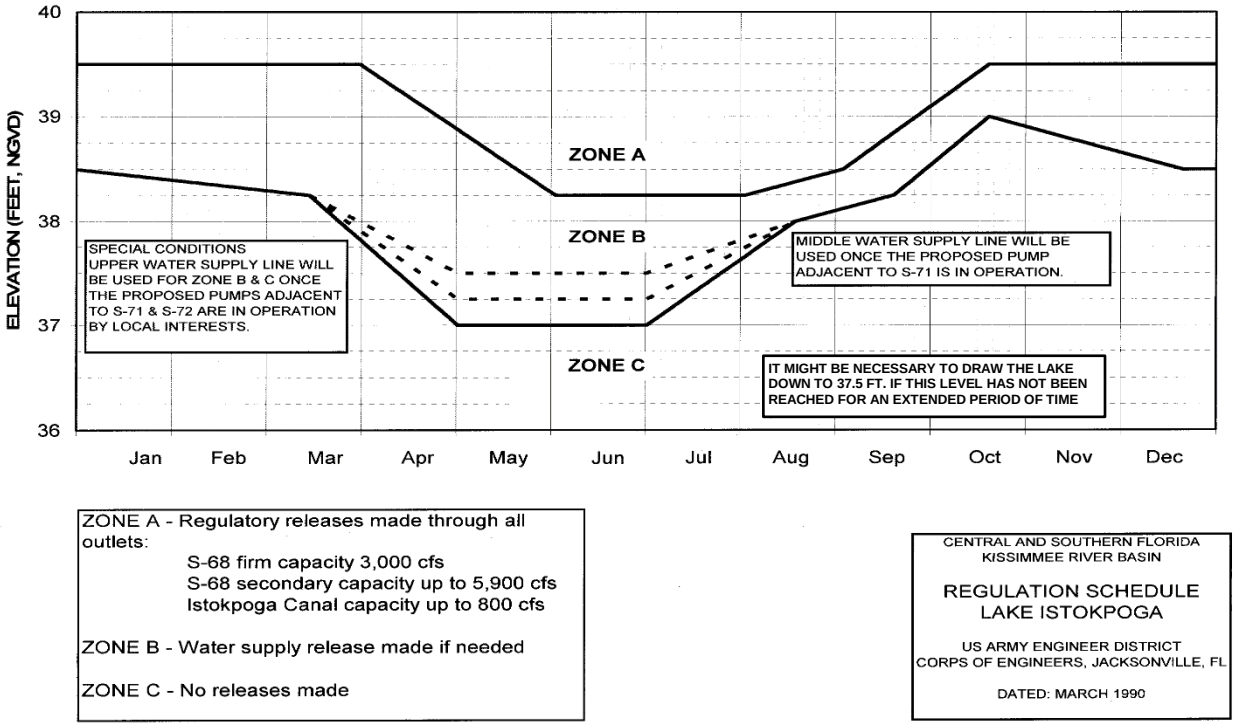


Figure 8. Lake Istokpoga regulation schedule.

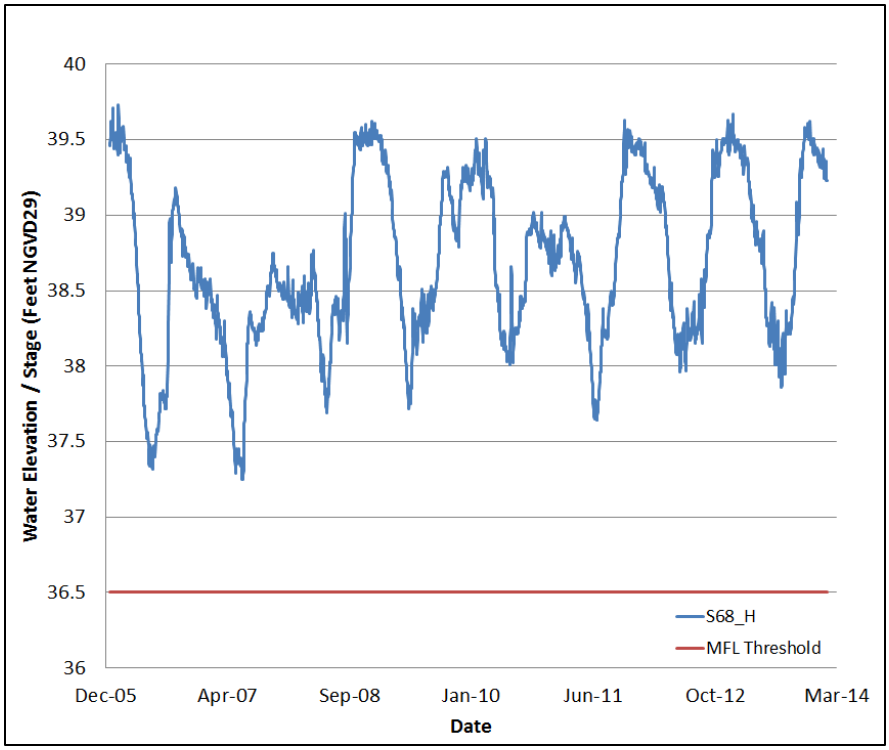


Figure 9. Water elevations in Lake Istokpoga (at the S-68 Structure) from MFL adoption to March 2014 showing no MFL exceedances or violations.

Lake Okeechobee

Lake Okeechobee is used for multiple purposes including urban, agricultural and environmental water supply, flood control, navigation, and commercial and recreational fisheries. It is also a key ecological component of the Greater Everglades ecosystem. The lake has multiple inflows, including the Kissimmee River, and receives water from a watershed in excess of 4,600 square miles. However, the lake has two major outlets for flood control purposes: one to the east coast via the St. Lucie Canal and another to the west coast via the Caloosahatchee Canal. Additional limited flood control discharges from Lake Okeechobee to the lower east coast are possible via the West Palm Beach Canal, Hillsboro Canal, North New River Canal, and Miami Canal. The 143-mile long Herbert Hoover Dike encircles the lake to protect the surrounding communities from flooding.

MFL criteria and a prevention strategy were established for Lake Okeechobee in 2001. Significant harm criteria associated with the MFL were based on the relationship between water levels in the lake and the abilities to 1) protect the coastal aquifer against saltwater intrusion, 2) supply water to Everglades National Park, 3) provide littoral zone habitat for fish and wildlife, and 4) ensure navigational and recreational access (SFWMD 2000a).

2008 LORS and Adaptive Protocols

Due to concerns about the integrity of the Herbert Hoover Dike, the USACE adopted a new lake schedule, 2008 LORS, to reduce the risk of the Herbert Hoover Dike failing before it is rehabilitated (USACE 2007). The schedule includes operating guidelines designed to maintain Lake Okeechobee water levels primarily between 12.5 and 15.5 feet NGVD, which is approximately one foot lower than the previous schedule. Overall, the changes under 2008 LORS result in an average loss of approximately 430,000 acre-feet of water storage. The new schedule also increased the frequency of low lake stage exceeding the MFL criteria.

Due to the impacts of 2008 LORS, the SFWMD changed the lake's MFL status from prevention to recovery and developed a recovery strategy**.** The strategy includes a regulatory component that limits future additional withdrawals from Lake Okeechobee and all surface waters hydraulically connected to the lake (referred to as the "Lake Okeechobee Waterbody") to prevent further degradation of the level of certainty for existing legal users as well as change in lake MFL performance.

To assist managing the lake under 2008 LORS, the Adaptive Protocols for Lake Okeechobee Operations were revised in 2010 (SFWMD 2010). The adaptive protocols describe how the SFWMD staff and Governing Board make recommendations to the USACE concerning 2008 LORS and the Water Control Plan (USACE 2008) provisions while considering the SFWMD's multiple statutory objectives and responsibilities outlined in Chapter 373, F.S. The protocols are not intended to establish, dictate, or regulate water levels or operations. Instead, they provide operational guidance to SFWMD staff, as local sponsor, when making operational recommendations to the USACE. This protocols are not self-executing, and do not bind the SFWMD or any other person to take, or not to take, any specific action. The key goals of the protocols are to improve water supply, flood protection, and ecosystem benefits within the constraints of 2008 LORS and the Central and Southern Florida Project Water Control Plan (USACE 2008). For further discussion of the lake's MFL recovery strategy and adaptive protocols, see **Appendix B** and the *2013 Lower East Coast Water Supply Plan Update* (SFWMD 2013b).

Kissimmee River

The Kissimmee River and Kissimmee Chain of Lakes represent the largest surface water basin within the Kissimmee Basin Planning Area. Therefore it is a potential water supply source for the Lower Kissimmee Basin Planning Area. The Kissimmee Chain of Lakes in the upper basin is the primary source of water for the river. The river downstream of the S–65A Structure is within the LKB Planning Area. Currently, the Kissimmee River system is undergoing a major restoration. To date continuous water flow has been reestablished to 24 miles of the meandering river. When complete the project will enhance 40 miles of Kissimmee River historic river channel and floodplain ecosystem. After restoration is fully implemented, water will be stored in and released from the Kissimmee Chain of Lakes and its tributaries as part of a management strategy to balance water needs of the restored river, flood control, and necessary flows into Lake Okeechobee.

The District is developing performance criteria and completing the analysis needed for a water reservation in support of the Kissimmee River Restoration Project. The Kissimmee River Basin Water Reservation was placed on the District's 2014 Priority Water Bodies List and Schedule and the District anticipates adoption of the reservation rule by December 2015.

Surficial Aquifer System

Low to moderate quantities of good to fair quality water can be found within the surficial aquifer system (SAS) in the planning area. It is generally used for Public Water Supply (PWS), Domestic Self-Supply (DSS), landscape irrigation, and small-scale agricultural irrigation. The Okeechobee Utility Authority and the Seminole Tribe of Florida both use the SAS as a PWS source.

The SAS is primarily recharged by rainfall and excess use can impact the natural system, including wetlands. **Figure 10** shows the relationship between rainfall and water levels in an SAS monitoring well (SEBRNG G). As shown here, water levels in the SAS have remained steady since 2005 and appear most responsive to local rainfall conditions.

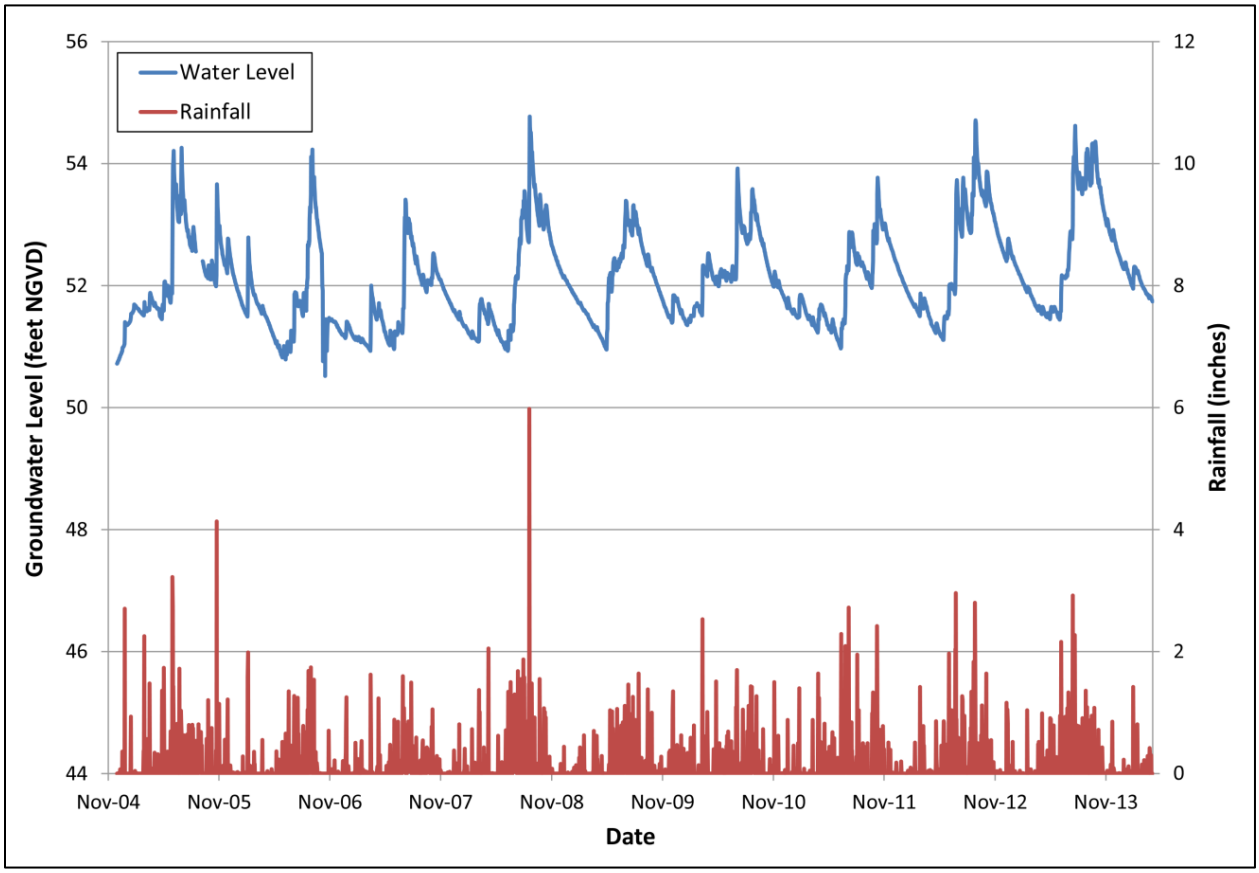


Figure 10. SAS water levels and rainfall amounts near the Sebring Airport.

Floridan Aquifer System

After surface water, the Floridan aquifer system is the second largest utilized source in the basin. As mentioned in **Chapter 1**, the Floridan aquifer system (FAS) consists of the Upper Floridan aquifer and the Lower Floridan aquifer. The Upper Floridan aquifer (UFA) is a primary source of water for many use categories in the LKB Planning Area and has demonstrated a high yield. The UFA is thickest in Glades and Okeechobee counties, averaging more than 1,000 feet. Chlorides, total dissolved solids (TDS), and sulfate concentrations increase with depth and distance to the south and west. Recharge to the FAS occurs along the central highlands of Florida including the Lake Wales Ridge. Due to the highly transmissive nature of the FAS, the effects of withdrawals from this aquifer may extend for long distances from the point of withdrawals. Utilization of the Lower Floridan aquifer (LFA) as a water source has been historically limited in the region due to TDS levels that are generally too high for crop production and PWS without membrane treatment.

Upper Floridan Aquifer Water Levels

A hydrogeologic and water quality investigation of the SAS, intermediate aquifer system (IAS), and FAS in Highlands County was completed in 2010 by the USGS. The resulting report, *Hydrogeology and Groundwater Quality of Highlands County, Florida* (Spechler 2010), provides a summary of the historical aquifer conditions in the area. The report discusses long-term statistical water level trends for wells penetrating the UFA. Water levels in one UFA well (HIF-37) located near the intersection of the C-41 Canal and State Road (S.R.) 70 have declined approximately 4 feet since the 1980s. However, water levels in a SFWMD UFA well (HIF-13) close to Lorida, FL showed no significant water level change in the same time frame. **Figure 11** shows the water levels for these two wells during the study's reporting period. Understanding the Floridan aquifer's response to water supply utilization has been and will continue to be an important focus of the SFWMD's drilling and testing program.

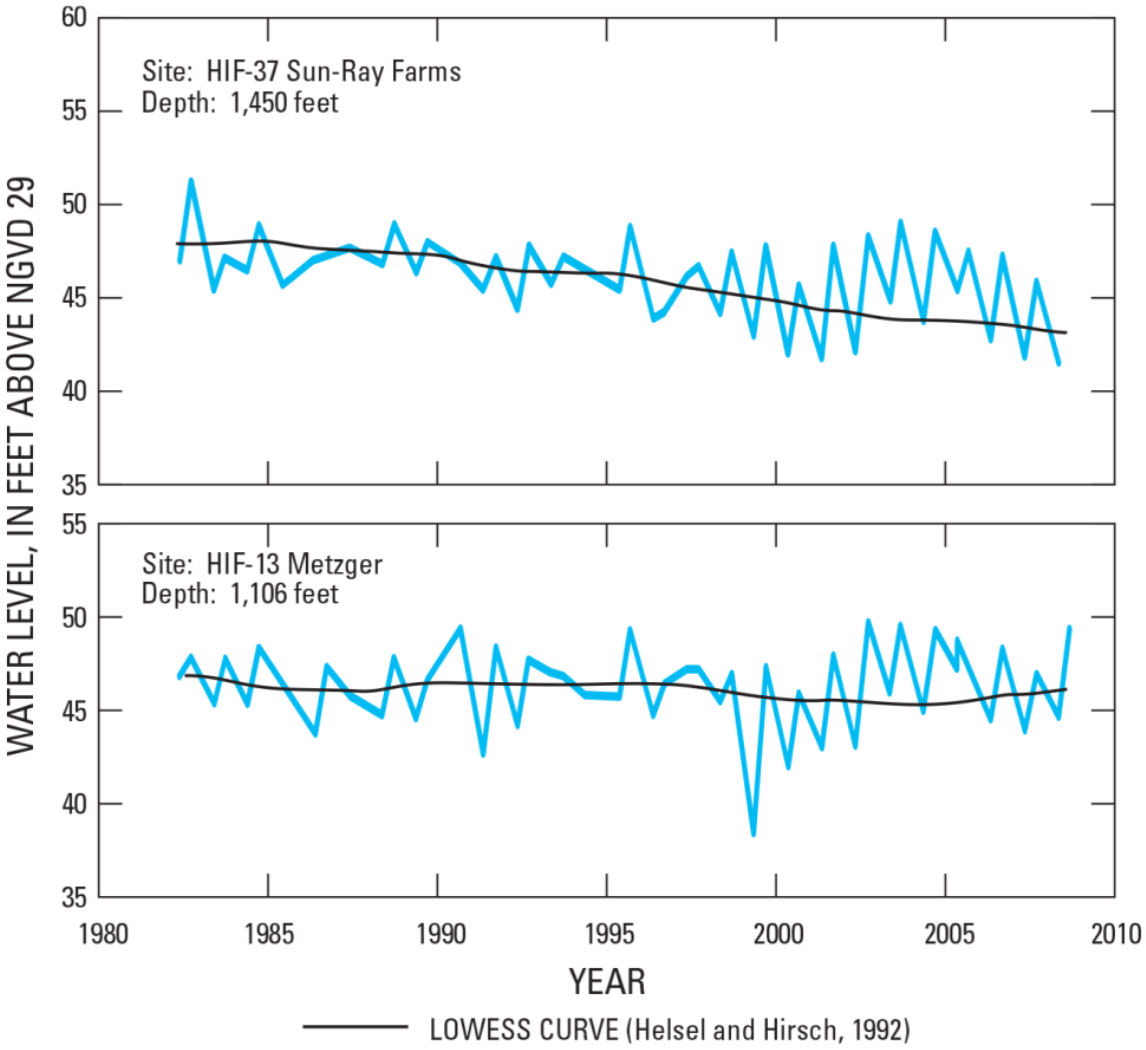


Figure 11. Water levels in two UFA monitoring wells in the LKB; Sun Ray Farms near S.R. 70 and Metzger Well near Lorida in Highlands County (modified from Spechler 2010).

Water Quality in the Floridan Aquifer

Most of the water withdrawn from the FAS comes from the Upper Floridan aquifer because it is less mineralized than water from deeper portions of the aquifer. Concentrations of chlorides and sulfates, as well as water hardness, may require advanced treatment prior to use, which adds to operating costs. TDS concentrations provide a reasonable indicator of water quality and are mapped for the UFA's upper producing zone and Avon Park permeable zone in **Figure 12**. In the recent periods of increasing withdrawals, the TDS concentration of water withdrawn from the UFA generally remained stable; however, TDS concentrations within the aquifer are geographically variable. Large-scale uses drawing on the FAS need to be carefully evaluated, designed, and operated to minimize the potential for water quality degradation over time due to saline water migration and possible cross-contamination between aquifers.

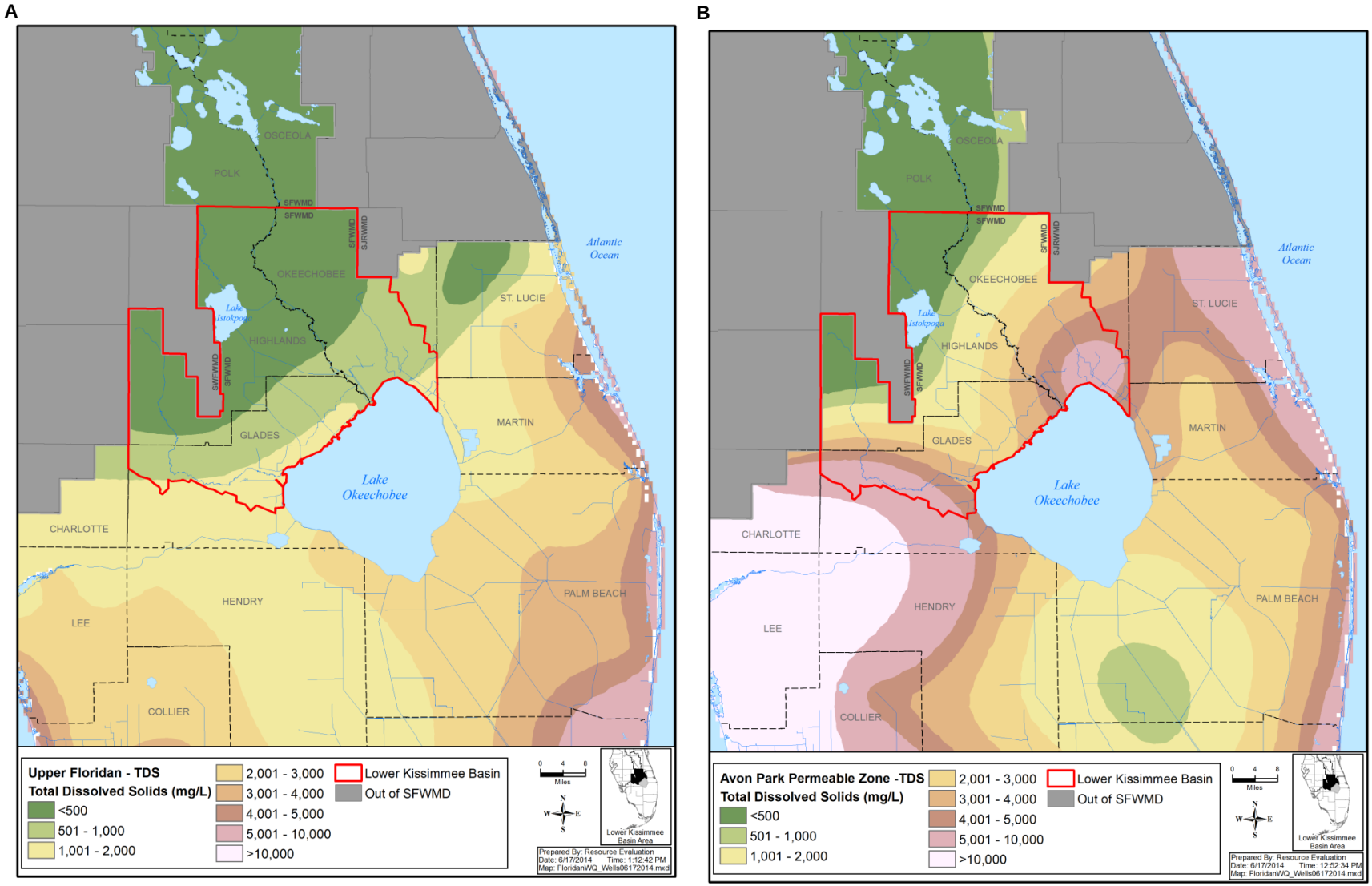


Figure 12. TDS concentrations in the UFA (**A**) upper producing zone and (**B**) Avon Park permeable zone. (Note: mg/L – milligrams per liter.)

EVALUATION AND ANALYSIS

Previous water supply plans incorporated regional groundwater and surface water modeling as part of the analysis process. The demand projections, assumptions, and resource protection criteria used in those analyses were reviewed and compared to current information. Where appropriate, the SFWMD recognized the findings and conclusions of the previous work conducted as part of the *Kissimmee Basin Water Supply Plan* (2000 KB Plan, SFWMD 2000b) and *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update, SFWMD 2006) as still representative of the issues necessary to address to meet the 2035 projected water demands for the LKB Planning Area. As part of this 2014 LKB Plan effort, an update to the previous groundwater modeling work was conducted to address the potential of groundwater withdrawals to impact MFL surface water bodies in the region. This new groundwater analysis and other studies used in the water resources evaluations are summarized here.

Groundwater Availability

As discussed in **Chapter 1**, there are three aquifer systems in the region: the surficial aquifer system (SAS), the intermediate confining unit/intermediate aquifer system (ICU/IAS), and the Floridan aquifer system (FAS). In some locations, these systems are isolated from each other by confining sediment units, while in others they are hydraulically connected. Additionally, in some places, these systems are well connected to surface water features such as lakes and wetlands, but in others they are separated. The relationship between a surface water feature and the underlying groundwater system can be complex. The LKB Planning Area contains both well-confined aquifers near Lake Okeechobee and more hydraulically connected aquifers adjacent to the Lake Wales Ridge area. Groundwater availability could be limited by the production capacity of the aquifer itself, or by harmful declines in water levels under lakes and wetlands as a result of groundwater withdrawals.

Model simulations were conducted for 2010 and 2035 using the Lower Kissimmee Basin Groundwater Model (LKBGWM). The LKBGWM was updated since the 2005–2006 KB Plan Update to improve calibration and update groundwater use information. The LKBGWM model is a steady-state model and is used to generally predict water levels and flow conditions under various assumptions that do not change with time. This model does not evaluate changes in water quality. In general, the model results can be used to indicate trends and relative changes between different scenarios, but should not be used to predict exact values. The model generalizes more specific flow patterns and aquifer characteristics and is limited by the availability of input data. There is little hydraulic, water level, or water quality data for the Lower Floridan aquifer in the study area. The LKBGWM and the analysis conducted for the 2010 and 2035 water use conditions are summarized in the *Lower Kissimmee Basin Groundwater Model Update Summary Report* (Butler et al. 2014).

In previous groundwater modeling efforts for the LKB Planning Area, the differences between water use in the baseline condition and projected water use simulations were

minimal and the potential for increased risk to lakes and wetlands, including areas along the Lake Wales Ridge, were shown to be small. As stated previously, increased water use over the planning horizon is again projected to be relatively small. In discussions with the SWFWMD, it was determined that a simple steady-state model could be used to assess the potential risks of increased groundwater withdrawals occurring within the LKB on the SWFWMD's MFL lakes in Highlands County along S.R. 27. Results of the simulations indicate that Floridan aquifer levels beneath those MFL lakes currently in prevention or recovery status will not be reduced. Therefore, the risk of adversely impacting the SWFWMD's recovery and prevention strategies resulting from the LKB projected demands is considered low. The risk of impacts to Lakes Istokpoga and Okeechobee from increased groundwater use is believed to be minimal due to the existence of sufficient aquifer confinement surrounding these lakes.

The locations and amounts of projected withdrawals simulated in the model were based on information collected from water users and contained in current water use permits. There are some risks to increasing groundwater use in the basin if the demands or the locations of the withdrawals were to change from those simulated in the model. Water withdrawal locations near the SFWMD and SWFWMD boundary are closer to the MFL lakes of concern and thereby inherently have an increased risk of impacting them.

TDS concentrations in the LFA may limit its suitability for some purposes. While water quality in the SAS and UFA is generally suitable for Public Water Supply and Agricultural Self-Supply (AGR) purposes, water quality issues such as high iron or TDS concentrations may limit their use in certain parts of the LKB Planning Area.

Surface Water Availability

Kissimmee River

The Kissimmee River will be evaluated as part of the establishment of the Kissimmee River Basin Water Reservation needed to protect fish and wildlife in the Kissimmee River, its floodplain, and the Upper Chain of Lakes. The reservation is expected to be adopted by December 2015.

Lake Okeechobee

With the development of 2008 LORS, the SFWMD changed Lake Okeechobee's MFL status from prevention to recovery and developed a recovery strategy**.** The regulatory component of the recovery strategy effectively limits future additional withdrawals from Lake Okeechobee and all surface waters that are hydraulically connected to the lake to prevent further degradation of the level of certainty for existing legal users or change in lake MFL performance.

Lake Istokpoga and Indian Prairie Basin

The history of water use for the Lake Istokpoga–Indian Prairie Basin has been one of water shortages and legal rights. The 2000 KB Plan evaluated the amount of surface water in the basin and found that the water demands of the users at that time could be met during a 1-in-10 year drought, but meeting water demands during more extreme drought conditions presented a problem. As previously mentioned, the District implemented RAA criteria (Section 3.2.1[A], Applicant's Handbook) for the Lake Istokpoga–Indian Prairie Canal System. No additional surface water will be allocated from District-controlled surface water bodies over and above existing allocations and no increase in surface water pump capacity will be recommended. This effectively limits future increased use of surface water in the basin.

OUTLOOK ON CLIMATE CHANGE

The uncertainties of climate change challenges water users and water managers as they plan for the future. Precipitation patterns are uncertain primarily because they are affected by large-scale global weather systems, such as El Niño and La Niña. For Florida, El Niño conditions tend to create above-normal rainfall in the dry season months and La Niña conditions generally form dry and somewhat warmer conditions (Koch-Rose et al. 2011).

Climate change can create additional complexities in planning. Traditionally, water resource planning used climate data from the past and current hydrology to represent future supply conditions because it was assumed the parameters of water resources (e.g., temperature, precipitation, stream flow, groundwater, and evaporation) would be the same as they had been in the past. While large variations in observed weather were experienced in the past, it was assumed that climate statistics would stay the same and variability would not increase in the future. With climate change, planning must consider additional uncertainties and larger variability (Water Utility Climate Alliance 2010).

Changes to evapotranspiration and weather patterns will likely affect water supply and demand. If temperatures and evapotranspiration increase as many experts expect, both PWS and AGR water demands may increase. More frequent intense rainfall events with longer interim dry periods could increase the total annual rainfall, but decrease effective rainfall as more water may be lost to runoff (Scavia et al. 2002).

Despite the uncertainties, climate change and its effects on surface water and freshwater aquifers should be included as a consideration in water supply planning. The SFWMD is developing models and evaluating water management scenarios of precipitation and sea level rise. To better understand the potential effects of changing weather patterns, it could be helpful if the SFWMD could investigate the ability to extend the climate data used in modeling more often than the typical frequency of every five years.

Climate Change Evaluation Efforts

Efforts to understand the effects of climate change and the approaches to deal with it are under evaluation by many agencies. At the national level, the United States Environmental Protection Agency (USEPA) developed the *National Water Program 2012 Strategy: Response to Climate Change* (USEPA 2012). In this document, the USEPA states that many actions that could be taken to adapt to climate change will add value absent climate change. The best management practices used by PWS utilities include water conservation and other efficiencies and have the ability to deal with climate change impacts as well as meeting increasing demand caused by population growth. Three of the goals from this strategy relate to water supply planning:

- Efficiency in the use of energy and water should form the foundation of how energy and water are developed, distributed, recovered, and used
- Wastewater treatment facilities, which treat human and animal waste, should be viewed as renewable resource recovery facilities that produce clean water, recover energy, and generate nutrients
- The water and energy sectors—governments, utilities, manufacturers, and consumers—should move toward integrated energy and water management from source, production, and generation to end user

SUMMARY

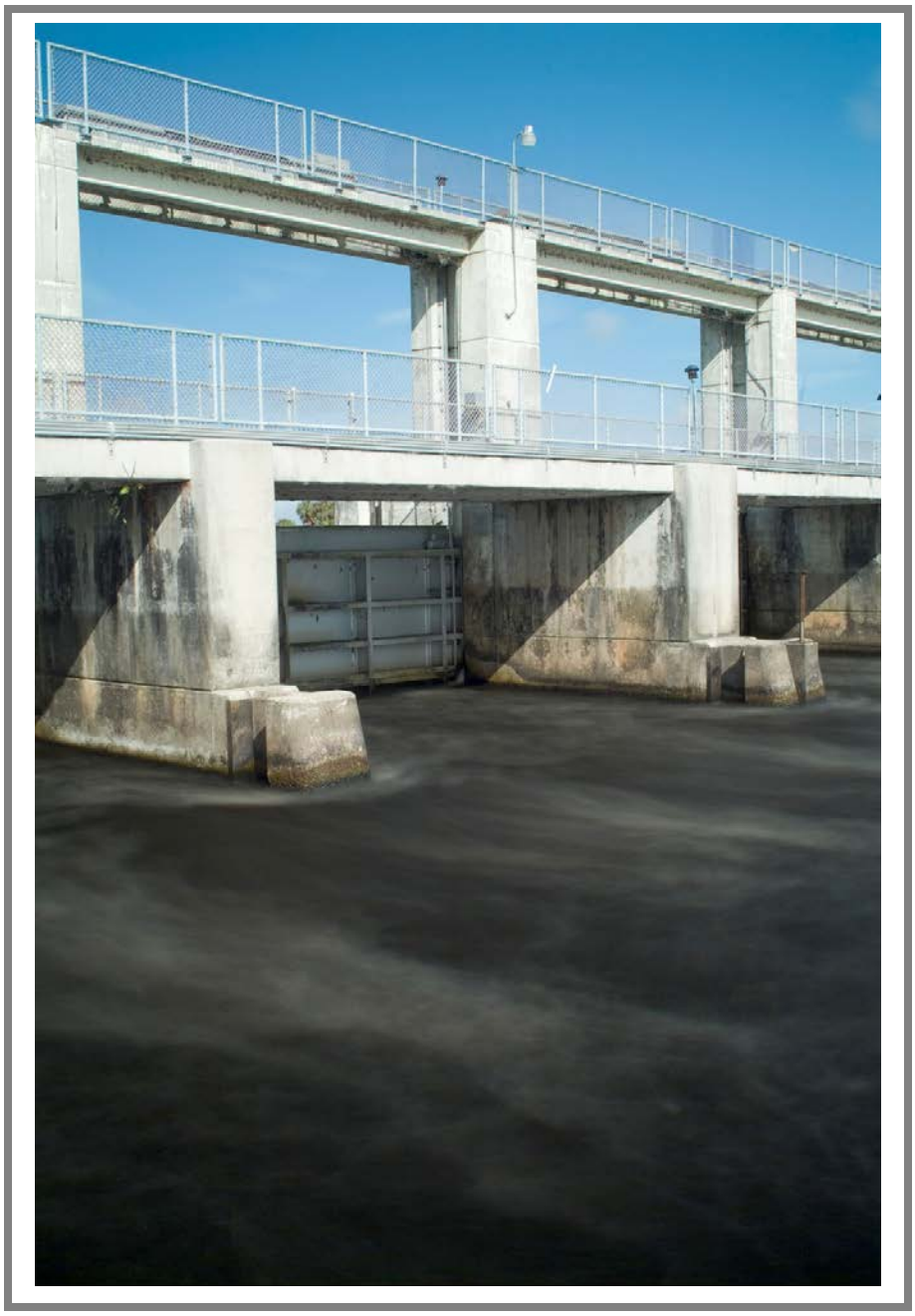
The findings and conclusions of the 2000 KB Plan and 2005–2006 KB Plan Update continue to represent the issues needing to be reviewed to meet the 2035 projected water demands within the LKB Planning Area. Increasing water demands require the development of additional groundwater supplies due to use limitations on surface water from Lake Istokpoga, Lake Okeechobee, and their surrounding tributaries.

The following findings have been made regarding the availability of water resources within the LKB to meet the projected 2035 water demands:

- The SAS will remain the primary source for DSS. New or increased use of the SAS for other uses including PWS and AGR will be determined on an application-by-application basis. The SAS is currently used by the Okeechobee Utility Authority and Seminole Tribe of Florida for PWS.
- The UFA will likely remain the primary source of water to meet additional demands. As such, monitoring aquifer water levels and water quality needs to continue to ensure there is no impact to existing legal users or surface water bodies. Impacts resulting from future use of the UFA is dependent upon the location and amount of the withdrawals.
- New uses of surface water from Lake Okeechobee are limited in accordance with the LOSA Restricted Allocation Area. The LOSA Water Availability Rule effectively limits future additional withdrawals from Lake Okeechobee and all surface waters that are hydraulically connected to the lake to prevent further

degradation of the level of certainty for existing legal users or change in the lake's MFL performance.

- The 2000 KB Plan evaluated the amount of surface water in the basin and found that water demands of the current users in the basin could be met during 1-in-10 year drought conditions, but drought conditions beyond that presented a problem in meeting all of the estimated demands. The District implemented restricted allocation area criteria for the Lake Istokpoga–Indian Prairie Canal system that effectively limits additional surface water will be allocated from District-controlled surface water bodies over and above existing allocations, and no increase in surface water pump capacity will be recommended.
- Water quality concentrations in the UFA near Lake Okeechobee and in portions of the LFA will limit their use as a water supply source without treatment and/or blending with other sources.
- The development of a water reservation for the Kissimmee River Basin was placed on the 2014 SFWMD Priority Water Bodies List and Schedule and reservation rule adoption is anticipated by December 2015.
- The SFWMD should coordinate with the SWFWMD to identify tools and a process to assess the impacts of potential future demands on MFL lakes in the Lake Wales Ridge region. The agreement on the process will occur subsequent to SWFWMD's review of the MFLs along the Lake Wales Ridge and the completion of updates to their Southern Water Use Caution Area groundwater model.
- To better understand the potential effects of changing weather patterns, the SFWMD should investigate the ability to extend the climate data used in modeling more often than the typical frequency of every five years.



4

Water Resource Development Projects

This chapter addresses the roles of the South Florida Water Management District (SFWMD or District) and other parties in water resource development projects and provides a summary of projects in the Lower Kissimmee Basin (LKB) Planning Area. The project summaries serve as an overview of water resource-related activities in the region. An update on the status of Districtwide water resource development projects is also provided since many contribute to the understanding of water resources in the LKB Planning Area. Additional detail on the status of these projects can be found in Volume II, Chapter 5A of the annual *South Florida Environmental Report* (available from www.sfwmd.gov/sfer).

TOPICS

- Lower Kissimmee Basin Projects
- Districtwide Projects
- Water Quality Projects
- Summary

Florida water law identifies two types of projects to meet water needs: water resource development projects (subject of this chapter) and water supply development projects. (subject of **Chapter 5**). Water resource development projects are generally the responsibility of water management districts and often by themselves do not yield specific quantities of water. Instead, these projects support water supply development and are intended to ensure the availability of an adequate supply of water for all existing and future uses, including maintaining the functions of natural systems. For example, hydrologic investigations and groundwater monitoring and modeling provide important information about aquifer characteristics, such as hydraulic properties and water quality, which are useful for appropriate facility design, identifying safe yields, and evaluating the economic viability of water supply development projects.

Water resource development is defined in Section 373.019(22), Florida Statutes (F.S.), as:

> *the formulation and implementation of regional water resource management strategies, including the collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage water resources; the development of regional water resource implementation programs; the construction, operation and maintenance of major public works facilities to provide for flood control, surface and underground water storage, and groundwater recharge augmentation; and*

related technical assistance to local governments, and to government-owned and privately owned water utilities.

Water resource planning in the LKB Planning Area is influenced by the Comprehensive Everglades Restoration Plan (CERP). Authorized by the United States Congress in 2000, CERP builds upon and complements other state and federal initiatives to revitalize south Florida's ecosystem. There are multiple implementation phases to these efforts, which are supported by modeling, land acquisition, project controls, and technical services performed throughout the process. An overview of some of these efforts is provided in this chapter and more detail on CERP projects can be found by region in the *2011–2014 Water Supply Plan Support Document* (Support Document, SFWMD 2014b).

LOWER KISSIMMEE BASIN-SPECIFIC PROJECTS

Projects that are contained wholly or partially within the Lower Kissimmee Basin are described in this section. These include:

- Lake Okeechobee Related Projects
- Istokpoga Marsh Watershed Improvement District Stormwater Project
- Nicodemus Slough Storage Project
- Fisheating Creek Watershed Feasibility Study
- Lower Kissimmee Basin Groundwater Modeling
- Exploratory Well OKF-105
- Hydrogeologic Investigation of Aquifer Systems in Highlands County

Lake Okeechobee Related Projects

In this section, the following projects related to Lake Okeechobee are discussed:

- CERP Lake Okeechobee Watershed Project
- Herbert Hoover Dike Major Rehabilitation
- Lake Okeechobee Habitat Enhancements

The locations of these projects and the specific habitat enhancement projects are shown in **Figure 13**.

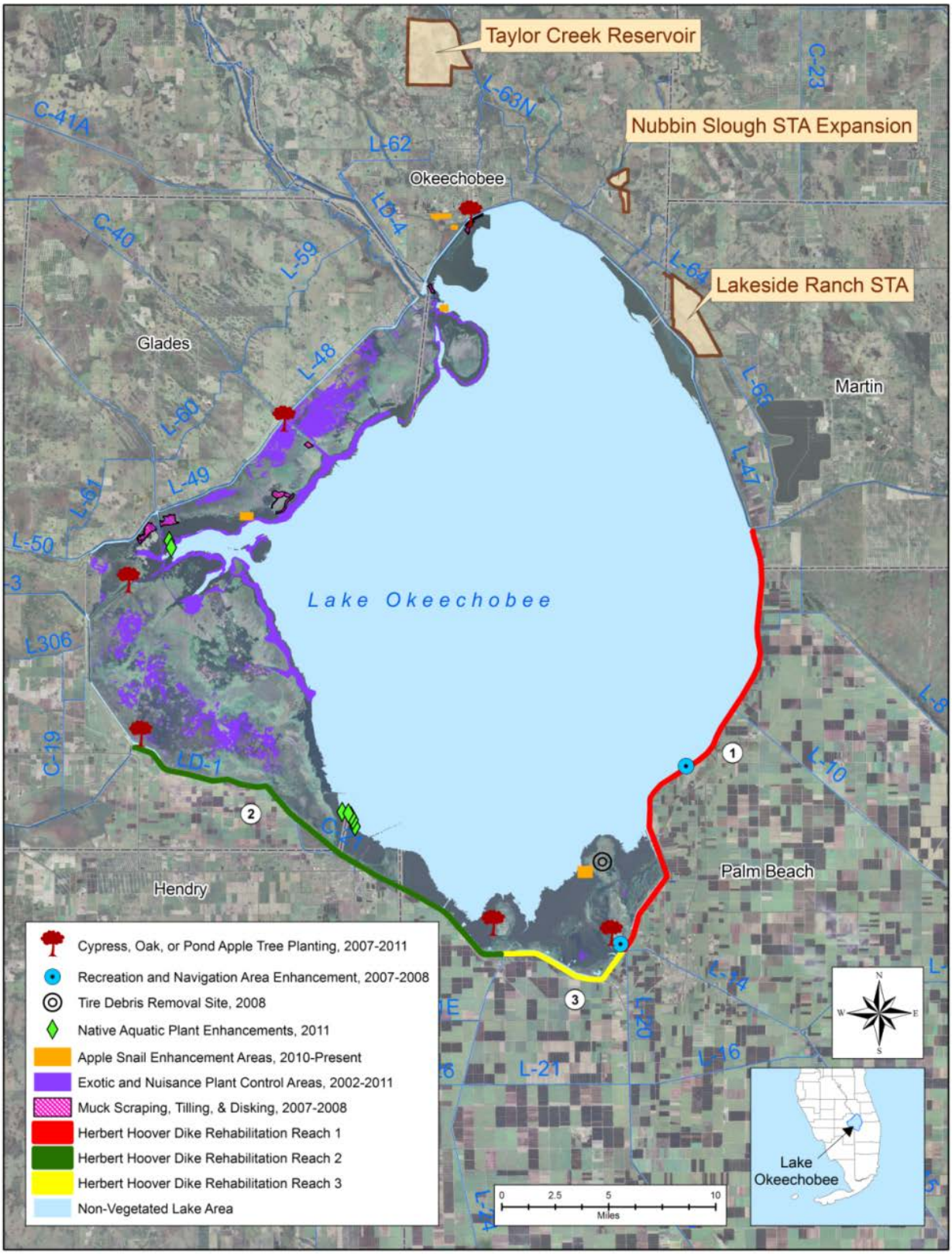


Figure 13. Projects and habitat enhancements in the Lake Okeechobee region.

CERP Lake Okeechobee Watershed Project

The CERP Lake Okeechobee Watershed Project area covers approximately 1,800 square miles and incorporates the four major tributary systems that drain the lower portion of the watershed into Lake Okeechobee. The purpose of this project is to reduce damaging Lake Okeechobee water releases to the surrounding estuaries, increase aquatic and wildlife habitat, regulate extreme highs and lows in lake stages, and reduce phosphorus loading. In addition, this project will focus on rehydrating wetlands in and around the areas north of Lake Okeechobee and improving the ecological health of Lake Istokpoga. This project includes additional storage that will provide water supplies needed for Lake Okeechobee minimum flows and levels (MFL) recovery.

Taylor Creek
Stormwater Treatment Area

The key components of the CERP Lake Okeechobee Watershed Project proposed tentatively selected plan consist of a recommended revised Lake Istokpoga regulation schedule and the following six structural water storage and treatment features:

- **Reservoir in the Taylor Creek/Nubbin Slough Basin** – a 1,984-acre reservoir will store up to 32,000 acre-feet (ac-ft) of water. It will receive flows from and discharge back to Taylor Creek.
- **Stormwater Treatment Area (STA) in the Taylor Creek/Nubbin Slough Basin –** a 3,975-acre treatment area will receive inflow from the L-64 Canal and discharge back to the L-47 Canal. It is projected to reduce total phosphorus loads by 15.8 metric tons per year.
- **Reservoir in the Kissimmee River Basin –** a 10,281-acre aboveground reservoir with a maximum storage capacity of 161,263 ac-ft. It will receive flow from and discharge back to the Kissimmee River.
- **Reservoir in the Lake Istokpoga Basin –** a 5,416-acre reservoir will store up to 79,560 ac-ft. It will receive flow from and discharge back to the C-41A Canal.
- **STA in the Lake Istokpoga Basin –** an 8,044-acre treatment area will receive flow from the C-41 Canal and discharge treated water to Lake Okeechobee. It is expected to reduce total phosphorus loads by approximately 29.1 metric tons per year.
- **Restored Wetland in Paradise Run** – a 3,730-acre wetland restoration site located at the confluence of Paradise Run, oxbows of the Kissimmee River, and Lake Okeechobee.

Implementation of the CERP Lake Okeechobee Watershed Project has been delayed primarily due to unresolved federal/state cost-sharing issues for project water quality components. However, pilot projects at Taylor Creek, Nubbin Sough, and Lakeside Ranch have been constructed and continue to be tested. These projects are being developed to

improve water quality and provide stormwater attenuation for Lake Okeechobee and are not water supply oriented. However, improved water quality and regional upper basin storage have incidental benefits for future supply even though the projects are not developed for that purpose.

USACE Herbert Hoover Dike Major Rehabilitation

The United States Army Corps of Engineers (USACE) is rehabilitating the Herbert Hoover Dike, a 143-mile series of levees and structures surrounding Lake Okeechobee, to address structural integrity concerns with the embankment and internal culvert structures. In 2007, the USACE designated the Herbert Hoover Dike a dam safety action classification risk of Class I, which is the highest risk of failure rating and requires remedial action.

Construction to reinforce the Herbert Hoover Dike

The ongoing remediation measures are addressing the highest points of potential failure in the system based on known areas of concern. The construction of a 21.4-mile cutoff wall in Reach 1 (see **Figure 13**) was completed in 2012. In addition, 32 culverts operated by the USACE are being replaced, removed, or abandoned with a scheduled completion in 2019.

The USACE is conducting a dam safety modification study. It is expected to be complete in 2015. This systemwide study is intended to identify risks within the system and recommend measures that can reduce the risk of failure. Additional remediation measures being considered include the construction of a cutoff wall and/or seepage management systems throughout all areas of the dike. The first phases of remediation addressing the highest risks from the study are scheduled for completion by 2022.

The USACE expects to operate under the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) until either 1) a new Lake Okeechobee schedule is implemented as a component of the systemwide operating plan to accommodate CERP projects, or 2) the Herbert Hoover Dike seepage management system is completed as determined necessary to lower the dam safety action classification rating. The USACE intends to implement a new schedule or any necessary schedule modifications or deviations concurrent with the completion of either of those items (USACE and SFWMD 2013). A revised regulation schedule could provide the additional water supplies needed for Lake Okeechobee MFL recovery, enhance the level of certainty to existing permitted users, and support other environmental objectives. For more information see www.saj.usace.army.mil/Missions/CivilWorks/LakeOkeechobee/HerbertHooverDike.aspx.

Lake Okeechobee Habitat Enhancements

The 2007 drought lowered Lake Okeechobee water levels, which allowed the SFWMD to perform a series of activities to protect and manage this water resource. Continued low water levels in Lake Okeechobee and Lake Istokpoga during 2008 prompted the SFWMD to garner input from various agencies to plan restoration projects for low lake stages during the coming dry seasons, as well as helping to mitigate the frequent low lake stages anticipated under the 2008 LORS. The restoration activities include muck scraping and disking/plowing, native aquatic plant enhancement, exotic and nuisance plant control, recreation and navigation area enhancement, in-lake debris removal, and initiation of an apple snail nursery. These activities are a part of the Lake Okeechobee MFL Recovery Strategy and aided further research and future project formulation.

Istokpoga Marsh Watershed Improvement District Stormwater Project

As described in **Chapter 3**, the Istokpoga Marsh Watershed Improvement District (IMWID) is a 22,000-acre agricultural area located southeast of Lake Istokpoga. The IMWID canal system serves as both a water supply from and a drainage system to Lake Istokpoga. The SFWMD is working with the IMWID, Highlands County, and the Florida Department of Agriculture and Consumer Services (FDACS) to initiate a dispersed water management and stormwater recycling project. The project will consist of approximately 1,200 acres of aboveground impoundments that will reduce the amount of storm water and phosphorus discharged by the IMWID by 60 to 70 percent. The collected storm water should also reduce the need for releases from Lake Istokpoga for irrigation.

Nicodemus Slough Storage Project

The Nicodemus Slough storage project is a cooperative agreement between the SFWMD and the property owner to retain excess water from Lake Okeechobee during periods when lake discharges to the Caloosahatchee River exceed desirable levels. The 16,000-acre project will pull excess water from the lake's rim ditch near Fisheating Creak through two pump stations. The pump stations will move the water over 7.5 miles west to the upstream end of the property where the water will be stored behind three internal berms and allowed to sheet flow through culverts located in those berms. It is anticipated that 34,000 acre-feet of water annually will be retained by the project.

Fisheating Creek Watershed Feasibility Study

Fisheating Creek is the only Lake Okeechobee tributary where no structure controls its discharge to the lake. It is characterized by extremely flashy flows and is one of the major sources of total phosphorus loading to the lake (SFWMD et al. 2011). The Fisheating Creek Feasibility Study is being conducted by the SFWMD, Florida Department of Environmental Protection (FDEP), and FDACS. Its objective is to identify the most appropriate mix of

features to improve the hydrology and water quality in the watershed to reduce nutrient loads entering Lake Okeechobee. Planning targets for achieving surface water storage and water quality improvements have been established. The next step is to locate conceptual water quality and storage features. Completion of the study has been postponed and may resume once the hydrological benefits of the proposed Fisheating Creek Special Wetland Reserve Project are quantified by the United States Department of Agriculture–Natural Resources Conservation Service (USDA-NRCS) and proposed Watershed Assessment Model enhancements are completed.

Lower Kissimmee Basin Groundwater Modeling

As part of the *2005–2006 Kissimmee Basin Water Supply Plan Update*, the District completed the Lower Kissimmee Basin Groundwater Model (LKBGWM, Radin et al. 2005). The LKBGWM was developed as a quasi-three-dimensional, steady-state groundwater flow model simulating the surficial aquifer system (SAS), the intermediate aquifer system (IAS), the Upper Floridan aquifer (UFA), and the Avon Park Permeable Zone, which are the uppermost producing zones of the Floridan aquifer system (FAS). The LKBGWM was updated for use in this *2014 Lower Kissimmee Basin Water Supply Plan*. The model was calibrated to 1995 and 2004 climatic and water use conditions and was validated using 2010 climatic and water use conditions. A uniform cell size of 2,640 square feet was used, resulting in a grid consisting of 130 rows and 130 columns.

As previously mentioned in **Chapter 3**, the model was used to evaluate potential impacts of projected 2035 water demands under average climatic conditions on the planning area and on some surface water bodies that have established MFLs. These MFL water bodies are located in the Southwest Florida Water Management District (SWFWMD), but are potentially within the area of influence of groundwater withdrawals in the SFWMD. Prior to the next water supply plan, and in coordination with the SWFWMD, the SFWMD should develop a process to refine modeling of the impacts of potential future demands on the MFL lakes in the Lake Wales Ridge region. Updating to a transient model should also be considered.

SFWMD Exploratory Well OKF-105

The SFWMD constructed an exploratory well (OKF-105) in Okeechobee County near the S-65C Structure to evaluate the hydrogeologic conditions of the FAS for water supply and aquifer storage and recovery (ASR) potential, and as a high-quality data source for groundwater model calibration. The finished well consists of three monitor zones, spanning intervals from 372 feet below land surface (bls) to 2,251 feet bls (Sunderland et al. 2011). Construction and testing of the well were useful for determining the vertical extent of transmissive and confining intervals within the FAS, as well as water quality stratification. The location of this well can be seen in **Figure 14**.

Hydrogeologic Investigation of Aquifer Systems in Highlands County

A hydrogeologic and water quality investigation of the SAS, IAS, and FAS in Highlands County was completed in 2010 by the USGS. The resulting report, *Hydrogeology and Groundwater Quality of Highlands County, Florida* (Spechler 2010), will enable water resource managers to better evaluate current hydrologic conditions, define present-day baseline conditions, and identify additional hydrologic data needs. The report compiles geologic and hydrogeologic data and uses that information to examine long-term patterns within the respective aquifers. The findings were also used in the development of the 2014 LKBGWM update.

DISTRICTWIDE PROJECTS

Water resource development projects encompassing more than one planning area are considered Districtwide projects. Aspects specifically pertaining to or having relevance to the LKB Planning Area are identified within the context of these Districtwide projects.

The following projects have been completed since the 2005-2006 KB Plan Update and are discussed in this section:

- Transport and Reaction Simulation Engine for Modeling of Water Quality
- Evapotranspiration Measurement Project
- Water Supply Cost Estimation Study
- Lake Okeechobee ASR Pilot Project/Kissimmee River ASR Pilot Project
- Paradise Run ASR Project
- Seminole Tribe Brighton Reservation ASR Project
- L-63N Canal ASR Project

The following ongoing and future projects are discussed in this section:

- Minimum Flows and Levels, Water Reservations, and Restricted Allocation Area Criteria Activities
- CERP ASR Regional Study
- Comprehensive Water Conservation Program
- Alternative Water Supply
- Drilling and Testing
- Groundwater Assessment

Completed Districtwide Projects

Transport and Reaction Simulation Engine for Modeling of Water Quality

A Fiscal Year (FY) 2009 study developed water quality modeling components and applied them to the SFWMD Regional Simulation Model. As a result of this study, a spatially distributed water quality model for phosphorus transport and cycling in wetlands was developed for application throughout the District (Jawitz et al. 2008).

Evapotranspiration Measurement Project

Evapotranspiration (ET) is a large part of the hydrologic budget in Florida, ranging from 30 to over 100 percent of average precipitation. In the past, the accuracy of hydrologic models, basin-scale studies, water budgets, and other hydrologic analyses throughout the state was limited because of the lack of accurate estimates for this large water loss. The Evapotranspiration Measurement Project was a response to this need and collected information to improve the methods for computing potential and reference ET. Potential ET data are necessary for most hydrologic simulation models. Reference ET is a necessary input for SFWMD permit applications.

The United States Geological Survey (USGS), in cooperation with the SFWMD, has completed numerous specialized hydrologic studies to address specific SFWMD needs related to ET measurement. The information provided from these studies was necessary to enhance the understanding of ET rates in various wetland and upland plant communities, and similar issues. The objectives of the studies were to measure actual ET from representative land covers, develop models to estimate projected ET, and provide 2-kilometer gridded satellite-based estimates of potential and reference ET on a daily timescale for all of Florida. The resulting data products from these studies include daily values of ET, which are archived in the USGS National Weather Information System database, and the daily potential and reference ET data sets by year and county from 1995 through 2010 (accessible at fl.water.usgs.gov/et).

Water Supply Cost Estimation Study

The objective of this project was to develop engineering cost estimation relationships for evaluating water supply alternatives for the SFWMD's regional planning areas. The study evaluated options using groundwater, surface water, seawater, ASR, and reclaimed water. The final cost study was published in two reports.

The Phase I report included probable costs for various water treatment and disinfection technologies, water treatment plant and distribution components, and various wastewater treatment technologies for capacities of 5, 10, 15, and 20 million gallons per day (MGD) based on project records. The report provides estimates of costs for wells, well treatment methods, wastewater treatment methods, deep injection well disposal, ASR, and surface water storage projects. This report (CDM 2007a) is available at: www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/water%20supply%20cost%20estimation%20study%202-2007_cdm.pdf.

The Phase II addendum complements Phase I and provides cost estimates for additional capacities of 1 and 3 MGD, as well as estimates for wastewater granular filters and chlorine disinfection using onsite generation of hypochlorite. The Phase II report (CDM 2007b) is available at: www.sfwmd.gov/portal/page/portal/xrepository/sfwmd_repository_pdf/wtrsupply_costestudy_phaseii_add_21-2007.pdf.

Aquifer Storage and Recovery Projects

CERP Lake Okeechobee ASR Pilot Project/Kissimmee River ASR Pilot Project

The Lake Okeechobee ASR pilot project initially consisted of up to five ASR wells, each with an estimated capacity of 5 MGD. Three ASR pilot projects were to be located around Lake Okeechobee to demonstrate ASR performance in geographically different areas: Moore Haven, Port Mayaca, and the Kissimmee River just north of Lake Okeechobee. The facilities at Moore Haven and Port Mayaca were deferred due to funding limitations, but the Kissimmee exploratory well became a pilot project.

The Kissimmee River ASR pilot project was designed, permitted, constructed, and tested by the USACE as part of CERP. The 5-MGD ASR well system is located along the eastern bank of the Kissimmee River (C-38 Canal) in Glades County (**Figure 14**). During four complete cycles of recharge, storage, and recovery conducted from 2010 through 2012, the system demonstrated high recovery efficiency and source water treatment via media filtration and ultraviolet disinfection processes. Responses to ASR activity within the FAS were monitored from four storage zone monitoring wells plus a surficial aquifer well. A technical data report for the project was published in December 2013 (SFWMD and USACE 2013).

ASR facility along the Kissimmee River

LOER Paradise Run ASR Project

The SFWMD evaluated the potential for ASR development in Glades County in the area of Paradise Run, on the western side of the Kissimmee River, south of the S-65E Structure (**Figure 14**). The project site is within a former alluvial plain wetland and meander belt of the Kissimmee River. An exploratory well (HIF-42) was constructed in 2008 to evaluate hydrogeological conditions in the FAS for a conceptual 10-well ASR system as a component of the Lake Okeechobee and Estuary Recovery (LOER) Program. The exploratory well defined the thickness and hydrogeological characteristics of potential storage zones in the Upper Floridan aquifer and the deeper Avon Park Permeable Zone. Conceptual designs for a one-well pilot project and a full-scale 10-well ASR system were completed.

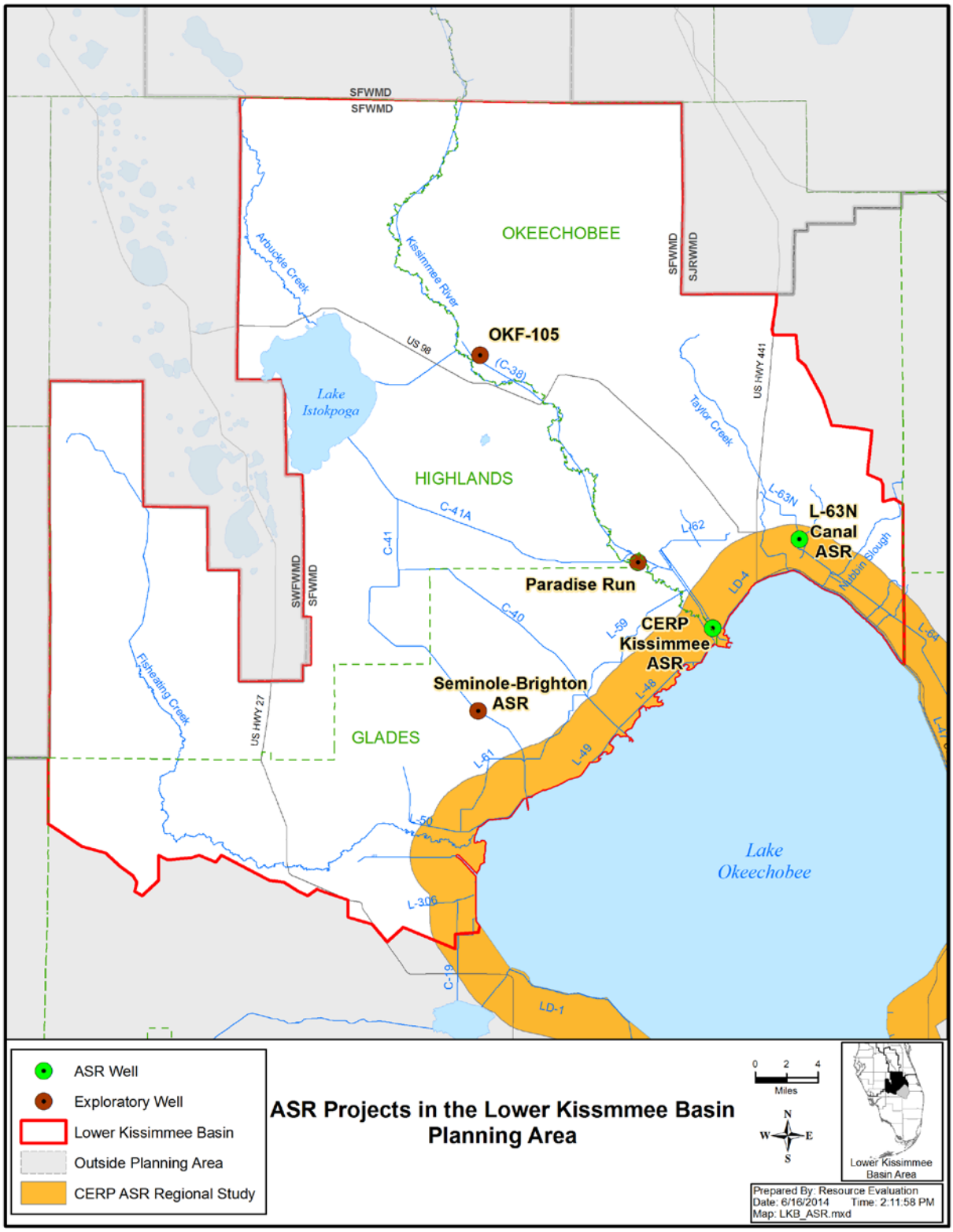


Figure 14. ASR projects in the LKB Planning Area.

LOER Seminole Tribe Brighton Reservation ASR Project

The SFWMD partnered with the Seminole Tribe of Florida to evaluate the potential for ASR technology at the Brighton Reservation as a component of the LOER Program (**Figure 14**). In 2007, an exploratory well was constructed to evaluate hydrogeological conditions in the FAS. Aquifer performance testing indicated that conditions in the FAS were suitable for ASR. A conceptual design for a one-well ASR pilot project, including the use of "in-bank" filtration was developed. Geotechnical and hydraulic evaluations of the shallow sediments along the bank of the C-41 Canal were conducted and determined the site to be unfavorable for high-capacity water transmittance to an ASR system.

LOER L-63N Canal ASR Project

This project involves the reactivation of the L-63N ASR system in Okeechobee County (**Figure 14**), which was permitted, constructed, and cycle tested by the SFWMD (CH2M Hill, 1989). The system originally consisted of a 24-inch diameter, high capacity ASR well, a dual-zone monitoring well, an intake/outfall structure, pumps, piping, a holding pond, and an aeration and chlorination system. An aquifer exemption was petitioned for and granted by the USEPA for coliform bacteria to facilitate testing with non-disinfected water. Since that time, an additional monitor well has been installed. Pending regulatory approval and identification of funding, the system will be used to store excess surface water during wet periods for subsequent recovery of stored water during dry periods.

CERP ASR Regional Study

The results of the CERP ASR pilot projects are being integrated into the CERP ASR Regional Study. This study is designed to address technical issues associated with the CERP ASR Program beyond the scope and budget of the pilot projects. In the study, the final number and disposition of all proposed ASR wells will be determined through scientific investigations conducted under the ASR Regional Study, and the associated ASR pilot projects. This project's major elements are a technology inventory, field data collection, geotechnical and geophysical evaluations, laboratory analysis, groundwater modeling, surface water modeling, water quality monitoring, and ecological assessments. The report will include conclusions regarding the actual quantity of ASR wells that may be feasible and recommendations on implementation of future components of the CERP ASR program. The ASR Regional Study is expected to be completed in December 2014.

Ongoing and Future Districtwide Projects

This section describes ongoing and planned projects in the SFWMD that affect the LKB Planning Area. The budget for these projects (with the exception of the CERP ASR Regional Study) for FY 2014 through FY 2018 is provided in **Table 11** and include costs for contracts (such as ecological monitoring) and staff time.

Water Supply Planning

Water supply planning is the process to determine a region's water needs and develop solutions to ensure an adequate supply of water to protect natural systems and to meet existing and future reasonable-beneficial uses, while sustaining water resources for future generations. The development of each regional water supply plan is a multiyear process. During this time, SFWMD coordinates with other agencies, local governments and utilities, the agricultural industry, environmental interests, and other stakeholders and holds public workshops and meetings and solicits input. Each regional water supply plan is updated every five years.

Table 11. Implementation schedule and costs for ongoing Districtwide water resource development projects that pertain to the LKB Planning Area (Modified from Martin 2014).

Districtwide Water Resource Development Projects	Plan Implementation Costs ($ in thousands)					
	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	Total
Water Supply Planning (DA01) Est. finish date: Ongoing	1,330	1,000	1,200	1,300	1,300	6,130
Alternative Water Supply Implementation (DB01) Est. finish date: Ongoing	325	325	325	325	325	1,625
MFL, Water Reservation and Restricted Allocation Areas Activities (DC01, DC05, DC08, DC09) Est. start date: 1995 Est. finish date: Ongoing	637	401	380	380	380	2,178
Comprehensive Water Conservation Program (DD01, DD07, DD08) Est. start date: 1977 Est. finish date: Ongoing	668	395	395	395	395	2,248
Drilling and Testing (DF01, DF05) Est. start date: 1990 Est. finish date: Ongoing	287	20	20	20	20	367
Groundwater Monitoring (DF01, DF06) Est. start date: 2002 Est. finish date: Ongoing	1,465	1,400	1,400	1,400	1,400	7,065
***Estimated* Portion of Central and Southern Florida Project Operation and Maintenance Budget Allocated to Water Supply**	104,000	104,000	104,000	104,000	104,000	520,000
Total	**108,712**	**107,541**	**107,720**	**107,820**	**107,820**	**539,613**

Alternative Water Supply

Development of alternative water supplies and source diversification is important to meeting Florida's future water needs and can reduce the effects of droughts in many areas. Through the Alternative Water Supply Funding Program, the SFWMD assists permittees in the development of reclaimed water projects, water reclamation facilities, brackish water wellfields, reverse osmosis treatment facilities, and ASR well systems. From FY 2007 through FY 2013, the SFWMD, in cooperation with the State of Florida, provided more than $92.7 million in alternative water supply funding for 219 projects. Three of these projects were within the LKB Planning Area and created 2.35 MGD of new water capacity. The water sources included stormwater recycling and reclaimed water efforts. A full description of Alternative Water Supply-related projects and associated funding is contained in the SFWMD's Alternative Water Supply Annual Reports, prepared pursuant to Section 373.707(7), F.S., and published in Volume II of the annual South Florida Environmental Report (www.sfwmd.gov/sfer).

Minimum Flows and Levels, Water Reservations, and Restricted Allocation Area Criteria Activities

MFLs, water reservations, and restricted allocation area rules are water resource protection measures that have been developed to help ensure the sustainability of water resources within the SFWMD (see **Chapter 3** for an introduction to these regulatory measures).

The establishment of a water reservation for the Kissimmee River Basin is on the District's 2014 Priority Water Bodies List and Schedule. The process of developing the reservation rule includes scientific research and technical evaluations to characterize the water resources involved, link their functions to water needs, and establish scientifically based criteria for meeting the needs of fish and wildlife. Prior to rule adoption, a public process will occur through a series of workshops, dedicated web pages, and notifications. The draft rule will be presented to the District's Water Resources Advisory Commission (WRAC) for discussion and additional stakeholder input. Adoption is expected by the District Governing Board by December 2015.

Currently there are no new MFL or restricted allocation area rulemaking efforts for areas located within the LKB Planning Area.

Comprehensive Water Conservation Program

The long-standing conservation goal of the SFWMD is to prevent and reduce wasteful, uneconomical, impractical, or unreasonable uses of water resources. This is addressed through planning, regulation, the use of alternative sources (such as reclaimed water), public education, and demand reduction through conservation technology, best management practices, and water-saving funding programs.

The Comprehensive Water Conservation Program is a series of implementation strategies designed to create an enduring conservation ethic and permanent reduction in water use. It

was approved in 2008 and developed in conjunction with stakeholders through the SFWMD's WRAC. The program is organized into regulatory, voluntary and incentive-based, and educational and marketing initiatives. More detailed information about the Comprehensive Water Conservation Program is found in **Chapter 5**. Additional supporting information can be found in Chapter 5 of the Support Document.

Drilling and Testing

Drilling and testing includes the installation of wells for short- to long-term monitoring of aquifer water levels. The SFWMD's knowledge of south Florida hydrogeology is enhanced whenever exploratory/test wells are constructed. Such increased understanding has improved the accuracy of groundwater modeling and decision making regarding the approval of consumptive use permits. As an example of this work the SFWMD constructed Well OKF-105 (**Figure 14**) to evaluate multiple zones within the FAS for the feasibility of water supply, ASR, and collection of data in support of groundwater models and monitoring.

Groundwater Monitoring

Information regarding groundwater levels is essential to managing and protecting south Florida's water resources. Real-time data combined with historical information about water levels, weather, rainfall, and water quality changes help managers make water resource decisions.

Water level and water quality monitoring at existing wells provide critical information to aid the SFWMD in developing groundwater models, assessing groundwater conditions, and managing the water resources. The District maintains extensive groundwater monitoring networks and partners with the USGS for additional ongoing monitoring. The resulting data are archived in DBHYDRO, the SFWMD's corporate environmental database (www.sfwmd.gov/dbhydro).

Districtwide groundwater monitoring activities related to the LKB Planning Area include:

- **USGS Contract for Water Level Monitoring –** An ongoing effort to collect data from groundwater level monitoring. The project includes well and recorder maintenance as well as archiving data in the USGS database for sites throughout the District.
- **Groundwater Monitoring –** An ongoing effort to monitor groundwater levels in all water supply planning areas of the SFWMD. As of 2012, Districtwide monitoring includes 760 groundwater stations for the SAS, IAS, and FAS. Data are collected, analyzed, validated, and archived in DBHYDRO.
- **Regional FAS Exploration and Well Maintenance –** Water level and water quality monitoring is ongoing at 61 FAS well sites Districtwide. Well maintenance is conducted as needed. Data are collected, analyzed, validated, and archived in DBHYDRO.
- **Hydrogeologic Database Improvements –** Backlogged data are being uploaded and miscellaneous database corrections are being made.

- **Monthly Groundwater Level Measurements** – Continued water level monitoring at select sites, including data collection, data analysis, and validation to supplement the existing groundwater level network.

Portion of Central and Southern Florida Project

The SFWMD's history and functions are closely linked to water resource development activities. District responsibilities include managing and protecting the water resources of South Florida by balancing and improving water quality, flood control, natural systems, and water supply.

WATER QUALITY AND STORAGE PROJECTS

Shallow water retention projects provide local groundwater recharge, opportunities for water quality improvement, storage for excess flows, and rehydration of drained systems. While these projects are not constructed for water supply development, there are potential benefits towards offsetting seasonal impacts to water sources. The following summarizes these projects in the LKB Planning Area.

Dispersed Water Management

Since 2005, the SFWMD has been working with a coalition of governmental agencies, environmental organizations, ranchers, and researchers to enhance opportunities for storing excess surface water on private and public lands. Over the years, these partnerships have made thousands of acre-feet of water retention and storage available throughout the Greater Everglades system. The effort is known under a number of names including Dispersed Water Management (DWM), Northern Everglades Payment for Environmental Services (NE-PES), and the Florida Ranchlands Environmental Services Project (FRESP). These programs encourage property owners to retain water on their land rather than drain it, accept and detain regional runoff, or do both. Managing water on these lands reduces wet-season water flow into Lake Okeechobee and subsequent discharge to coastal estuaries.

These projects are constructed to improve water quality and attenuate water releases and are not constructed with the purpose of water supply development. Project locations are displayed in **Figure 15** and more information can be found at www.sfwmd.gov/storage.

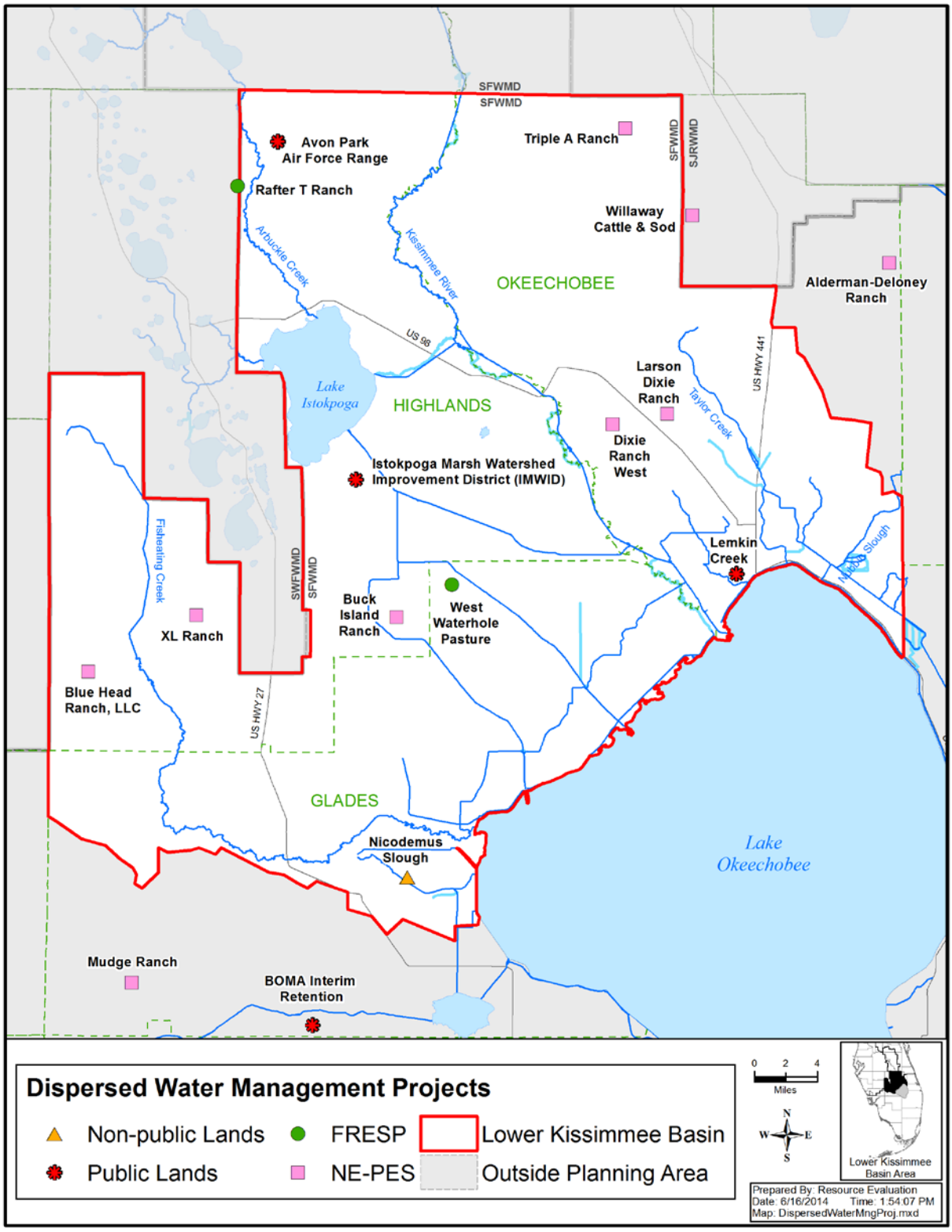


Figure 15. Dispersed Water Management projects.

Florida Ranchlands Environmental Services Project

FRESP is a program in which ranchers in the Northern Everglades are compensated for providing water retention, total phosphorus load reduction, wetland habitat expansion, or other environmental services. This program is a collaboration among the World Wildlife Fund, participating ranchers, USDA-NRCS, FDACS, SFWMD, and FDEP. A number of original FRESP pilot projects have been converted to NE-PES projects. There are two remaining participants in the LKB Planning Area during FY 2014.

Northern Everglades – Payment for Environmental Services

Based on the success of the FRESP pilot projects, the NE-PES program was developed as a partnership between water managers and private landowners to achieve water storage, water quality, and habitat improvement benefits in the Northern Everglades. The first eight NE-PES projects were approved by the District Governing Board in 2011 and two additional projects were approved in 2013.

Water management on Dixie Ranch

SUMMARY

Water resource development projects are intended to ensure the availability of an adequate supply of water. The SFWMD expanded groundwater monitoring and testing efforts, completed hydrogeologic studies, conducted groundwater modeling, and implemented outreach and educational programs to encourage efficient use of water resources in the LKB Planning Area through conservation and reuse. Additionally, the District performed studies, such as the Supply Cost Estimation Study to determine the viability of water resource development options to increase water supply through water resource alternatives. Due to severe budget constraints, funding for future water resource development projects is generally limited to staff time. As funds become available, projects will be prioritized based on the needs at the time. Past and future benefits of the water resource development projects reviewed in this chapter include:

- Improved understanding of the hydrogeology and water availability of the region
- Increased future supply availability
- Preservation of existing supplies through better understanding, management, and continued monitoring of resources
- Prevention of the loss of the natural system
- Coordination with other agencies and stakeholders to exchange hydrogeologic knowledge and data

5

Evaluation of Water Source Options

TOPICS

This chapter presents an overview of water supply options and water conservation measures available within the Lower Kissimmee Basin (LKB) Planning Area through 2035. Relatively small growth in water demands is projected for the area over the planning horizon. Because traditional water resources, such as surface water and, to a smaller degree, groundwater, in the basin are limited, alternative sources are identified and discussed in this chapter. Some examples of alternative or nontraditional sources include brackish groundwater, new storage capacity (aquifer storage and recovery and reservoirs), reclaimed water, and storm water for consumptive uses. These options may make additional water available from historically used sources by providing improved management of the resource, or there may be a previously undeveloped or underutilized source of water in the region. Information is provided for the following options:

- Surface water
- Groundwater
- Reclaimed water
- New storage capacity

To evaluate the water source options, consideration must be given to several factors. These include future water needs, source availability, water quality requirements for the intended uses, and cost. Water use within the LKB Planning Area is expected to increase from approximately 192 million gallons per day (MGD) in 2010 to more than 222 MGD by 2035. **Chapter 2** summarizes the gross water demand for each water use category.

WATER SOURCES

The evaluations of water source options are made within the context of the issues identified in **Chapter 3**. In this chapter, each water supply option includes a brief discussion on the availability of the resource and potential impacts to the natural systems. The *2011–2014 Water Supply Plan Support Document* (Support Document) contains detailed information on aquifers and aquifer yield specific to the LKB Planning Area as a whole (Chapter 7), water source options including water conservation and related costs (Chapter 5), and water treatment technologies and associated costs (Chapter 6). Information about water treatment technologies is also provided in the *Water Supply Cost Estimation Study* (CDM 2007a, 2007b). These costs are not a substitute for the detailed evaluations and feasibility and design studies needed to plan and build such facilities.

Surface Water

Creeks, lakes, canals, and rivers in the Kissimmee Basin form an integrated water management system that directs surface water flow from the Upper Kissimmee Basin to the Lower Kissimmee Basin and into Lake Okeechobee. The LKB Planning Area's major surface water sources include Lake Istokpoga, Fisheating Creek, the Kissimmee River (C-38 Canal), and Taylor Creek/Nubbin Slough. All of these surface water features flow into Lake Okeechobee either directly or indirectly.

Lake Okeechobee

Lake Okeechobee provides water supply throughout the year and is critical for flood control during wet periods. The lake serves as a supplemental water supply source for agriculture when rainfall is insufficient and can be used as a backup source for agricultural areas directly adjacent to the L-59, L-60, and L-61 canals on the north and west sides of the lake during dry periods. Additionally, pumps G-207 on the C-41 Canal (Harney Pond) and G-208 on the C-40 Canal (Indian Prairie) allow for water deliveries to the Seminole Tribe of Florida's Brighton Reservation during periods of extended drought. The Okeechobee Utility Authority (OUA) is the only Public Water Supply (PWS) utility using water directly from Lake Okeechobee. Further increased withdrawals from the lake are limited due to the implementation of the 2008 Lake Okeechobee Regulation Schedule by the United States Army Corps of Engineers.

Lake Okeechobee

Lake Istokpoga

Surface water from Lake Istokpoga has traditionally been used to meet irrigation demands within the Indian Prairie Basin, which is between Lake Istokpoga and Lake Okeechobee in Highlands and Glades counties. Water is delivered via the S-68 Structure to the C-41A Canal and then distributed to the C-39A, C-40, and C-41 canals. The Istokpoga Marsh Watershed Improvement District receives water directly from Lake Istokpoga. Water flows into Lake Istokpoga from the Arbuckle Creek watershed to the north and the Josephine Creek watershed, which includes areas within the Southwest Florida Water Management District (SWFWMD).

Historically, water availability was limited by storage issues and the conflicts inherent in managing surface waters for flood control. This caused numerous temporary water shortages in the basin. As a result, the Indian Prairie Basin area was designated a restricted allocation area (see **Chapter 3**), which limits the use of surface water resources over and above existing conditions (SFWMD 2014a). In recent years, some permittees have increased use from Floridan aquifer wells as groundwater is a more reliable source of water during extended dry periods.

Fisheating Creek

Fisheating Creek is the second largest natural water source for Lake Okeechobee. Much of the land surrounding the creek is publicly owned or under conservation easements. The lower reach of the creek remains in a largely natural state. Plans are under way to restore the upper section. Past efforts in the basin have focused on improving water quality by reducing total phosphorus loads going into Lake Okeechobee. Mutually beneficial water quality and water supply opportunities might be achieved from the construction of stormwater runoff storage areas identified as part of the Fisheating Creek Feasibility Study (see **Chapter 4**). The development of these storage areas is not expected to begin for several years and the potential for water supply opportunities will be reviewed at that time.

Fisheating Creek

Kissimmee River

The Kissimmee Basin south of the S-65 Structure on Lake Kissimmee encompasses approximately 670 square miles and represents, along with inflows from the Upper Kissimmee Basin, approximately 50 percent of the surface water flow into Lake Okeechobee (SFWMD, FDEP, and FDACS 2011). This basin forms the headwaters of Lake Okeechobee

and the Everglades, and is identified as the Northern Everglades portion of the South Florida Water Management District (SFWMD or District).

The Kissimmee River Restoration Project is a large-scale, multi-phased, ecosystem restoration effort. The project aims to reestablish the river/floodplain system's ecological integrity while maintaining existing flood protection. To achieve these goals, additional water storage will be generated in the headwater lakes of Kissimmee, Cypress, and Hatchineha through regulation schedule modifications needed to approximate the system's historical inflows to the river. The regulation schedule modifications also will increase the quantity and quality of shoreline habitat in the three headwater lakes for the benefit of fish and wildlife. When fully implemented, the project is expected to require water to be stored in and released from the Kissimmee Chain of Lakes and its tributaries as part of a management strategy for balancing flood control and environmental restoration.

The SFWMD began technical work to establish a water reservation for the Kissimmee Basin in 2008. Ecologic and hydrologic analyses were conducted and documented in the draft *Technical Document to Support Water Reservations for the Kissimmee River and Chain of Lakes* (SFWMD 2009a), which included hydrologic modeling of the Kissimmee River and its tributaries. In June 2014, the District Governing Board reinitiated rule development, to include updated analyses, and adoption of the rule is expected by December 2015.

Taylor Creek / Nubbin Slough

Taylor Creek and Nubbin Slough are interconnected and drain into Lake Okeechobee from the north and northeast. The combined basin includes three tributaries: Lettuce Creek, Henry Creek, and Mosquito Creek, which are intercepted by canals L-63, L-64 and C-59. Surface water use in the basin is primarily for agriculture including pasture and dairies. This region was identified as contributing large amounts of phosphorus to Lake Okeechobee and as such a number of stormwater treatment areas (STA) and reservoir projects are ongoing in the basin (see **Chapter 4**). The southern portions of this basin are included in the Lake Okeechobee Service Area (LOSA), which is under restricted allocation area criteria that limit additional surface water withdrawals.

Groundwater

Groundwater sources in the LKB Planning Area are fresh groundwater from the surficial aquifer system (SAS), the intermediate confining unit/intermediate aquifer system (ICU/IAS), and the Upper Floridan aquifer (UFA). Brackish water is also available from the Lower Floridan aquifer (LFA) and the portions of the UFA near Lake Okeechobee. More information about these aquifers is provided in **Chapters 1** and **3** of this document and Chapter 8 of the Support Document.

Surficial Aquifer System

The SAS has low productivity in the LKB Planning Area but is sufficient to be the major water supply source for Domestic Self-Supply (DSS). Additionally, the SAS has been used for PWS, lawn irrigation, some industrial and commercial use, and small-scale agricultural irrigation. Both the Okeechobee Utility Authority and the Seminole Tribe of Florida's Brighton Water Treatment Plant have 1.0-MGD wellfields that withdraw water from the SAS. It is anticipated that the future additional demand for DSS, lawn irrigation, and some agricultural use will be met from this source.

Intermediate Confining Unit / Intermediate Aquifer System

The ICU/IAS acts as a semi-confining unit between the SAS and FAS in the LKB Planning Area. While a few locally occurring water producing zones within the IAS exist, they generally do not produce large amounts of water. Some wells located in southern Okeechobee County and the western portions of the planning area along the Lake Wales Ridge have exhibited moderate yields due to local sand beds in the aquifer. The IAS is not seen as a largely viable source of water in the LKB region.

Floridan Aquifer System

In the LKB Planning Area, fresh groundwater from the UFA has historically been a reliable source of water for Agricultural Self-Supply (AGR) and some PWS. In the northern parts of the planning area, the UFA is generally fresh, but it becomes brackish closer to Lake Okeechobee (see **Figure 12** in **Chapter 3**). It is expected that future AGR demands will be primarily met with water from the UFA. Groundwater modeling simulations were conducted to assess the possible impacts of the estimated increases in demand through 2035 (Butler et al. 2014). As described in **Chapter 3**, results of the simulations project no additional reductions in Floridan aquifer system (FAS) levels beneath MFL lakes of concern along the Lake Wales Ridge; therefore, the risk to SWFWMD MFL recovery and prevention strategies resulting from withdrawal of the projected 2035 demand is low. Sufficient aquifer confinement is believed to exist around Lakes Istokpoga and Okeechobee that the risk of negatively impacting them through increased FAS groundwater use is minimal. Based on the analysis, it appears that supplies from the UFA are adequate to meet the projected needs within the LKB over the planning horizon. It should be noted however that there are certain risks to increasing groundwater use in the basin if the demands or the locations of the withdrawals were to change.

The LFA generally contains brackish to saline water throughout much of the Lower Kissimmee Basin; however, fresh water has been found in the northwestern portion of Highlands County close to the Lake Wales Ridge. Water derived from the brackish portions of the LFA might be useful for blending with other freshwater sources.

Reclaimed Water

Reclaimed water is water that received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility. Reclaimed water can be used for many purposes including groundwater recharge, irrigation of golf courses, residential lots, medians, agriculture, if suitable, and other green space, industrial uses such as cooling and process water, and environmental enhancement. The State of Florida's Water Resource Implementation Rule (Chapter 62-40, Florida Administrative Code [F.A.C.]) requires the Florida Department of Environmental Protection (FDEP) and water management districts to advocate and direct the use of reclaimed water as an integral part of water management programs, rules, and plans. The SFWMD requires all applicants for water use permits to use reclaimed water unless the applicant demonstrates it is not feasible.

Wastewater reuse conserves water resources and is an environmentally sound alternative to deep well injection and other traditional disposal methods. Although disposal methods will always be needed in wet periods, the use of reclaimed water during normal to dry periods minimizes wasteful disposal of water resources. In addition, reclaimed water provides an acceptable alternative to potable water for uses like irrigation, normally at a lower cost.

Currently, the OUA, Okeechobee Correctional Institute (OCI), and Sebring Airport provide reclaimed water within the LKB Planning Area. In 2010, the three utilities generated an average of 0.86 MGD of reclaimed water. Sebring Airport irrigated one small agricultural operation while most of OUA's reclaimed water (0.5 MGD) was delivered to Williamson Cattle Company to irrigate 761 acres of citrus. The remaining 0.22 MGD produced by the OUA was used at the plant for irrigation or other internal uses. In 2010, the OCI utilized 0.09 MGD of reclaimed water for spray field irrigation. The Spring Lake wastewater treatment plant, owned by the development, also produces a small amount of treated wastewater that is used to augment the golf course's irrigation supply. The capacity of the wastewater treatment plant at Spring Lake is below the 0.1 MGD reporting requirement for the FDEP inventory.

New Storage Capacity for Surface Water or Groundwater

Storage is an essential component of any water supply system that experiences fluctuations in supply and demand. Capturing excess surface water during wet conditions for use during dry periods increases the available water. In central and south Florida, two-thirds of the annual rainfall occurs in the wet season. Without sufficient storage capacity, much of this water is lost through the surface water management and flood protection systems. In the LKB Planning Area, potential types of water storage include aquifer storage and recovery (ASR) wells and reservoirs.

Aquifer Storage and Recovery

ASR is the storage of water by injecting it into an acceptable aquifer. The aquifer acts as an underground reservoir for the injected water, reducing water loss to evaporation. Available potable water, surface water, groundwater, or reclaimed water is collected during times when plentiful (typically during the wet season), treated to meet federal and state drinking water standards, and then pumped into an aquifer through a well. The water is stored for later recovery In the LKB Planning Area, most ASR systems store treated water in the FAS, where it displaces brackish water. The percent of water that is recovered depends on subsurface conditions, and the level of treatment required after storage and recovery depends on whether the water is for public consumption, irrigation, surface water augmentation, or wetland enhancement.

The volume of water made available through ASR wells depends on several local factors, such as well yield, water availability, variability in water supply and demand, and use type. Uncertainty of storage and yield capabilities and water quality characteristics present associated risks for success, but ASR provides storage for water that would otherwise be lost and represents a water supply management option for Florida's future.

To date, 36 ASR wells have been constructed within the SFWMD. A number of these are ASR pilot studies being conducted within the LKB or adjacent regions. These include the Kissimmee River ASR, Paradise Run ASR, and the L-63N Canal ASR projects. Descriptions of these projects can be found in **Chapter 4**.

Of the existing ASR wells, some are fully permitted for operation, while most are in operational testing or are inactive. A change in the primary drinking water standard for arsenic (i.e., 50 to 10 parts per billion) added uncertainty to obtaining operational ASR permits from the FDEP. Through site testing, new treatment technology, and recent changes in regulatory criteria, ASR wells are considered a viable option for providing future water supply to meet growing demands.

Local and Regional Reservoirs

Surface reservoirs can improve water quality and provide supplemental water supply for municipalities, agricultural and industrial uses, and environmental management. They store water, primarily during wet conditions, for use in the dry season. Water is typically captured and pumped from rivers or canals and stored in aboveground or in-ground reservoirs. For example, small-scale (local) reservoirs are used by individual farms to store recycled irrigation water or collect local stormwater runoff. These reservoirs may provide water quality treatment before off-site discharge. Large-scale reservoirs (regional) are used for stormwater attenuation, water quality treatment in conjunction with stormwater treatment areas, and storage of seasonally available supplies.

WATER CONSERVATION

Water conservation is an integral part of water supply planning and water resource management. For planning purposes, water conservation is considered a water source option because it reduces, defers, or eliminates the need to expand the water supply infrastructure. A blend of developing new alternative water supplies and increasing water conservation may be required to meet future water demands. Using conservation measures to decrease demands is usually the least costly option when compared to water supply development projects, which may require significant upfront investments and ongoing maintenance. This section describes water conservation opportunities, programs, and tools available to users in the LKB Planning Area.

In 2008, the District Governing Board approved the Comprehensive Water Conservation Program which covers all planning regions of the District. The overarching vision of the program is to achieve a measurable reduction in water use, inspire governments, citizens and businesses to value and embrace a conservation ethic, and serve as a model for water conservation (SFWMD 2008). Chapter 5 of the Support Document provides more information about the program.

Agricultural Irrigation

Agricultural irrigation is the largest water use sector in the LKB Planning Area and offers significant water conservation potential. The water use permitting process bases water allocations for agriculture on numerous factors including acreage, crop type, growing and irrigation methods, and site-specific parameters such as soil type and anticipated rainfall. Demand reduction must be based on those aspects that can be changed, such as irrigation and growing methods. Generally, these types of changes are expensive and require extensive planning and consideration.

Irrigation efficiency can be improved by either replacing an outdated or inefficient irrigation system or by optimizing the operation and maintenance of an existing system. The selection of a new system depends on the type of crop, soil, water source, and water availability. Reviewing irrigation scheduling (time between irrigation events and amount of water applied) may also increase efficiency. Farmers can also use soil moisture sensors to understand soil conditions for particular fields and crops and improve agricultural irrigation scheduling. Tailwater recovery, a planned system to capture and recycle water that runs off the field, may also be used to conserve irrigation water supplies. Additional information on water conservation for the agricultural use sector can be found in Chapters 4 and 5 of the Support Document.

Agricultural Best Management Practices

Agricultural best management practices (BMPs) are actions agricultural businesses can take to protect or improve water quality or quantity while maintaining or even enhancing agricultural production. The Florida Department of Agriculture and Consumer Services

(FDACS) and FDEP develop and adopt BMPs by rule for different types of agricultural operations, specific regions, or statewide. Most BMPs in the LKB are established to improve water quality; however, some contain an implicit water conservation component. For example, tailwater recovery and irrigation efficiency are BMPs identified as having implicit water conservation benefits. The District recommends agricultural users investigate and implement the BMPs appropriate for their crop type and region.

Mobile Irrigation Labs

The Mobile Irrigation Lab (MIL) is a voluntary program, supported by the water management districts, FDACS, and the United States Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS), that performs free evaluations of irrigation systems and encourages the adoption of efficient irrigation management practices that conserve water. During a MIL visit, trained technicians analyze irrigation system efficiency and make recommendations for physical and operational improvements that may include modification of irrigation systems and equipment, alteration of irrigation scheduling, and other aspects of system management. In the LKB, the Highlands Soil & Water Conservation District operates a MIL program.

Florida Automated Weather Network

The Florida Automated Weather Network (FAWN), operated by the University of Florida/ Institute of Food and Agricultural Sciences (UF/IFAS), provides weather information from locations throughout the state at 15-minute intervals. FAWN management tools provide decision support functions to growers using historical weather data and crop modeling technology to help in short- and long-term planning, thereby maximizing the efficiency of their irrigation practices. Access to FAWN is available from http://fawn.ifas.ufl.edu/data/.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program, implemented through the USDA-NRCS, provides a voluntary conservation program for farmers and ranchers. The program promotes agricultural production and environmental quality as compatible national goals. Financial and technical assistance is offered to participants to install or implement structural and management practices that address impaired water quality and conservation of water resources on eligible agricultural land.

Public Water Supply

Considerable water savings can typically be attained through conservation efforts targeting PWS users. However, unlike other planning areas in the District, the PWS use sector for the LKB does not make up a very large percentage of the region's demands. For that reason, conservation information on the PWS sector is abbreviated in this plan. A list of the conservation measures being implemented by the PWS utilities and their associated local

governments are shown on **Table 12**. Each of these measures is explained in detail in Chapters 4 and 5 of the Support Document.

Typically, PWS-sponsored water conservation programs may also support the purchase and installation of high-efficiency plumbing and irrigation fixtures. Additionally, many of the conservation measures available for PWS users are also applicable for DSS users. The SFWMD supports PWS water conservation efforts through the implementation of programs such as the Water Savings Incentive Program (WaterSIP), Water Conservation Hotel and Motel Program (Water CHAMP), and Florida Water Star program. The SFWMD also supports the Florida-Friendly Landscaping and Florida-Friendly Yard recognition programs and the United States Environmental Protection Agency (USEPA) WaterSense programs. Additionally, PWS utilities are strongly encouraged to use a water conservation planning tool, such as the Conserve Florida Water Clearinghouse's EZ Guide (EZ Guide) or the Alliance for Water Efficiency's Conservation Tracking Tool, when creating a water conservation program. Detailed descriptions and explanations of the above-mentioned programs and tools can be found in Chapter 5 of the Support Document.

Table 12. LKB PWS conservation implementation status.

Utility	Irrigation Hours Ordinance	Florida-Friendly Landscape Ordinance[a]	Ultra Low Volume Fixtures Ordinance	Rain Sensor Ordinance	Water Conservation Rate Structure	Leak Detection and Repair Program[b]	Public Education Program[c]
Highlands County							
Sebring, City of – Utilities Dept. (Sebring Airport)	Yes[d]	No	No	Yes	No	Yes	No
Spring Lake Development District[e]	Yes[f]	No	Yes	No	Yes	Yes	Yes
Okeechobee County							
Okeechobee Utility Authority[g]	Yes[d]	Yes	No	Yes	Yes	Yes	Yes

Note: Section 4.1.2, Applicant's Handbook (SFWMD 2014a) does not apply to the Brighton Reservation, which is under the jurisdiction of the Seminole Tribe of Florida.

a. Includes Xeriscape ordinances that have not been updated to reflect Florida-friendly Landscaping principles.
b. Program initiated when unaccounted for water greater than 10 percent.
c. Program can vary depending on permit requirements and other factors.
d. Upon declaration of a water shortage or water shortage emergency by the SFWMD or SWFWMD.
e. Follows Highlands County water conservation measures.
f. Follows SWFWMD year-round water conservation measures.
g. Follows Okeechobee County and/or city of Okeechobee water conservation measures.

Landscape Irrigation

Recreational and landscape water is used to irrigate parks, athletic fields, golf courses, landscaped areas (e.g., homeowner association common areas and the areas around commercial centers and office buildings), roadway medians, and cemeteries. Demand reduction is possible by employing best management and design practices and new irrigation technologies, including rain sensors or soil moisture sensors and weather-based irrigation system controllers, to maintain a high degree of water use efficiency. Properties using antiquated equipment should consider upgrading to the latest irrigation control technology and the use of Florida-friendly landscaping principles where feasible. Smaller properties may be able to incorporate the capture of storm water in rain barrels or cisterns. The deployment of mobile irrigation labs can help identify ways to improve irrigation efficiencies. Funding assistance from the SFWMD through the WaterSIP program may be available for hardware-based water use efficiency projects. Information on smart irrigation technologies, MILs, and the WaterSIP program can be found in Chapter 5 of the Support Document.

Year-Round Landscape Irrigation Conservation Measures

In March 2010, the SFWMD's Mandatory Year-Round Landscape Irrigation Conservation Measures Rule (Chapter 40E-24, F.A.C.) became effective. Within the LKB Planning Area, this rule limits irrigation of existing landscapes to two days per week in Okeechobee and Highlands counties and three days per week in Glades County. Irrigation using reclaimed water, cisterns, rain barrels, and various low-volume methods (e.g. microirrigation, container watering, and hand watering with a hose equipped with an automatic shut-off nozzle), may be used at any time. For new lawns and landscapes, additional watering days are permitted for up to 90 days following installation. For more information on this irrigation rule please refer to Chapter 4 of the Support Document.

Rule 40E-24, F.A.C. outlines the Year Round Landscape Irrigation Conservation measures adopted by the District. Glades county, which is located wholly within the District, follows the District's three-day-a-week irrigation schedule. Okeechobee and Highlands counties, which partially fall within the District, follow a two-day-a-week schedule. The two-day-a-week schedule was adopted to reflect the SWFWMD and the St. Johns River Water Management District (SJRWMD) schedules imposed for the remainder of those counties. Counties have the option of adopting their own year round irrigation rules, as long as they are equal to or more restrictive than those imposed by the SFWMD.

Golf Course Water Conservation

As of 2014, five permitted golf courses are within the boundaries of the LKB Planning Area. Golf courses are encouraged to use appropriate irrigation inhibiting technology, such as properly functioning rain sensors or soil moisture sensors, as well as some type of weather, evapotranspiration, or soil moisture-based smart irrigation technology. These types of projects may be eligible for partial funding from the Water SIP as described in Chapter 5 of the Support Document.

Industrial / Commercial / Institutional Use

While many industrial, commercial, and institutional users in the LKB Planning Area are self-supplied (i.e., draw water from either an on-site well, retention pond, canal, or even reclaimed water), some use potable utility-supplied water. The tools and programs mentioned in this chapter and Chapter 5 of the Support Document can increase efficiency and reduce wasteful use. To assist this use class in improving water use efficiency, the SFWMD published the *Water Efficiency and Self-Conducted Water Audits at Commercial and Institutional Facilities, A Guide for Facility Managers* (SFWMD 2013a). This guide assists facility managers through detailed self-conducted water use assessment procedures and potential conservation methods for the most common points of water use. The guidebook and its companion water use and savings calculators are available for download from the SFWMD's conservation webpage (www.savewaterfl.com) under Businesses.

SUMMARY

Overall, the future water demands in the LKB Planning Area can continue to be met during a 1-in-10 year drought over the planning horizon using traditional sources and existing alternative water supply projects. Certain surface water sources such as Lake Istokpoga, Lake Okeechobee, and the Kissimmee River do not have additional available water beyond their current permitted withdrawal amounts. Surface water users within the Lake Okeechobee Service Area have only a 1-in-6 year drought level of certainty. Groundwater modeling completed as part of this planning effort showed groundwater from the Upper Floridan aquifer is available to meet the projected new demands. However, new uses from the UFA may be limited near the Lake Wales Ridge due to potential influence on lake levels in the SWFWMD or in the southeast portion of the planning area where water quality becomes an issue.

6

Water Supply Development Projects

This chapter summarizes the water supply development projects anticipated to meet the water needs of the Lower Kissimmee Basin (LKB) Planning Area for the 2010–2035 planning horizon. Information on demand projections is provided for each water use category (see **Chapter 2**). Additional details about water demand projections, utility information, and local government planning information can be found in **Appendices A**, **C**, and **D**, respectively.

TOPICS

- Regional and Local Planning Linkage
- Funding
- Summary
- PWS Utility Summaries

Water users, such as utilities, local governments, and self-suppliers, including Agricultural Self-Supply and Industrial/Commercial/Institutional Self-Supply users, are primarily responsible for water supply development projects. For each Public Water Supply (PWS) utility supplying 100,000 gallons per day (0.1 million gallons per day [MGD]) or greater to its service area, a utility summary is included at the end of this chapter. The utility summaries provide population and demand projections.

The South Florida Water Management District's (District or SFWMD) water supply plans typically identify proposed sources and list proposed PWS development projects to meet future demands. However, the PWS utilities in the LKB are able to meet the projected demands through 2035 and therefore have not proposed future supply projects.

REGIONAL AND LOCAL PLANNING LINKAGE

The District's water supply planning process is closely coordinated and linked to the water supply planning of local governments and utilities. Significant coordination and collaboration throughout the water supply plan development and approval process is needed among all water supply planning entities.

Since the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update), the District has worked with staff from PWS utilities in the LKB Planning Area to evaluate the need for water supply development projects for this *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan). While additional surface water supplies are

limited in the basin, groundwater is believed to be adequate to meet all of the projected demands. For this reason, it appears that additional water supply development projects are not needed at this time.

Although comprehensive plans, facilities work plans, and consumptive use permits are prepared at different times, each use the latest and best available data. Local governments' future projects should generally be consistent among plans and permits, and meet projected water demands.

Appendix B provides information and statutory requirements relevant to local government comprehensive plans. The regional and local water supply planning process is described as follows and illustrated in **Figure 16**.

PROCESS

Regional and Local Water Supply Planning Process

The District is required to notify each PWS utility of the projects identified in this plan for that utility to consider and incorporate into its corresponding government's required 10-Year Water Supply Facilities Work Plan in meeting future water demands. This notification must occur within six months following approval of the water supply plan update. PWS utilities then must respond to the SFWMD about their intentions to develop and implement the projects identified by the plan or provide a list of other projects or methods to meet these needs (Section 373.709[8][a], Florida Statutes [F.S.]).

Within 18 months following approval of the regional water supply plan, local governments are required to adopt 10-Year Water Supply Facilities Work Plans and amendments into their comprehensive plans. The work plans contain the capital improvements element, which outlines specifics about the need for, and the location of, public facilities, principles for construction, cost estimates, a schedule of capital improvements, and other related information.

The potable water element of a local government's 10-Year Water Supply Facilities Work Plan is required by Section 163.3177(6)(c), F.S., to:

- Incorporate the water supply projects or projects selected by the local government from those projects identified in the updated regional water supply plan or proposed by the local government
- Identify water supply projects to meet the water needs identified in the updated regional water supply plan within the local government's jurisdiction
- Include a work plan, covering at least a 10-year planning period, for building public, private, and regional water supply facilities, including the development of alternative water supplies, which are identified in the potable water element to meet the needs of existing and new development

By November 15 of every year, all utilities are required to submit a progress report about the status of their water supply projects (completed, under way, or planned for implementation). By December 1 of each year, local governments are required to submit updated capital improvements project information to the Florida Department of Economic Opportunity (FDEO) and the SFWMD. **Figure 16** shows the linkage and sequence of the water supply planning process with 10-Year Water Supply Facilities Work Plans and local government comprehensive plans, beginning with the adoption of a water supply plan update.

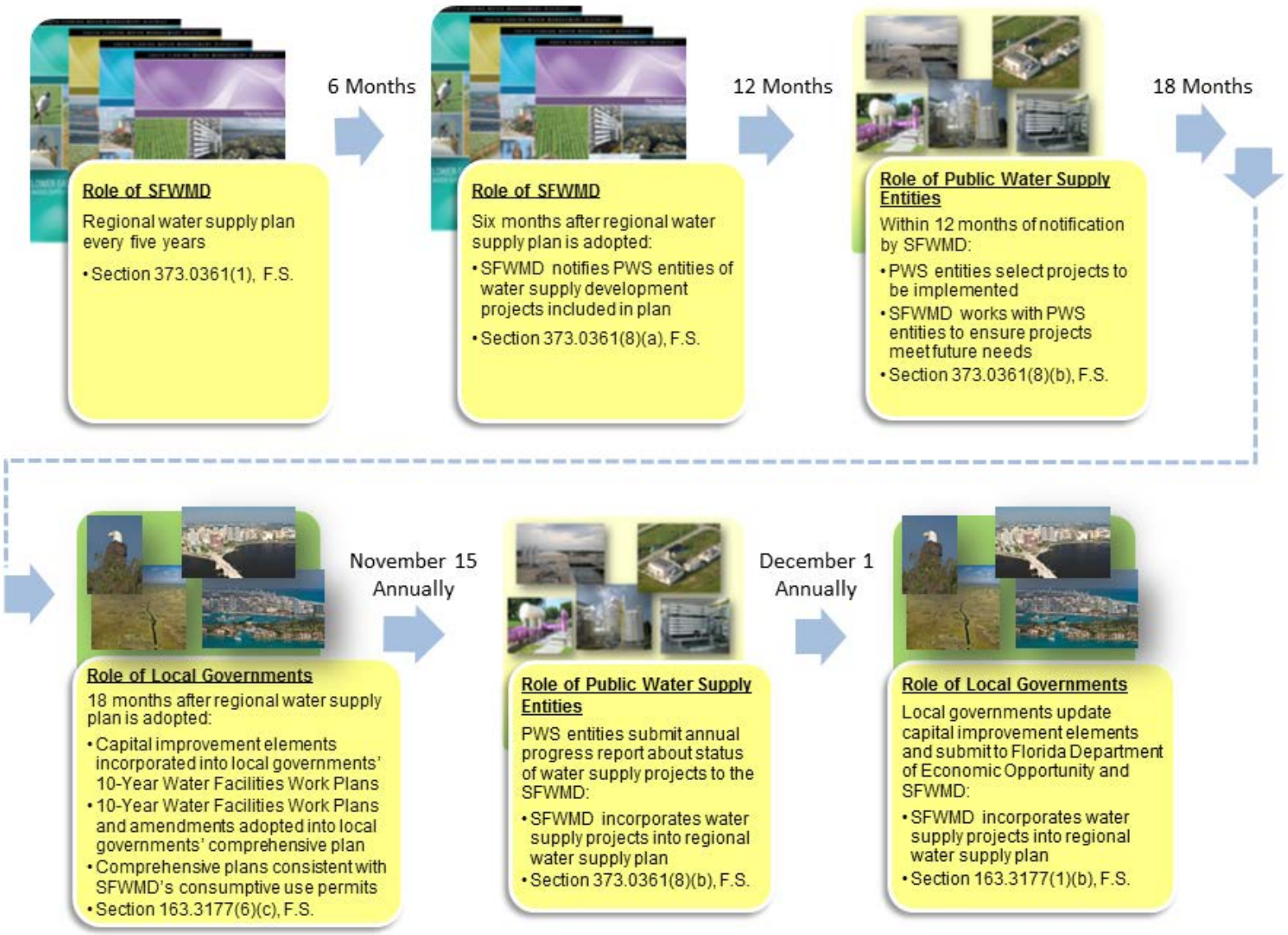


Figure 16. Linking regional water supply planning with local government comprehensive planning.

Link to Water Use Permitting

A Florida Department of Environmental Protection (FDEP) 2012 guidance memorandum addresses coordination between the SFWMD's water use permitting and water supply planning staff on projects included in water supply plans. By increasing coordination during the water supply planning process, water use permit applicants planning an identified water supply project will be assured that SFWMD staff is familiar with the projects, have supporting data, and will be able to facilitate the permitting process. While no water supply projects were proposed for this plan, projects would have been reviewed by SFWMD staff working in water use permitting and water supply planning using the following set of questions:

- Does the proposed project use a source of limited availability?
- Is the project located in a restricted allocation area?
- Is the proposed source from a minimum flows and levels (MFL) water body or is it connected, directly or indirectly, to an MFL water body? If yes, is the proposed use consistent with MFL recovery or prevention strategies?
- What other environmental water needs (e.g., Comprehensive Everglades Restoration Plan [CERP] targets, water reservations) may be impacted?
- What resource issues have been identified in recent permit applications in the general area for the same source (e.g., wetlands, saltwater intrusion, MFLs)?
- Have existing legal users of the same source had resource-related compliance issues?
- Have any new technical studies been completed related to source availability?

However, each proposed use of water must meet the conditions for permit issuance found in Section 373.223, Florida Statutes (F.S.), and the implementing criteria found in Chapter 40E-2, Florida Administrative Code (F.A.C.). Section 373.223, F.S., requires applicants to establish that the proposed use of water 1) is a reasonable-beneficial use as defined in Section 373.019, F.S., 2) will not interfere with any presently existing legal use of water, and 3) is consistent with the public interest. Water use permits are required for all water supply development projects, except for those using 100 percent seawater or reclaimed water under direct pressure or from a lined pond.

A discussion of the demand and supply conditions for each of the six major water use categories follows.

Agricultural Self-Supply

Agricultural irrigation is the largest water use in the LKB Planning Area and is projected to remain so over the planning horizon. Agricultural water use includes supplies for irrigated, commercially grown crops, including pasture grasses. Gross agricultural water demand is projected to rise from 162.5 MGD in 2010 to 185.0 MGD in 2035; an increase of 22.5 MGD or

14 percent. **Chapter 2 and Appendix A** provide more information about agricultural water use and projected demands.

The traditional water sources for irrigation in the LKB Planning Area are fresh surface water and fresh groundwater. Although total agricultural water use in the planning area is projected to rise only moderately over the planning period, the restricted allocation areas of the Indian Prairie Basin and Lake Okeechobee Service Area (LOSA) limit surface water availability from these sources. The District is also responsible for ensuring maximum reliability for delivering water to the Seminole Tribe of Florida under the Seminole Water Rights Compact. The District meets this obligation using water from both Lake Istokpoga and Lake Okeechobee. Therefore, historically available freshwater sources are expected to be in very limited supply to meet additional future demands in the Indian Prairie Basin and LOSA and additional demands are expected to be met from the Floridan aquifer system.

Development of groundwater and surface water may be feasible in some areas; however, permitting new freshwater supplies will depend on local resource conditions. Potential new water may be provided through subregional storage and the capture and recycling of storm water (stormwater retention and tailwater recovery). Groundwater appears to be adequate to meet the projected 2035 demands. Projects utilizing a combination of surface and groundwater may be practical to maximize supplies of either source. Reclaimed water is currently used in a limited manner by the Okeechobee Utility Authority (OUA) at Williamson Ranch for the irrigation of hay and citrus.

The continued and increased use of best management practices (BMPs), including water conservation, could reduce the amount of water needed to meet crop demands in average to wet years. These efforts are discussed in **Chapter 5**. In addition, the Florida Department of Agriculture and Consumer Services (FDACS) develops and adopts by rule agricultural BMPs addressing water quality and contain an implicit water conservation component. Growers who enroll in the FDACS BMP Program and implement the BMPs demonstrate their commitment to water resource protection, have a presumption of compliance with state water quality standards, and are eligible for technical and financial assistance toward meeting water resource protection goals. However, it is understood that conservation measures do not provide an additional volume of water to help meet water demands in times of drought.

Public Water Supply

Public Water Supply demand includes all potable uses served by public and private utilities with a production capacity equal to or greater than 0.1 MGD. PWS demand in the LKB Planning Area is currently met through fresh groundwater from the surficial aquifer system and Upper Floridan aquifer system, as well as surface water from Lake Okeechobee. The PWS net demand is projected to grow from 2.8 MGD in 2010 to 3.4 MGD by 2035. The projected 0.6 MGD rise is accommodated by existing consumptive use permits. No new water supply development projects are needed to meet expected demand at this time.

Utility Summaries

Individual utility summaries are presented at the end of this chapter. The summaries provide baseline information about finished water demands, existing permitted sources and allocations, completed and proposed projects that create water capacity, and other related information. Since the 2005–2006 KB Plan Update, one new water treatment plant has been constructed in the LKB. The Seminole Tribe of Florida completed the Brighton Water Treatment Plant in 2009. It is designed to supply up to 0.8 MGD to the Brighton Reservation and to the Lakeport Water Association through a bulk water sale agreement.

The population and water demands for each utility are based on the methodology and results provided in **Appendix A**. The water demand projections represent finished water per capita use rates and net water demands. These are different from raw water per capita rates and gross demands that reflect water withdrawn at the source prior to treatment. There may be significant differences in the quantity of raw and finished water delivered due to treatment process efficiencies.

This 2014 LKB Plan uses permanent population for existing demand projections. This is consistent with the methodology used by the University of Florida Bureau of Economic and Business Research for population estimates.

Maps in **Appendix C** display utility service areas. Utilities that produce less than 0.1 MGD annually were not evaluated and do not appear on the service area maps in the appendix. The populations served by these smaller utilities are included in the Domestic Self-Supply category.

Domestic Self-Supply

Domestic Self-Supply (DSS) net demands in the LKB Planning Area are projected to increase almost 25 percent from 2.1 MGD in 2010 to 2.6 MGD in 2035. DSS includes potable water from a private supply, typically a domestic well serving a private residence and utilities that produce less than 0.1 MGD. In the LKB Planning Area, DSS needs are met almost exclusively with fresh water from the surficial aquifer or Upper Floridan aquifer.

Industrial / Commercial / Institutional Self-Supply

In the LKB Planning Area, the Industrial/Commercial/Institutional Self-Supply (ICI) use category includes large plant facilities for citrus and sugar processing plants, manufacturing, and technical needs, such as concrete and biotechnology. The projected demand for this category is expected to grow from 19.5 MGD in 2010 to 23.9 MGD by 2035.

The ICI category has sufficient fresh groundwater supplies to meet future needs. However, alternative water supply options should be considered based on location and local conditions. If reclaimed water is available to meet existing and new ICI water demands, the feasibility of such opportunities will be evaluated through consumptive use permitting.

Recreational / Landscape Self-Supply

The Recreational/Landscape Self-Supply (REC) category includes irrigation for large landscaped areas, such as parks, golf courses, common areas, and cemeteries. Historically, irrigation supplies for this category include local fresh groundwater and surface water captured from canals or from ponds in stormwater management systems. In the LKB Planning Area, REC demand is projected to increase from 0.61 MGD in 2010 to 0.65 MGD by 2035. This 0.04 MGD increase in projected demand can be met, for the most part, by traditional sources. Treated wastewater is currently used in a limited manner at the Spring Lake community golf course. As additional reclaimed water becomes available its use should be evaluated and utilized where feasible.

Power Generation Self-Supply

The Power Generation Self-Supply (PWR) category in the LKB Planning Area is expected to experience minimal growth over the planning horizon. The area's major power generators have not identified plans for the construction of new facilities during the next 20 years in this region. PWR demand was 4.4 MGD in 2010 and is projected to be 6.4 MGD in 2035. Water use in this category typically has a recycling component, which should continue and perhaps gain efficiency to reduce water demands in the future.

FUNDING

Funding for water supply development and water conservation at the local level is the shared responsibility of water suppliers and users. The State of Florida and the water management districts have provided funding assistance to local water users to develop alternative water supplies and measurable water conservation programs. In most cases, funding is allocated to projects included in a region's water supply plan update. Some projects not in this 2014 LKB Plan, but consistent with the plan's goals, may also be funded. When the SFWMD deems appropriate, a plan may specifically identify the need for multijurisdictional approaches to project options based on analysis and permittable, financial, and technical feasibility. The SFWMD provides funding for alternative water supply and measurable water conservation through its Alternative Water Supply (AWS) Program and Water Savings Incentive Program (WaterSIP). Any AWS or water conservation project identified in a SFWMD Water Supply Plan or Plan Update would make that project eligible for future funding, although funding is not guaranteed. An application must be submitted and processed for the determination of an award.

Alternative Water Supply Program

Through the AWS Program between Fiscal Year (FY) 2006 and FY 2014, the District provided partial funding to LKB water users to develop alternative water supply projects for agricultural irrigation purposes. The completed projects included one reclaimed water project and five stormwater/irrigation capture projects. The reclaimed water project,

Williamson Cattle Company Expanded Reuse System from the OUA, developed 0.35 MGD of new distribution capacity in FY 2009. The stormwater/irrigation projects totaled an estimated 2.91 MGD of new capacity (**Table 13**).

Table 13. Agriculture stormwater irrigation projects supported by the AWS Program.

Project Name	County	Fiscal Year	MGD
101 Ranch 17.2 Acre Reservoir	Okeechobee	2006	0.12
101 Ranch 44 Acre Reservoir	Okeechobee	2006	0.32
DHW Sod & Cattle Stormwater Irrigation	Okeechobee	2006	0.12
Raulerson & Son Ranch Stormwater Recycling Project	Okeechobee	2007	1.15
Lippincott Farm Stormwater Recycling System	Okeechobee	2008	1.20
Total			**2.91**

Water Savings Incentive Program

The WaterSIP provides cost-share funding for projects that reduce urban water use. The SFWMD provides matching funds up to $50,000 or up to 50 percent, whichever is less, to water providers and users (i.e., cities, utilities, industrial groups, schools, hospitals, homeowners associations) for water-saving technologies. These technologies include low-flow plumbing fixtures, rain sensors, fire hydrant flushing devices, and other hardware. From FY 2006 to FY 2014, the SFWMD partially funded one project in the LKB; an allocation of $13,000 for the Highlands Soil and Water Conservation District to implement a toilet retrofit program with a potential savings of 5.5 million gallons per year.

SUMMARY

Total water demands within the LKB Planning Area, from all sources, are projected to rise by 30 MGD by 2035. Based on the evaluation undertaken for this plan, fresh groundwater and surface water supplies are believed to be adequate to meet all projected demands through the planning horizon of 2035. However, the level of certainty is reduced to a 1-in-6 year drought condition for those surface water users located within the Lake Okeechobee Service Area.

Six water utilities that distribute greater than 0.1 million gallons per day operate within the LKB Planning Area. The Okeechobee Utility Authority continues to be the largest utility in the region and is projected to serve roughly 28,000 residents by 2035. All PWS growth within the planning basin will continue to be served with existing facilities.

LAKEPORT WATER ASSOCIATION

County: Glades

Service Area: Lakeport and areas of unicorporated Glades County

Description: Lakeport Water Association, Inc. is a Florida not-for-profit corporation that operates water supply distribution facilities in the unincorporated community of Lakeport and areas of Glades County. In 2010, the Glades County Board of County Commisioners granted an exclusive franchise to the Lakeport Water Association, which set service area boundaries. Lakeport does not maintain a water treatment plant; instead, the water supply is obtained by bulk purchase from the Seminole Tribe of Florida (Tribe). The Tribe has a surficial aquifer wellfield and a water treatment plant on the Brighton Reservation. The interconnection between Lakeport and Brighton has a design capacity of 350,000 gallons per day. In 2013, a new contract was executed between the Lakeport Water Association and the Tribe authorizing up to 300,000 gallons per day of bulk water service for the next 40 years. Lakeport's utility has indicated that the community is largely built-out.

POPULATION AND FINISHED WATER DEMAND			
	Existing	**Projected**	
	2010	**2020**	**2035**
Population	1,289	1,471	1,663
Per Capita (gallons per day finished water)	58	58	58
Finished Potable Water Demands (daily average annual finished water in MGD)	**0.10**	**0.11**	**0.12**
Raw Potable Water Demands (daily average annual raw water in MGD)	**NA**	**NA**	**NA**
WATER USE (MGD)			
	Existing	**Projected**	
Potable Water Source	**2010**	**2020**	**2035**
Bulk Purchase from Seminole Tribe of Florida	0.10	0.11	0.12
Total Use	**0.10**	**0.11**	**0.12**

SEBRING AIRPORT

County: Highlands

Service Area: Sebring Airport

Description: The City of Sebring operates the water system at Sebring Airport to provide public water supply for an area of 2,141 acres. The service area is composed of non-residential commerical and industrial users. Given that the service area is non-residential in nature, population is not used as a basis for developing water use demand projections. Water demand of 0.12 MGD is estimated using guidance from the SFWMD's *Guidebook for the Analysis of Developments of Regional Impact* (SFWMD 1988). Annual water demand is projected to be constant over the planning horizon based on current information.

The airport reclaims an average 20,000 gallons of wastewater per day for use in agricultural irrigation.

The airport's water system is also integrated with the City of Sebring utility system via a 12-inch water main connecting to Sebring's Desoto City Water Plant. The water treatment system includes chlorination and high service pumping.

The Sebring Airport water use permit expires April 29, 2031. The water system's primary source is the Upper Floridan aquifer with a permitted annual allocation not to exceed 42.22 million gallons (MG) (approx. 0.12 MGD).

POPULATION AND FINISHED WATER DEMAND			
	Existing	**Projected**	
	2010	**2020**	**2035**
Population	NA	NA	NA
Per Capita (gallons per day finished water)	NA	NA	NA
Finished Potable Water Demands (daily average annual finished water in MGD)	**0.12**	**0.12**	**0.12**
Raw Potable Water Demands (daily average annual raw water in MGD)	**0.12**	**0.12**	**0.12**
SFWMD WATER USE PERMITTED (28-00139-W) ALLOCATION (MGD)			
Potable Water Source	**Existing**	**Projected**	
	2010	**2020**	**2031**
Fresh Water	0.12	0.12	0.12
Total Allocation	**0.12**	**0.12**	**0.12**
POTABLE WATER TREATMENT CAPACITY			
FDEP Permitted Capacity	**Cumulative Facility & Project Capacity (MGD)**		
	Existing	**Projected**	
	2012	**2020**	**2035**
Fresh Water	1.00	1.00	1.00
Planned Project Capacity	0.00	0.00	0.00
Total Capacity	**0.00**	**0.00**	**0.00**

SPRING LAKE IMPROVEMENT DISTRICT

County: Highlands

Service Area: Spring Lake Improvement District

Description: The 3,359-acre Spring Lake Improvement District was created in 1971. The area is primarily residential with a golf course and with some smaller commerical development. The utility services primarily single family homes and some multifamily units. The golf course is serviced by a separate water use permit (28-00533-W), which authorizes surface water from on-site lakes for supply.

Spring Lake's water use permit limits the annual allocation to 117 MG (approximately 0.32 MGD) and expires November 13, 2018. In 2010, water use was reported at 0.21 MGD.

Spring Lake's water supply comes from three Upper Floridan aquifer wells located at the water treatment plant. The water treatment plant has a treatment efficiency of 99 percent. A water loss audit conducted for the year 2012 estimated loss of 3.1 percent during distribution.

POPULATION AND FINISHED WATER DEMAND			
	Existing	**Projected**	
	2010	**2020**	**2035**
Population	3,230	3,574	4,074
Per Capita (gallons per day finished water)	65	65	65
Finished Potable Water Demands (daily average annual finished water in MGD)	**0.21**	**0.23**	**0.26**
Raw Potable Water Demands (daily average annual raw water in MGD)	**0.21**	**0.23**	**0.27**
SFWMD WATER USE PERMITTED (28-00122-W) ALLOCATION (MGD)			
Potable Water Source	**Existing**	**Projected**	
	2010	**2020**	**2035**
Fresh Water	0.32	0.32	0.32
Total Allocation	**0.32**	**0.32**	**0.32**
POTABLE WATER TREATMENT CAPACITY			
	Cumulative Facility & Project Capacity (MGD)		
	Existing	**Projected**	
FDEP Permitted Capacity	**2012**	**2020**	**2035**
Fresh Water	0.50	0.50	0.50
Planned Project Capacity	0.00	0.00	0.00
Total Capacity	**0.50**	**0.50**	**0.50**
NONPOTABLE WATER TREATMENT CAPACITY			
Reclaimed Water	0.00	0.00	0.00

OKEECHOBEE UTILITY AUTHORITY

County: Okeechobee

Service Area: City of Okeechobee and areas of unicorporated Okeechobee County

Description: The OUA has a Lake Okeechobee surface water treatment plant rated at 5.0 MGD capacity and a surficial aquifer system groundwater treatment plant with 1.0 MGD capacity. Treated water from both plants is pumped into a common water distribution system. With a combined treatment capacity of 6.0 MGD and combined permitted water use of 3.48 MGD, the OUA has existing capacity to meet projected needs through 2035.

The groundwater treatment plant uses aeration, filtration, and disinfection with an estimated treatment and distribution loss of less than 3 percent. The surface water treatment plant uses flocculation and sedimentation followed by ozonation, filtration, and disinfection. The combined losses from treatment and distribution of the two treatment systems is estimated to be 15 percent. The withdrawal from Lake Okeechobee is from five pumps on Lake Okeechobee and two pumps on the SFWMD Rim Canal. Intake structures on the lake enable access to water at surface levels down to 6.5 feet NGVD.

Since the 2005–2006 KB Plan Update, the OUA evaluated the installation of a reverse osmosis (RO) system to add capacity. The RO options were found to be cost prohibitive and in 2011 the OUA chose to seek an increased allocation from Lake Okeechobee above its base condition water use. A variance from the requirements of the restricted allocation rule was granted by the SFWMD in 2012. The following limitations to annual withdrawals were stipulated: a total of 1,269 MG (approx. 3.48 MGD) with 1,002 MG (approx. 2.75 MGD) from Lake Okeechobee and 267 MG (approx. 0.73MGD) from the surficial aquifer. The OUA water use permit expires on April 2, 2032. The OUA has no interconnections with other utilities.

The OUA operates one wastewater treatment plant that has the capacity to treat 1.0 MGD. Most of the treated effluent is used for agricultural irrigation. A small amount of treated effluent is disposed of via an on-site percolation pond and on-site spray irrigation. The residual is disposed of via a deep injection well. There are no plans to expand reuse at this time.

POPULATION AND FINISHED WATER DEMAND			
	Existing	**Projected**	
	2010	**2020**	**2035**
Population	22,896	25,087	28,009
Per Capita (gallons per day finished water)	84	84	84
Finished Potable Water Demands (daily average annual finished water in MGD)	**1.92**	**2.20**	**2.35**
Raw Potable Water Demands (daily average annual raw water in MGD)	**2.23**	**2.44**	**2.73**
SFWMD WATER USE PERMITTED (47-00004-W) ALLOCATION (MGD)			
	Existing	**Projected**	
Potable Water Source	**2014**	**2020**	**2032**
Fresh Water (SAS)	0.73	0.73	0.73
Fresh Water (Lake Okeechobee)	2.75	2.75	2.75
Total Allocation	**3.48**	**3.48**	**3.48**

POTABLE WATER TREATMENT CAPACITY			
	Cumulative Facility & Project Capacity (MGD)		
	Existing	Projected	
FDEP Permitted Capacity	2014	2020	2035
Fresh Water (SAS)	1.00	1.00	1.00
Fresh Water (Lake Okeechobee)	5.00	5.00	5.00
Planned Project Capacity	0.00	0.00	0.00
Total Capacity	**6.00**	**6.00**	**6.00**
NONPOTABLE WATER TREATMENT CAPACITY			
Reclaimed Water	0.85	0.85	0.85

OKEECHOBEE CORRECTIONAL INSTITUTE

County: Okeechobee

Service Area: Okeechobee Correctional Institute

Description: Okeechobee Correctional Institute (OCI) was established in 1995 and houses adult male inmates. A population of 1,900, including inmates and staff, is assumed for the planning horizon. The future projected potable water demands are expected to remain similar to the 2010 demand of approximately 0.17 MGD.

The water treatment plant has a rated capacity of 0.86 MGD and is supplied by two wells drawing from the Upper Floridan aquifer. Potable water is treated by aeration and chlorination. The permit for OCI limits groundwater use to an annual allocation of 73.25 MG (approx. 0.2 MGD) and expires January 15, 2015.The facility has its own wastewater treatment plant with effluent disposal through an on-site spray field. There is an additonal facility, the Okeechobee Work Camp, that uses surface water from lakes to irrigate agricultural fields under a separate permit (47-01052-W).

POPULATION AND FINISHED WATER DEMAND			
	Existing	**Projected**	
	2010	**2020**	**2035**
Population	1,900	1,900	1,900
Per Capita (gallons per day finished water)	NA	NA	NA
Finished Potable Water Demands (daily average annual finished water in MGD)	**0.17**	**0.17**	**0.17**
Raw Potable Water Demands (daily average annual raw water in MGD)	**0.17**	**0.17**	**0.17**
SFWMD WATER USE PERMITTED (47-00421-W) ALLOCATION (MGD)			
	Existing	**Projected**	
Potable Water Source	**2010**	**2020**	**2030**
Fresh Water	0.20	0.20	0.20
Total Allocation	**0.20**	**0.20**	**0.20**
POTABLE WATER TREATMENT CAPACITY			
	Cumulative Facility & Project Capacity (MGD)		
	Existing	**Projected**	
FDEP Permitted Capacity	**2012**	**2020**	**2035**
Fresh Water	0.86	0.86	0.86
Planned Project Capacity	0.00	0.00	0.00
Total Capacity	**0.86**	**0.86**	**0.86**
NONPOTABLE WATER TREATMENT CAPACITY			
Reclaimed Water	0.20	0.20	0.20

BRIGHTON SEMINOLE INDIAN RESERVATION

County: Glades

Service Area: Brighton Seminole Indian Reservation and the unincorporated community of Lake Port.

Description: The Brighton Seminole Indian Reservation operates the Brighton Water Treatment Plant to supply potable water to users within the Brighton Reservation and to the neighboring community of Lakeport. The Seminole Tribe of Florida maintains a bulk water user agreement with Lakeport Water Association, Inc. for supply of up to 300,000 gallons of finished potable water a day. The Brighton water delivery represents the sole source for the Lakeport service area.

The Brighton Water Treatment Plant was completed in 2009 to replace a leased off-site wellfield and water treatment plant. The Brighton Water Treatment Plant, and its associated wellfield, are located on the Brighton Seminole Indian Reservation and are operated under authorizations provided in the Water Rights Compact Among the Seminole Tribe of Florida, the State of Florida, and the South Florida Water Management District (Second Amendment to the Seventeenth Annual Work Plan). Once the new treatment facility became operational, the Seminole Tribe of Florida ceased utilization of the leased water treatment plant and withdrew the related water use permit (22-00183-W).

The Brighton Water Treatment Plant's water source consists of eight wells constructed in the surficial aquifer system. The wellfield is designed to produce up to 1 MGD. The treatment train at the plant consists of coagulation, microfiltration, and nanofiltration. The filtration reject water is blended with surface water and disposed of via a sprayfield near the plant. The plant's design capacity is for an annual average demand of 0.4 MGD and maximum daily production of 0.8 MG. In 2010, the Brighton Water Treatment Plant produced 0.41 MGD finished potable water from 0.46 MGD raw water from the wellfield. Approximately one quarter of the total finished water produced in 2010 was delivered to the Lakeport Water Association.

7

Future Direction

This chapter summarizes the future direction for water supply in the Lower Kissimmee Basin (LKB) Planning Area. The changes in water demand predicted in this *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan) remain consistent with those changes that were identified in the *2005–2006 Kissimmee Basin Water Supply Plan Update*. Water demand is expected to increase by about 30 million gallons per day (MGD) in the planning area by 2035, primarily due to the robust agricultural industry.

Fishing in the Restored Kissimmee River

Analyses conducted during this plan indicate there are sufficient sources of water to meet the 2035 projected demands despite limitations in water availability since the previous plan. Meeting the 1-in-10 level of certainty for those surface water users located within the Lake Okeechobee Service Area (LOSA) portion of the planning area is not possible within the next five years due to the interrelationship of the federal and state projects outlined in this plan and operations of Lake Okeechobee under the 2008 Lake Okeechobee Regulation Schedule (2008 LORS). The South Florida Water Management District (SFWMD or District) anticipates any additional water from Lake Okeechobee resulting from operational changes or a revised regulation schedule could return the lake from minimum flow and level (MFL) recovery to prevention status, enhance the level of certainty to existing permitted users, and support other environmental objectives.

Rehabilitation of the Herbert Hoover Dike by the United States Army Corps of Engineers (USACE) is important for protection of the citizens living near the lake and completing the project in part or wholly may enable revision of the lake operating schedule. Meeting the future surface water needs of the LOSA area depends on utilizing the flexibility within the 2008 LORS as incremental dam safety improvements are completed; and in the longer term, completion of the seepage berm construction or equivalent repairs to the Herbert Hoover Dike for Reaches 1, 2, and 3 by the USACE and implementation of a new Lake Okeechobee regulation schedule.

The guidance offered in this plan should be considered in developing water supply options to meet future needs. Statutory requirements, existing conditions, resource constraints (including protection tools and criteria), and the needs of all water users are addressed. Because there are sufficient traditional sources of water in the region to meet 2035 projected demands, no water supply projects were proposed by water users in the region (some permittees have planned additional wells that were approved in their water use permit). However, all water users are encouraged to continue to be prudent with water use decisions and use water efficiently. The SFWMD's future direction for water supply planning in the LKB Planning Area recommends continued coordination with agricultural stakeholders, utilities and other water users, natural resource protection, and continued monitoring to develop responses to changes in water levels or water quality in surface water and groundwater.

WATER SOURCES

The LKB Planning Area traditionally has relied on surface water from Lakes Istokpoga and Okeechobee and their connected canals and fresh groundwater from the surficial aquifer system (SAS) and Floridan aquifer system (FAS) as the primary water sources for Agricultural Self-Supply (AGR), Public Water Supply (PWS), and other urban and industrial uses. It is anticipated that these uses will continue. The limitations on surface water sources in this basin will require additional reliance on groundwater for new supplies.

While projected increases in water demands are not large, a steady-state groundwater model was used to simulate the changes between the 2010 and 2035 demands and provide insight on water levels in the Floridan aquifer system. Of particular concern were the MFL lakes in the Lake Wales Ridge area of the Southwest Florida Water Management District (SWFWMD). Results of the groundwater simulations indicate that Floridan aquifer levels beneath those lakes currently in prevention or recovery status will not be reduced as a result of the 2035 projected demands. Therefore, the risk of the increased demands of the LKB Planning Area adversely impacting the SWFWMD's recovery and prevention strategies is considered low.

Restricted allocation area criteria limit future additional withdrawals from Lake Okeechobee and Lake Istokpoga and the hydraulically connected canals. These criteria provide important protection to the existing legal users in the restricted allocation areas. In the Lake Istokpoga–Indian Prairie Basin area, existing legal users are provided assurances that their water supplies will not be interrupted during 1-in-10 year drought conditions. However, as stated above, in the LOSA, the current level of certainty is for 1-in-6 year drought conditions.

Water storage features such as reservoirs, aquifer storage and recovery, and impoundments can be used to capture storm water, groundwater, and surface water during wet weather periods and provide supplemental water supply for AGR, PWS, natural systems, and other needs. Conservation is an important component in integrated water resource management and may reduce, defer, or eliminate the need to expand the water supply infrastructure.

Reclaimed water can be used to meet new uses or replace traditional freshwater sources currently used for irrigation or industrial purposes but its availability in the LKB Planning Area is very limited.

The SFWMD offers recommendations and guidance in the following sections for consideration by local governments, utilities, agricultural entities, other water users, and SFWMD water supply managers and staff as a basis for the future direction of water supply planning in the LKB Planning Area.

Groundwater

Surficial Aquifer System

At current use rates and locations, water levels in the SAS appear to be stable. The potential use of the SAS is projected to be minor and new uses will be evaluated on an application-by-application basis through the District's consumptive use permitting process. The following actions are recommended:

- All local water users are encouraged to coordinate with the SFWMD to determine if the SAS is an appropriate source for their intended use.
- Design of well/wellfield locations, configurations, and pumping regimes should maximize withdrawals while avoiding harm to natural systems or pollution sources as demonstrated through modeling that meets water use permitting criteria.

Floridan Aquifer System

The FAS is typically productive in the LKB Planning Area and expected to be the primary source to meet the 2035 demands. While generally fresh, the upper portions of the FAS become brackish as the point of withdrawal nears Lake Okeechobee. In addition, points of withdrawal in the FAS near the boundary between the District and the SWFWMD increase the potential to impact lakes along the Lake Wales Ridge. Brackish groundwater, particularly in the Lower Floridan aquifer, is not considered a limited resource in the LKB Planning Area. The following future actions are recommended:

- Brackish water from the FAS may be blended with fresh groundwater and/or surface water to produce acceptable irrigation-quality water. Blended water supplies depend on crop requirements, water sources, volume of stored water, and natural system requirements. They also require monitoring to ensure acceptable water quality.
- All local water users installing FAS wells are encouraged to collaborate with the SFWMD to gather and share hydrogeologic data. These data increase knowledge of the FAS and could be used to support future groundwater modeling efforts.
- Local water users, other agencies, local governments, and utilities are encouraged to coordinate with the SFWMD to improve ongoing water level and water quality monitoring of the FAS.

- Landowners are encouraged to plug and abandon inactive or dysfunctional FAS wells in accordance with existing rules and regulations. This will prevent loss of water via free-flowing wells and contamination of the SAS and intermediate confining unit/intermediate aquifer system with more saline water from the FAS.
- Potential FAS withdrawals located near the SWFWMD/SFWMD boundary may have limitations due to the SWFWMD's prevention and recovery strategies for the MFL lakes along the Lake Wales Ridge.
- The SFWMD should coordinate with the SWFWMD to identify the appropriate tool(s) and develop a process to assess the impacts of potential future demands on MFL lakes in the Lake Wales Ridge region. The agreement on the process will occur subsequent to SWFWMD's review of the MFLs along the Lake Wales Ridge and the completion of updates to their Southern Water Use Caution Area groundwater model.
- The SFWMD should consider transitioning the current steady-state groundwater model to a transient model.

Surface Water


Istokpoga Canal

Primary surface water sources in the LKB Planning Area include Lake Istokpoga, Lake Okeechobee, and the connected canals. Agriculture is the largest water use category in the planning area and agricultural irrigation is the primary user of surface water. Users of surface water from Lake Istokpoga and its associated canals and Lake Okeechobee and its hydraulically connected canals are subject to restricted allocation area criteria that limit increases in surface water withdrawals within the LOSA and within the Lake Istokpoga–Indian Prairie Basin. Accordingly, no additional surface water will be allocated from these areas above existing allocations (SFWMD 2014a). **Chapter 3** and the *2011–2014 Water Supply Plan Support Document* (SFWMD 2014b) provide additional detail on these rules.

The District is developing performance criteria and completing the analysis needed for a water reservation in support of the Kissimmee River Restoration Project. The Kissimmee River Basin Water Reservation was placed on the District's 2014 Priority Water Bodies List and Schedule and the District anticipates adoption of the reservation rule by December 2015. This will likely restrict future water supply from this source.

The following actions are proposed for the LKB Planning Area:

- Where appropriate, water users should look to create storage areas within their boundaries or to find outside storage areas of surface water that may be

collected in portions of the year when flood control releases are being made from Lake Istokpoga and Lake Okeechobee.

- The SFWMD will continue to implement MFL recovery and prevention strategies for Lake Istokpoga and Lake Okeechobee and update these in conjunction with future plan updates.
- USACE should complete seepage berm construction or equivalent repairs to the Herbert Hoover Dike for Reaches 1, 2, and 3 no later than 2022 and revise the Lake Okeechobee regulation schedule, as recognized in the *Final Environmental Impact Statement including Appendices A through G – Lake Okeechobee Regulation Schedule* (USACE 2007) and the *Draft Integrated Project Implementation Report and Environmental Impact Statement – Central Everglades Planning Project* (USACE and SFWMD 2013).
- Agricultural users should reduce or augment use of surface water with projects such as stormwater and tailwater recovery, the blending of brackish groundwater with fresh water where available, and more efficient water conservation practices.
- Complete development of a reservation for the Kissimmee River.

Reclaimed Water

Currently, the total amount of wastewater treated by wastewater treatment facilities in the LKB Planning Area is less than 1 MGD. All reuse of treated wastewater as reclaimed water must meet applicable requirements.

New Storage Capacity for Surface Water or Groundwater

Potential types of water storage include aquifer storage and recovery (ASR) wells, off-stream reservoirs, and surface water impoundments and ponds. The SFWMD's Dispersed Water Management Program is designed to encourage property owners to retain storm water on their land, accept regional runoff for storage, or use both options. Additional analysis will be conducted and the results will be utilized to optimize the program as more experience is gained.

Recommended actions include:

- Construction of new or retrofitted surface water storage systems for agricultural operations could provide additional supply for irrigation.
- Continue to evaluate ASR for potential application in the LKB.

Water Conservation

The implementation of robust water conservation programs throughout the LKB Planning Area offers water use savings potential to reduce future water demand. All water users are urged to implement water conservation measures to further reduce water supply needs. The following conservation-related actions are recommended:

- The District will continue to implement the 2008 Comprehensive Water Conservation Program (SFWMD 2008).
- Local governments can develop or enhance existing ordinances to be consistent with Florida-friendly landscaping provisions (Section 373.185, Florida Statutes [F.S.]).
- For users seeking alternative water supply options for surface water, projects using blended sources and tailwater/stormwater recovery systems may reduce agricultural water demand on freshwater supplies.
- Agricultural water users are encouraged to use the Florida Automated Weather Network (FAWN) irrigation tools.
- Installation of higher efficiency irrigation systems by agricultural water users is encouraged where applicable and appropriate for specific crop types.

Coordination

Coordination and collaboration throughout the water supply planning process is essential among regional, local government, and utility planning entities. Examples of coordination activities include:

- Water Supply Facilities Work Plans are due within 18 months of adoption of the 2014 LKB Plan. Local governments and utilities need to provide linkages and coordination between the 2014 LKB Plan and the local government water supply-related elements.
- Work with the Florida Department of Agriculture and Consumer Services (FDACS) and agricultural stakeholders on methodologies and data sources for future crop projections.
- Coordinate ongoing activities outside the basin with the SWFWMD, St. Johns River Water Management District (SJRWMD), and Central Florida Water Initiative (CFWI) planning efforts.
- Work with the Florida Department of Environmental Protection (FDEP) through the Lake Okeechobee Basin Management Action Plan on current and future water supply planning processes dealing with storm water, water quality, and water storage in the LKB Planning Area.

Climate Change

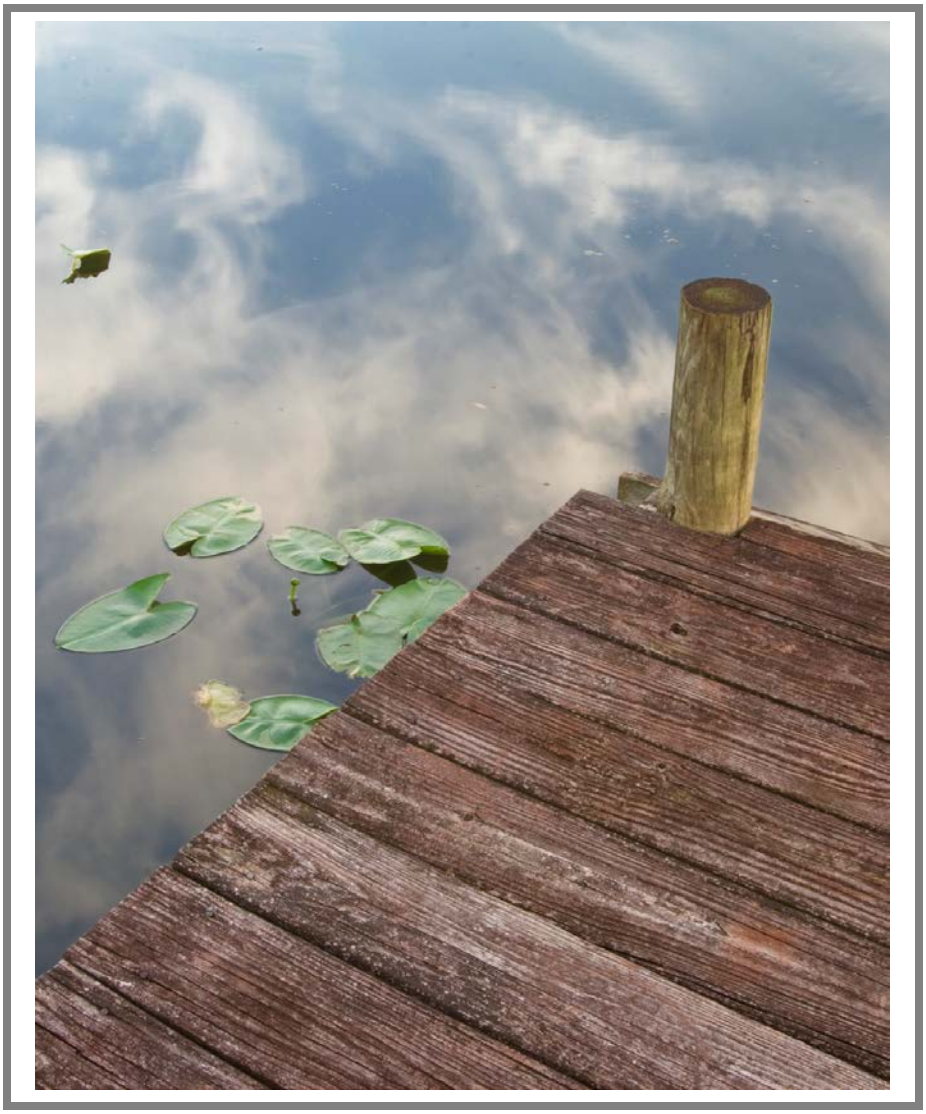
Climate change has the potential to affect hydrologic conditions, and thus water supply sources, as well as patterns of water demand. The degree of climate change in various regions and the possible impacts to those regions are highly uncertain. Despite uncertainties, the District is considering climate change phenomena and its related effect on hydrologic conditions in the water supply planning process (SFWMD 2009b). Recommendations related to climate change include:

- Because of changing weather patterns, the SFWMD should investigate the ability to extend the climate data used in modeling more often than the typical frequency of once every five years.
- The SFWMD should continue to partner with utilities, water management districts, local government representatives, and academic organizations in the Florida Water and Climate Alliance, a stakeholder-scientist partnership committed to support decision-making in water resource management, planning, and supply operations in Florida.

CONCLUSIONS

Sufficient water appears to be available to meet the 2035 projected water demand identified for the Lower Kissimmee Basin Planning Area during a 1-in-10 year drought condition. This level of certainty is reduced to a 1-in-6 year drought condition for those surface water users located within the Lake Okeechobee Service Area portion of the planning area over the next five years. The bulk of the identified projected uses are expected to utilize groundwater as their future water source. Surface water sources in the basin are limited and future use of this source may require additional water conservation or the construction of storage facilities.

Successful implementation of this 2014 LKB Plan requires close coordination with agricultural stakeholders, local governments, and utility water supply planning entities. Collaboration with stakeholders is also essential for directing the implementation of the preceding recommendations and guidance. This partnering should ensure that water resources in the LKB Planning Area continue to be prudently managed and available to meet future demand.



Glossary

1-in-10 year drought A drought of such intensity that it is expected to have a return frequency of once in 10 years. A drought in which below normal rainfall occurs and has a 90 percent probability of being exceeded over a twelve-month period. A drought event that results in an increase in water demand to a magnitude that would have a 10 percent probability of being exceeded during any given year.

Acre-foot, acre-feet (ac-ft) The volume of water that covers 1 acre to a depth of 1 foot. The equivalent of 43,560 cubic feet, 1,233.5 cubic meters, or 325,872 gallons, which is approximately the amount of water it takes to serve two typical families for one year.

Agricultural best management practice (BMP) A practice or combination of agricultural practices, based on research, field testing, and expert review, determined to be the most effective and practicable means of improving water quality or quantity while maintaining or even enhancing agricultural production.

Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) A simple water budget model for estimating irrigation demands that estimates demand based on basin-specific data. The AFSIRS model calculates both net and gross irrigation requirements for average and 1-in-10 year drought irrigation requirements. A crop's net irrigation requirement is the amount of water delivered to the root zone of the crop, while the gross irrigation requirement includes both the net irrigation requirement and the losses incurred in the process of delivering irrigation to the crop's root zone.

Agricultural (AGR) Self-Supply The water used to irrigate crops, water livestock, and for aquaculture (e.g., fish production) that is not supplied by a Public Water Supply utility.

Alternative water supply "Salt water; brackish surface water and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface water or groundwater, water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; storm water; and, any other water supply source that is designated as nontraditional for a water supply planning region in the applicable regional water supply plan" (Section 373.019, Florida Statutes).

Applicant's Handbook *Applicant's Handbook for Water Use Permit Applications* (SFWMD 2014a). Read in conjunction with Chapters 40E-2, Florida Administrative Code, the Applicant's Handbook further specifies the general procedures and information used by SFWMD staff for review of water use permit applications with the primary goal of meeting SFWMD water resource objectives.

Aquifer A geologic formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs.

Aquifer storage and recovery (ASR) The underground storage of storm water, surface water, fresh groundwater or reclaimed water, which is appropriately treated to potable standards and injected into an aquifer through wells during wet periods. The aquifer (typically the Floridan aquifer system in South Florida) acts as an underground reservoir for the injected water, reducing water loss to evaporation. The water is stored with the intent to recover it for use during future dry periods.

Aquifer system A heterogeneous body of (interbedded or intercalated) permeable and less permeable material that functions regionally as a water yielding hydraulic unit and may be composed of more than one aquifer separated at least locally by confining units that impede groundwater movement, but do not greatly affect the hydraulic continuity of the system.

Base flow Sustained flow of a stream in the absence of direct runoff. It includes natural and human-induced stream flows. Natural base flow is sustained largely by groundwater discharges.

Baseline condition A specified condition, defined by a period of measured background data or otherwise defined, that is used for comparison with subsequent data or simulated information.

Basin (groundwater) A hydrologic unit containing one large aquifer or several connecting and interconnecting aquifers.

Basin (surface water) A tract of land drained by a surface water body or its tributaries.

Below land surface Depth below land surface regardless of land surface elevation.

Central and Southern Florida Project (C&SF Project) A complete system of canals, storage areas, and water control structures spanning the area from Lake Okeechobee to the east and west coasts and from Orlando south to the Everglades. It was designed and constructed during the 1950s by the United States Army Corps of Engineers to provide flood control and improve navigation and recreation.

Comprehensive Everglades Restoration Plan (CERP) The federal-state partnership framework and guide for the restoration, protection, and preservation of the South Florida ecosystem. CERP also provides for water-related needs of the region, such as water supply and flood protection.

Confined aquifer Water-bearing stratum of permeable rock, sand, or gravel overlaid by a thick, impermeable stratum. An aquifer that contains groundwater that is confined under pressure and bounded between significantly less permeable materials such that water will rise in a fully penetrating well above the top of the aquifer. In cases where the hydraulic head is greater than the elevation of the overlying land surface, a fully penetrating well will naturally flow at the land surface without means of pumping or lifting.

Confining unit A body of significantly less permeable material than the aquifer, or aquifers, that it stratigraphically separates. The hydraulic conductivity may range from nearly zero to some value significantly lower than that of the adjoining aquifers, and impedes the vertical movement of water.

Consumptive use Any use of water that reduces the supply from which it is withdrawn or diverted.

Control structure An artificial structure designed to regulate the level/flow of water in a canal or other water body (e.g., weirs, dams).

DBHYDRO The South Florida Water Management District's corporate environmental database, storing hydrological, meteorological, hydrogeological, and water quality data.

Demand management Also known as water conservation, demand management involves reducing the demand for water through activities that alter water use practices, improve efficiency in water use, reduce losses of water, reduce waste of water, alter land management practices, and/or alter land uses.

Desalination A process that treats saltwater water to remove or reduce chlorides and dissolved solids, resulting in the production of fresh water.

Disinfection The process of inactivating microorganisms that cause disease. All potable water requires disinfection as part of the treatment process prior to distribution. Disinfection methods include chlorination, ultraviolet radiation, and ozonation.

Dissolved oxygen The concentration of oxygen dissolved in water, sometimes expressed as percent saturation, where saturation is the maximum amount of oxygen that theoretically can be dissolved in water at a given altitude and temperature.

Domestic Self-Supply (DSS) The water used by households whose primary source of water is water treatment facilities and/or private wells with pumpages of less than 100,000 gallons per day.

Drainage basin Land area where precipitation runs off into streams, rivers, lakes, and reservoirs. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. The drainage basin is a part of the earth's surface that is occupied by a drainage system, which consists of a surface stream with all its tributaries and impounded bodies of water. It is also known as a watershed, a catchment area, or a drainage area.

Drawdown (1) The vertical distance between the static water level and the surface of the cone of depression. (2) A lowering of the groundwater surface caused by pumping.

Drought A period of below average rainfall, typically longer than a few months, that adversely affects growing or living conditions.

Effective rainfall The portion of rainfall that infiltrates the soil and is stored for plant use in the crop root zone.

Effluent Treated water that is not reused after flowing out of any plant or other works used for treating, stabilizing, or holding wastes. Effluent is "disposed" of.

Environmental impact statement Required under United States environmental law by the National Environmental Policy Act for federal government agency actions "significantly affecting the quality of the human environment." It evaluates the positive and negative environmental effects of a proposed agency action.

Evapotranspiration (ET) The total loss of water to the atmosphere by evaporation from land and water surfaces and by transpiration from plants.

Exceedance (1) The violation of the pollutant levels permitted by environmental protection standards. (2) To fall below an adopted minimum flow or level criterion for a duration greater than specified for the minimum flow and level water body, as defined in Rule 40E-8.021(17), Florida Administrative Code.

Existing legal use of water A water use authorized under a SFWMD water use permit or existing and exempt from permit requirements.

Finished water Water that completed a purification or treatment process; water that passed through all the processes in a water treatment plant and is ready to be delivered to consumers.

Finished water demand (see *Net water demand*)

Fiscal Year (FY) SFWMD's fiscal year begins on October 1 and ends on September 30 the following year.

Florida Administrative Code (F.A.C.) The Florida Administrative Code is the official compilation of the administrative rules and regulations of state agencies.

Florida-Friendly Landscaping Quality landscapes that conserve water, protect the environment, are adaptable to local conditions, and are drought tolerant. The principles of such landscaping include planting the right plant in the right place, efficient watering, appropriate fertilization, mulching, attraction of wildlife, responsible management of yard pests, recycling yard waste, reduction of stormwater runoff, and waterfront protection. Additional components include practices such as landscape planning and design, soil analysis, the appropriate use of solid waste compost, minimizing the use of irrigation, and proper maintenance.

Florida Statutes (F.S.) The Florida Statutes are a permanent collection of state laws organized by subject area into a code made up of titles, chapters, parts, and sections. The Florida Statutes are updated annually by laws that create, amend, or repeal statutory material.

Floridan aquifer system (FAS) A highly used aquifer system composed of the upper Floridan and lower Floridan aquifers. It is the principal source of water supply north of Lake Okeechobee. The upper Floridan aquifer is used for drinking water supply in parts of Martin and St. Lucie counties. From Jupiter to southern Miami, water from the FAS is mineralized (total dissolved solids are greater than 1,000 milligrams per liter) along coastal areas.

Gross irrigation demand or **gross irrigation requirement** (AFSIRS model) The amount of water that must be withdrawn from the source in order to be delivered to the plant's root zone. Gross irrigation demand includes both the net irrigation requirement and the losses incurred irrigating the plant's root zone.

Gross water demand (or raw water demand) is the amount of water withdrawn from the water resource to meet a particular need of a water user or customer. Gross demand is the amount of water allocated in a water use permit. Gross or raw water demands are nearly always higher than net or user/customer water demands.

Groundwater Water beneath the surface of the ground, whether or not flowing through known and definite channels. Specifically, that part of the subsurface water in the saturated zone, where the water is under pressure greater than the atmosphere.

Harm As defined in Chapter 40E-8, Florida Administrative Code, the temporary loss of water resource functions that result from a change in surface or groundwater hydrology and takes a period of one to two years of average rainfall conditions to recover.

Headwaters (1) Water that is typically of higher elevation (with respect to tailwater) or on the controlled side of a structure. (2) The waters at the highest upstream point of a natural system that are considered the major source waters of the system.

Hydrogeology The geology of groundwater, with particular emphasis on the chemistry and movement of water.

Hydrologic condition The state of an area pertaining to the amount and form of water present.

Hydrology The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Impoundment Any lake, reservoir, or other containment of surface water occupying a depression or bed in the earth's surface and having a discernible shoreline.

Industrial/Commercial/Institutional (ICI) Self-Supply Water used by industrial, commercial, or institutional operations withdrawing a water quantity of 100,000 gallons per day or greater from individual, on-site wells.

Injection well Refers to a well constructed to inject treated wastewater directly into the ground. Wastewater is generally forced (pumped) into the well for dispersal or storage in a designated aquifer. Injection wells are generally drilled below freshwater levels, or into unused aquifers or aquifers that do not deliver drinking water.

Intermediate aquifer system This aquifer system consists of five zones of alternating confining and producing units. The producing zones include the Sandstone and Mid-Hawthorn aquifers.

Irrigation efficiency (AFSIRS Model) (1) A measure of the effectiveness of an irrigation system in delivering water to a plant for irrigation and freeze protection purposes. It is expressed as the ratio of the volume of water used for supplemental plant evapotranspiration to the volume pumped or delivered for use. (2) The average percent of total water pumped for use that is delivered to the root zone of a plant. (3) As a modeled factor, irrigation efficiency refers to the average percent of total delivered water applied to the plant's root zone.

Irrigation water use Uses of water for supplemental irrigation purposes, including agricultural lands, as well as golf courses, nurseries, recreational areas, and landscapes.

Landscape irrigation The outside watering of shrubbery, trees, lawns, grass, ground covers, vines, gardens, and other such flora, not intended for resale, which are planted and are situated in such diverse locations as residential and recreational areas, cemeteries, public, commercial and industrial establishments, and public medians and rights-of-way.

Level of certainty A water supply planning goal to assure at least a 90 percent probability during any given year that all the needs of reasonable-beneficial water uses will be met, while sustaining water resources and related natural systems during a 1-in-10 year drought event.

Million gallons per day (MGD) A rate of flow of water equal to 133,680.56 cubic feet per day, or 1.5472 cubic feet per second, or 3.0689 acre-feet per day.

Minimum flows and levels (MFL) The point at which further withdrawals will result in significant harm to water resources or ecology of the area. An MFL is established by water management districts pursuant to Sections 373.042 and 373.0421, Florida Statutes, for a given water body and set forth in Parts II and III of Chapter 373.

Mobile irrigation laboratory A vehicle furnished with irrigation evaluation equipment that is used to carry out on-site evaluations of irrigation systems and to provide recommendations on improving irrigation efficiency.

Model A computer model is a representation of a system and its operations, and provides a cost-effective way to evaluate future system changes, summarize data, and help understand interactions in complex systems. Hydrologic models are used for evaluating, planning, and simulating the implementation of operations within SFWMD's water management system under different climatic and hydrologic conditions. Water quality and ecological models are also used to evaluate other processes vital to the health of ecosystems.

National Geodetic Vertical Datum of 1929 (NGVD) A geodetic datum derived from a network of information collected in the United States and Canada. It was formerly called the "Sea Level Datum of 1929" or "mean sea level." Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific coasts, it does not necessarily represent local mean sea level at any particular place.

Natural system A self-sustaining living system that supports an interdependent network of aquatic, wetland-dependent, and upland living resources.

Net irrigation demand or **net irrigation requirement** (AFSIRS Model) The amount of water the plant needs in addition to anticipated rainfall. This is an estimate of the amount of water (expressed in inches per year) that should be delivered to the plant's root zone.

Net water demand (or user/customer water demand) is the water demand of the end user after accounting for treatment and process losses, and inefficiencies. When discussing Public Water Supply, the term "finished water demand" is commonly used to denote net demand.

Outlet An opening through which water can be freely discharged from a reservoir.

Per capita use (1) The average amount of water used per person during a standard time period, generally per day. (2) Total use divided by the total population served.

Performance measure A scientifically measurable indicator or condition that can be used as a target for meeting water resource management goals. Performance measures quantify how well or how poorly an alternative meets a specific objective. Good performance measures are quantifiable, have a specific target, indicate when a target has been reached, and measure the degree to which the goal has been met.

Permeability The capacity of a porous rock, sediment, or soil for transmitting a fluid.

Planning Area The South Florida Water Management District is divided into five areas within which planning activities are focused: Upper Kissimmee Basin, Lower Kissimmee Basin, Upper East Coast, Lower West Coast, and Lower East Coast.

Potable water Water that is safe for human consumption.

Power Generation (PWR) Self-Supply The difference in the amount of water withdrawn by electric power generating facilities for cooling purposes and the water returned to the hydrologic system near the point of withdrawal.

Process water Water used for nonpotable industrial usage, e.g., mixing cement.

Priority Water Bodies List and Schedule Section 373.042(2), Florida Statutes, requires each of the five water management districts to provide the Florida Department of Environmental

Protection an annual list and schedule of specific lakes and rivers with minimum flows and levels and water reservation rules that will be adopted to protect them from the effects of consumptive use allocations.

Public Water Supply (PWS) Water supplied by water treatment facilities for potable use (drinking quality) with projected average pumpages greater than 0.1 million gallons per day.

Rapid infiltration basin A wastewater treatment method by which wastewater is applied in deep and permeable deposits of highly porous soils for percolation through deep and highly porous soil.

Raw water (1) Water that is direct from the source—groundwater or surface water—without any treatment. (2) Untreated water, usually that entering the first unit of a water treatment plant.

Raw water demand (see *Gross water demand*)

Reasonable-beneficial use Use of water in such quantity as is needed for economic and efficient use for a purpose, which is both reasonable and consistent with the public interest.

Recharge (groundwater) The natural or intentional infiltration of surface water into the ground to raise groundwater levels.

Recharge (hydrologic) The downward movement of water through soil to groundwater; the process by which water is added to the zone of saturation; or the introduction of surface water or groundwater to groundwater storage, such as an aquifer. Recharge or replenishment of groundwater supplies consists of three types: 1) natural recharge, which consists of precipitation or other natural surface flows making their way into groundwater supplies; 2) artificial or induced recharge, which includes actions specifically designed to increase supplies in groundwater reservoirs through various methods, such as water spreading (flooding), ditches, and pumping techniques; 3) incidental recharge, which consists of actions, such as irrigation and water diversion, which add to groundwater supplies, but are intended for other purposes. Recharge may also refer to the amount of water so added.

Reclaimed water Water that received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility (Rule 62-610.200, Florida Administrative Code)

Recreational/Landscape (REC) Self-Supply Water used for landscape and golf course irrigation. The landscape subcategory includes water used for parks, cemeteries, and other irrigation applications of 0.1 million gallons per day or greater. The golf course subcategory includes those operations not supplied by a Public Water Supply or regional reuse facility.

Regional Simulation Model A regional hydrologic model developed principally for application in South Florida. It is developed on a sound conceptual and mathematical framework that allows it to be applied generically to a wide range of hydrologic situations. It simulates the coupled movement

and distribution of groundwater and surface water throughout the model domain using a hydrologic simulation engine to simulate the natural hydrology and a management simulation engine to provide a wide range of operational capability.

Restricted allocation area An area designated within the South Florida Water Management District for which allocation restrictions are applied with regard to the use of specific sources of water. The water resources in these areas are managed in response to specific sources of water in the area for which there is a lack of water availability to meet the projected needs of the region from that specific source of water (Applicant's Handbook, SFWMD 2014a).

Retrofit (1) Indoor: the replacement of existing water fixtures, appliances, and devices with more efficient fixtures, appliances, and devices for the purpose of water conservation. (2) Outdoor: **t**he replacement or changing out of an existing irrigation system with a different irrigation system, such as a conversion from an overhead sprinkler system to a micro irrigation system (Applicant's Handbook, SFWMD 2014a).

Reuse The deliberate application of reclaimed water for a beneficial purpose. Criteria used to classify projects as "reuse" or "effluent disposal" are contained in Rule 62-610.810, Florida Administrative Code. The term "reuse" is synonymous with "water reuse."

Reverse osmosis (RO) A membrane process for desalting water using applied pressure to drive the feed water (source water) through a semipermeable membrane.

Saltwater intrusion The invasion of a body of fresh water by a body of salt water due to its greater density. It can occur either in surface water or groundwater bodies. The term is applied to the flooding of freshwater marshes by seawater, the upward migration of seawater into rivers and navigation channels, and the movement of seawater into freshwater aquifers along coastal regions.

Seawater or **salt water** Water with a chloride concentration at or above 19,000 milligrams per liter (Applicant's Handbook, SFWMD 2014a).

Self-supplied The water used to satisfy a water need, not supplied by a Public Water Supply utility.

Serious harm As defined in Rule 40E-8.021, Florida Administrative Code, the long-term, irreversible, or permanent loss of water resource functions resulting from a change in surface water or groundwater hydrology.

Service area The geographical region in which a water supplier has the ability and the legal right to distribute water for use.

Significant harm As defined in Rule 40E-8-021, Florida Administrative Code, the temporary loss of water resource functions that result from a change in surface water or groundwater hydrology and takes more than two years to recover, but which is considered less severe than serious harm.

Storm water Water that does not infiltrate, but accumulates on land as a result of storm runoff, snowmelt runoff, irrigation runoff, or drainage from areas, such as roads and roofs.

Stormwater treatment area (STA) A system of constructed water quality treatment wetlands that use natural biological processes to reduce levels of nutrients and pollutants from surface water runoff.

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

Surficial aquifer system (SAS) Often the principal source of water for urban uses within certain areas of South Florida. This aquifer is unconfined, consisting of varying amounts of limestone and sediments that extend from the land surface to the top of an intermediate confining unit.

Tailwater Water that is typically of lower elevation or on the discharge side of the structure.

Treatment facility Any facility or other works used for the purpose of treating, stabilizing, or holding water or wastewater.

Turbidity The measure of water clarity caused by suspended material in a liquid.

Unconfined aquifer (1) A permeable geologic unit or units only partly filled with water and overlying a relatively impervious layer. Its upper boundary is formed by a free water table or phreatic surface under atmospheric pressure. Also referred to as water table aquifer. (2) An aquifer containing water that is not under pressure; the water level in a well is the same as the water table outside the well.

Utility Any legal entity responsible for supplying potable water for a defined service area.

Violation (MFL) As defined in Rule 40E-8.021(18), Florida Administrative Code, to fall below an adopted minimum flow or level criterion for a duration and frequency greater than specified for the MFL water body. Unless otherwise specified herein, in determining the frequency with which water flows and levels fall below an established MFL for purposes of determining an MFL violation, a "year" means 365 days from the last day of the previous MFL exceedance.

Wastewater The combination of liquid and water carried pollutants from residences, commercial buildings, industrial plants, and institutions together with any groundwater, surface runoff, or leachate that may be present.

Water budget An accounting of total water use or projected water use for a given location or activity.

Water Conservation Areas (WCAs) Part of the original Everglades ecosystem that is now diked and hydrologically controlled for flood control and water supply purposes. These are located in the western portions of Miami-Dade, Broward, and Palm Beach counties, and preserve over 1,350 square miles, or about 50 percent of the original Everglades.

Water conservation rate structure A water rate structure designed to conserve water. Examples of conservation rate structures include, but are not limited to, increasing block rates, seasonal rates, and quantity-based surcharges.

Water reservation As described in Section 373.223(4), Florida Statutes, a legal mechanism to set aside water for the protection of fish and wildlife or the public health and safety from consumptive water use. The reservation is composed of a quantification of the water to be protected, which includes a seasonal and a location component.

Water Resources Advisory Commission A commission of the South Florida Water Management District that serves as an advisory body to the Governing Board. The WRAC is the primary forum for conducting workshops, presenting information, and receiving public input on water resource issues affecting Central and South Florida.

Water resource development The formulation and implementation of regional water resource management strategies, including collection and evaluation of surface water and groundwater data; structural and nonstructural programs to protect and manage the water resources; development of regional water resource implementation programs; construction, operation and maintenance of major public works facilities to provide for flood control, surface and groundwater storage, and groundwater recharge augmentation; and related technical assistance to local governments and to government-owned and privately owned water utilities (Section 373.019, Florida Statutes).

Water Shortage Plan This effort includes provisions in Chapters 40E-21 and 40E-22, Florida Administrative Code, and identifies how water supplies are allocated to users during declared water shortages. The plan allows for supply allotments and cutbacks to be identified on a weekly basis based on the water level within Lake Okeechobee, demands, time of year, and rainfall forecasts.

Water supply development The planning, design, construction, operation, and maintenance of public or private facilities for water collection, production, treatment, transmission, or distribution for sale, resale, or end use. (Section 373.019, Florida Statutes)

Water supply plan Detailed water supply plan developed by the South Florida Water Management District under Section 373.709, Florida Statutes, providing an evaluation of available water supply and projected demands at the regional scale. The planning process projects future demand for 20 years and recommends projects to meet identified needs.

Water table The surface of a body of unconfined groundwater at which the pressure is equal to that of the atmosphere; defined by the level where water within an unconfined aquifer stands in a well.

Water use permitting The issuance of permits by the SFWMD, under the authority of Chapter 40E-2, Florida Administrative Code, allowing withdrawal of water for consumptive use.

Watershed A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water. Watersheds conform to federal hydrologic unit code standards and can be divided into subwatersheds and further divided into catchments, the smallest water management unit recognized by SFWMD operations. Unlike drainage basins, which are defined by rule, watersheds are continuously evolving as the drainage network evolves.

Wellfield One or more wells producing water from a subsurface source. A tract of land that contains a number of wells for supplying a large municipality or irrigation district.

Wetland An area that is inundated or saturated by surface water or groundwater with vegetation adapted for life under those soil conditions (e.g., swamps, bogs, and marshes).

Yield The quantity of water (expressed as rate of flow or total quantity per year) that can be collected for a given use from surface or groundwater sources.

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

2014

LOWER KISSIMMEE BASIN

Water Supply Plan

Appendices

A

Water Demand Projections

The South Florida Water Management District (SFWMD or District) completes the complex process of calculating water demand usage, estimates, and projections in coordination with stakeholder groups, other agencies, utilities, and local governments. This appendix describes the methods used to compile estimates of water demands with a 25-year planning horizon using a base year of 2010 and extending to 2035 for the Lower Kissimmee Basin (LKB) Water Supply Planning Area.

NOTE

Perceived discrepancies in table totals are due to rounding.

This appendix presents water demand assessments for the following water use categories:

- **Public Water Supply (PWS)** – Publicly or privately held utilities producing water in amounts of 0.1 million gallons per day (MGD) or greater for distribution to its customers
- **Domestic Self-Supply (DSS)** – Individual private wells and small utilities with an average flow less than 0.1 MGD
- **Industrial/Commercial/Institutional Self-Supply (ICI)** – Self-supplied water for business operations and institutional operations
- **Recreational/Landscape Self-Supply (REC)** – Water to fulfill irrigation demands for large landscaped areas, such as community and homeowner association common grounds, ball fields, parks, cemeteries, and golf courses
- **Power Generation Self-Supply (PWR)** – Water used at power plants primarily for cooling purposes
- **Agricultural Self-Supply (AGR)** – Water demands for crop irrigation and incidental uses associated with crop production

DATA SOURCES AND METHODS

In general, preparing water demand estimates and projections is highly dependent on land use activities and population growth and dispersion. For example, estimates of irrigated acreages are fundamental to projecting water supply demand for AGR, while information about existing and future projections of population are key to projecting reasonable PWS demand.

To meet the planning goal, the water supply needs of existing and future reasonable-beneficial uses are based on meeting those needs in a 1-in-10 year drought event (Section 373.709[2][a], Florida Statutes [F.S.]). The water demand estimates for 2010 and projections through 2035 are provided for each use category in five-year increments for average rainfall conditions and 1-in-10 year drought conditions in this appendix. Data sources for each category may include the Florida 2010 Census of Population and Housing (United States Census Bureau 2012), federal and state agency reports, water use permitting files, PWS utility information, and municipal planning documents. In some instances, reliable historical information or indicators of future activity and market studies were available to assist in predicting water use. The method used for each water use category is summarized in the appropriate section of this appendix.

NOTE

Average Rainfall and 1-in-10 Year Drought

An average rainfall year is defined as a year with rainfall equal to the mean annual rainfall for the period of record. A 1-in-10 year drought condition is defined as below normal rainfall with a 90 percent probability of being exceeded over a 12-month period. This means there is a 10 percent chance that less than this amount will be received in any given year. Section 373.0361(2)(a), F.S., states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event.

The water demands in the LKB Planning Area are described and analyzed in two ways, gross and net demand. Gross or raw water demand is the water allocated in a consumptive use permit, and is the volume of water withdrawn from a source. Net demand is the volume of water needed by an end user to meet their needs after deducting treatment and process water losses, and after accounting for estimated delivery system inefficiencies. Net demand is commonly referred to as finished water in a utility system.

PUBLIC WATER SUPPLY AND DOMESTIC SELF-SUPPLY

This section describes the methodology used to estimate the 2010 and projected population and PWS and DSS raw and finished water demand estimates. The approach and assumptions used for this *2014 Lower Kissimmee Basin Water Supply Plan* (2014 LKB Plan) are similar to those used for the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update).

2010 Base-Year Estimates

The year 2010 was established as the baseline demographic condition for this plan due to data available from the 2010 United States census and to maintain consistency with the SFWMD's other regional water supply plans. The Bureau of Economic and Business Research (BEBR) estimates for the 2010 permanent resident population are used as control populations for each county within the LKB Planning Area. BEBR's medium scenario population projections were used as county control values for 5-year intervals from 2015

through 2035 (BEBR 2011). These population estimates and projections are also provided in **Table A-1.**

One challenge in developing water use projections within the LKB Planning Area is that the region only covers portions of each of the three counties. Additionally, some utility service areas cross county lines and Okeechobee County is partially in the St. Johns River Water Management District. To address these complexities, the District completed a Geographic Information System (GIS) analysis using 2005 aerial photography, land use profile imaging, and census block data. The development of current and future (2035) potable water service area maps used in these efforts were coordinated with the PWS utilities. **Figure C-1** of **Appendix C** shows the utility service areas used for this analysis.

For the required 5-year incremental projections within the planning horizon of this plan, census block data from the 2010 census (U.S. Census Bureau 2012) were used as the principal means of distributing 2035 county control populations to the PWS future service areas within the LKB Planning Area. Five-year incremental projections for each PWS utility were based on a linear interpolation of the change in population from the 2010 estimates to 2035 adjusted projections. These results were shared with and reviewed by the Southwest Florida Water Management District (SWFWMD), St. Johns River Water Management District (SJRWMD), and local utility and county government staff and adjustments were made as appropriate. Residents not falling within the current utility service areas were recognized as DSS. **Table A-2** shows the results of the population distributions by county and by local utility service provider.

Table A-1. Lower Kissimmee Basin permanent population totals, 2010–2035.

County	2010	2015	2020	2025	2030	2035
LKB Glades	3,991	4,244	4,554	4,832	5,111	5,359
LKB Highlands	10,488	10,999	11,604	12,178	12,730	13,229
LKB Okeechobee	38,488	40,320	42,052	43,784	45,324	46,768
Total	**52,967**	**55,563**	**58,210**	**60,794**	**63,165**	**65,356**

Note: LKB Glades, LKB Highlands, and LKB Okeechobee in this and subsequent tables refers only to the portions of those counties that are in the Lower Kissimmee Basin Planning Area.

Table A-2. Distribution of permanent population by utility.

Utility	2010 Population	2035 Population
Lakeport Water Association	1,289	1,663
Okeechobee Utility Authority[1] (Glades Co.)	1,469	1,973
Glades County Self-Served (DSS)	1,233	1,724
LKB Glades County Total	**3,991**	**5,359**
Spring Lake Improvement District	3,230	4,074
City of Sebring (Sebring Airport)	0	0
Highlands County Self-Served (DSS)	7,258	9,155
LKB Highlands County Total	**10,488**	**13,229**
Okeechobee Utility Authority[1] (w/o Glades Co)	21,427	26,036
Okeechobee Correctional	1,900	1,900
Okeechobee County Self-Served (DDS)	15,161	18,831
LKB Okeechobee County Total	**38,488**	**46,768**
LKB Total	**52,967**	**65,356**

***Note:** Perceived discrepancies in table totals are due to rounding.

[1] OUA's service area is located in two counties: Glades and Okeechobee. To calculate OUA's population served, add the OUA's Glades and Okeechobee county populations.

Per Capita Use Rate

The per capita use rate (PCUR) expresses the total annual water use divided by the number of permanent residents. This method includes all finished water used by permanent and seasonal residents, industrial, landscaping and irrigation water from PWS, and any water losses in delivery supplied or lost by the system. PCURs were calculated using the average of reported water use from 2009 and 2010. Reported water use came from either the Florida Department of Environmental Protection (FDEP) monthly reports or the District's water compliance database. In the case of utilities within the LKB, this is the same value as water withdrawn from the source due to minimal losses in the treatment process. The PCURs for DSS within each LKB county were assumed to be the same as the state average PCUR. **Table A-3** provides the calculated PCURs for individual utilities and the resulting average water demands by utility for the 5-year increments.

Table A-3. PCURs and gross average water demand by utility within the LKB (MGD)

Facility	PCUR	2010	2015	2020	2025	2030	2035
Lakeport	58	0.07	0.08	0.09	0.09	0.10	0.10
Okeechobee Utility Authority	84	0.14	0.15	0.16	0.17	0.18	0.19
Glades County Self-Served	89	0.11	0.12	0.13	0.13	0.14	0.15
LKB Glades County Totals		**0.32**	**0.35**	**0.38**	**0.39**	**0.42**	**0.44**
Spring Lake Improvement District	65	0.21	0.22	0.23	0.24	0.25	0.26
Highlands County Self-Served	89	0.65	0.68	0.71	0.75	0.78	0.81
City of Sebring (Sebring Airport)	NA	0.12	0.12	0.12	0.12	0.12	0.12
LKB Highlands County Totals		**0.98**	**1.02**	**1.06**	**1.11**	**1.15**	**1.19**
Okeechobee Utility Authority	84	2.09	2.19	2.29	2.38	2.46	2.54
Okeechobee Correctional	NA	0.17	0.17	0.17	0.17	0.17	0.17
Okeechobee County Self-Served	89	1.35	1.42	1.49	1.56	1.62	1.68
LKB Okeechobee County Totals		**3.61**	**3.78**	**3.95**	**4.11**	**4.25**	**4.39**
LKB Public Water Supply Total		2.80	2.93	3.06	3.17	3.28	3.38
LKB Domestic Self–Supply Total		2.11	2.22	2.33	2.44	2.54	2.64
LKB Region Total		**4.91**	**5.15**	**5.39**	**5.61**	**5.82**	**6.02**

Average Rainfall and 1-in-10 Year Drought PWS Adjustments

In 1998, the SFWMD completed a Districtwide Water Supply Assessment comparing historic PWS water use during wet, dry, and average rainfall conditions. Based on this review, a general relationship was defined that characterized 1-in-10 year dry climatic conditions as requiring approximately 6 percent more water use over average conditions. Since PCURs were calculated using average conditions, a 6 percent adjustment was applied to the water use projects to address a 1-in-10 year drought condition.

INDUSTRIAL / COMMERCIAL / INSTITUTIONAL SELF-SUPPLY

This category includes self-supplied industrial, commercial, and institutional water demands not supported by a public utility. This category includes mining operations. Water supplied by utilities is included with PWS.

Projection Methodology

Demand for ICI water use is projected to change at the same rate as each county's population with minimal differences between average and 1-in-10 year drought conditions.

Currently the largest amount of ICI use in the LKB Planning Area is in Glades County for the operation of the Palmdale sand mine.

In the past few years, interest in biofuel/ethanol production has increased in the LKB Planning Area. However, given the uncertainty about when a biofuel plant may be built in the area and after conferring with stakeholders, the ICI demand projections for planning purposes do not reflect this potential future water use.

Projection Results

Table A-4 summarizes the current and projected ICI demand in the LKB Planning Area in five-year increments during the planning horizon.

Table A-4. ICI demand projections (MGD).

County	2010	2015	2020	2025	2030	2035
LKB Glades	12.1	12.7	13.2	13.8	14.3	14.9
LKB Highlands	4.6	4.8	5.0	5.2	5.4	5.6
LKB Okeechobee	2.8	2.9	3.0	3.1	3.2	3.4
Total	19.5	20.4	21.2	22.1	23.0	23.9

RECREATIONAL / LANDSCAPE SELF-SUPPLY

The REC category includes self-supplied water for large landscaped areas such are parks and cemeteries, golf course irrigation, and aquatic parks should they exist. This acreage is typically identified through consumptive use permits. Golf course growth rates and landscape acreage by county are projected separately due to the different factors influencing their expansion. Irrigation requirement estimates for average and 1-in-10 year drought events were made for both landscape and golf course irrigation using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model (Smajstrla 1990). The irrigation requirements were calculated using a representative irrigation system/rainfall station/soil type combination for each county. Recreational demands supplied by public utilities or a homeowner on a well for their potable use are included as part of the PWS and DSS demands respectively.

Projection Methodology

Landscape and golf course acres were identified using the SFWMD's water use permit data system. These data were verified and adjusted using numerous industry sources to reflect changes since the permit was issued. Estimation of future growth was made using county population growth rates, information provided by local planning officials, and golf course industry publications. Projections for landscape irrigation and golf course acreage were prepared separately and later combined for calculating water demands.

Recreational and landscape gross and net irrigation demand estimates during average and 1-in-10 year drought conditions were made using the AFSIRS Model. The net demand is the amount of supplemental water provided to the plant's (i.e., grass) root zone required for sustainable yields. Dividing the net demand by an Irrigation Efficiency Factor provides the gross demand or amount of total water withdrawn from the source. The demands are calculated using 36 years of rainfall and potential evapotranspiration data from appropriate meteorological stations. The analyses also consider soil types, runoff, irrigation methods, and strategies. Sprinkler irrigation system efficiency of 75 percent is applied to calculate recreational use. The AFSIRS model uses appropriate regional crop coefficients for sod to represent turfgrass, and also reflects actual irrigation practices for nurseries and landscape plants that are modeled based on types of irrigation systems identified within permits. Demands are calculated for each county.

Landscape

Demand projections for this section include irrigated acreage permitted for landscaping and recreation, excluding golf courses and areas addressed under PWS permits. Landscape acreage was projected to increase at the same rate as the county population through 2035. Projections for large-scale landscape self-supply acreage are summarized by county in **Table A-5**.

Table A-5. Landscape self-supply acreage.

County Area	2010	2015	2020	2025	2030	2035
LKB Glades	0	0	0	0	0	0
LKB Highlands	8	9	11	12	14	16
LKB Okeechobee	32	34	36	38	40	42
Total	**40**	**43**	**46**	**50**	**54**	**58**

Golf Courses

Golf course acreages were estimated for 2010 using the SFWMD Water Use Permit Information System and information from golf course publications, such as the golf course directory published by the National Golf Foundation, communication with local planning officials and golf course personnel, and GIS land use information.

Five golf courses are known to have existed in 2010 within the LKB Planning Area–two in Highlands County and three in Okeechobee County. The 2010 golf course acreage was 261 acres. One course at the Spring Lake development is at least partially irrigated with treated wastewater. Analysis indicates no increase in golf course development within the LKB region over the planning horizon (NGF 2013).

Projection Results

Table A-6 summarizes the projected water demands for REC through 2035. No landscape or golf course acreage was identified for the portion of Glades County within the LKB Planning Area.

Table A-6. Gross irrigation demands for REC under average rainfall and 1-in-10 year drought conditions in the LKB Planning Area.

County/Acreage/Demand	2010	2015	2020	2025	2030	2035
LKB Highlands County						
Irrigated Acreage	98	99	101	102	104	106
Net Irrigation Requirements						
Annual Based on Average Rainfall Year (20.8 in.)	0.20	0.20	0.21	0.21	0.21	0.22
Annual Based on 1-in-10 Year Drought Conditions (33.7 in.)	0.33	0.33	0.34	0.34	0.35	0.35
LKB Okeechobee County						
Irrigated Acreage	203	205	207	209	211	213
Net Irrigation Requirements						
Annual Based on Average Rainfall Year (20.3 in.)	0.40	0.41	0.41	0.42	0.42	0.43
Annual Based on 1-in-10 Year Drought Conditions (26.4 in.)	0.53	0.53	0.54	0.54	0.55	0.56
LKB Total						
Irrigated Acreage	301	304	307	311	315	319
Net Irrigation Requirements						
Annual Based on Average Rainfall Year	0.61	0.61	0.62	0.63	0.64	0.65
Annual Based on 1-in-10 Year Drought Conditions	0.85	0.86	0.87	0.88	0.89	0.91

POWER GENERATION SELF-SUPPLY

The primary use of water at thermoelectric power plants is for cooling purposes. Other water uses include boiler make-up water and ancillary needs, such as domestic-type use by employees. Currently, two power plants withdraw water within the LKB Planning Area. These are the Tampa Electric Company (TECO) Phillips Power Station in Highlands County and the Indiantown Cogeneration Plant in Martin County.

In 2010, TECO's Phillips Power Station withdrew between less than 0.1 and 0.5 MGD of fresh water for powerhouse generation and cooling purposes. Use of water at the facility fluctuates with demand, which makes it difficult to estimate future use. However, the facility is currently permitted for 1.0 MGD. Water use reported in **Table A-7** represents an estimate of potential use at the facility assuming reasonable population growth for Highlands County.

The Indiantown Cogeneration Plant relies on surface water that is withdrawn from the L-63N Canal (Taylor Creek) when the canal stage is sufficiently high. This Okeechobee County source water is transferred to the plant via a 19-mile pipeline that discharges to a 30-million gallon pond. Historic water use for plant operations has averaged approximately 4.3 MGD through 2013. To account for future power-related water demands within Okeechobee County, this 2014 LKB Plan incorporates a projected amount of surface water over the planning horizon to accommodate the Martin County plant.

Florida Power & Light (FPL) does not currently operate a facility in the LKB Planning Area, but has proposed a possible new facility for construction within the next 10 years in northeast Okeechobee County. This site is within the SJRWMD and just outside the LKB. The proposed facility is estimated to need 27 MGD of water supply for operation. Since numerous options for this potential power plant are being reviewed at by FPL, demands for this possible facility are not included nor evaluated as part of this plan.

Projection Results

Table A-7 shows that anticipated PWR water demands for the 2035 planning horizon. Power generation water demands are assumed to be the same for both average rainfall and 1-in-10 year drought conditions.

Table A-7. Estimated water needs for PWR.

County Area	2010	2015	2020	2025	2030	2035
LKB Glades	0.0	0.0	0.0	0.0	0.0	0.0
LKB Highlands	0.15	0.25	0.45	0.65	0.85	1.05
LKB Okeechobee	4.3	4.4	4.6	4.9	5.1	5.3
Total	4.4	4.6	5.1	5.5	5.9	6.4

AGRICULTURAL SELF-SUPPLY

AGR demands account for most of the water used within the LKB. The 2010 estimates indicate that agriculture accounts for 85 percent of average condition demands. In part, this accounting reflects the addition of irrigated pasture as an agricultural demand category. In past SFWMD water supply plans, this use was not specifically included in water demand projections. In the 2005–2006 KB Plan Update, agricultural acreage was projected to decrease slightly in the northern metropolitan counties and hold relatively constant in the

more rural southern counties that now comprise the LKB Planning Area. While specific crops may decline, the overall trend indicates agricultural growth in the region. Notable changes to the projected agricultural activities within the LKB Planning Area are the introduction of new strawberry, blueberry, and sorghum production. Sorghum is planned to be used as a biofuel feedstock within Highlands County.

Many commercial agricultural activities occurred during 2010 within the LKB Planning Area. In order to organize and estimate the water use associated with irrigating commercially grown crops, the types of uses were categorized into the following groups: 1) citrus, 2) other fruits and nuts, 3) vegetables, melons and berries, 4) field crops, sugarcane and sorghum, 5) sod, 6) greenhouse/nursery, 7) irrigated pasture, and 8) miscellaneous (cattle watering and aquaculture). Water uses associated with the processing and storage of the fruit and vegetables produced is considered an industrial activity and is included with ICI projections.

Projection Methodology

The District coordinated the development of agricultural acreage estimates and water demands for the LKB Planning Area with governmental agencies, agricultural stakeholders, and other industry professionals. Crop acreages were frequently developed for the entire county and then apportioned among water management districts or planning regions

Agricultural acreage was projected using historical data, available marketing information, and statistical modeling where appropriate. Where available, market information for key crops within the LKB were assessed to examine the relative supply and demand balance, price trends, and likely profit margins for growers over the planning horizon. This information was supplemented by trends in the value per acre for key crops to examine incentives for growers to plant certain crops. In addition, market indicators were compared to recent permitting activities to determine and reinforce existing market trends, crop popularity, and market signals indicated by the grower community that would support the underlying rationale for the demand projections.

Some permits indicated where key popular and relatively profitable crops were to be grown within the LKB area. Where growth in agricultural activity was identified but not limited to specific locations, the growth was distributed for the entire county and these projections apportioned to the land area under the jurisdiction of the SFWMD. Where appropriate, this was accomplished by assuming changes in acreage proportional to acreage estimates determined by aerial land use mapping using GIS in combination with District permit locations.

Estimation of Agricultural Acreages

The information used in estimating 2010 and future agricultural acreage totals was acquired from one or more of the following sources:

- The United States Department of Agriculture–National Agriculture Statistics Service (USDA-NASS 2012a, 2012b, 2013a, 2013b, 2013c, 2013d).

- SFWMD GIS agricultural land use/crop type analysis (2000 and 2005), 2008 land use/land cover maps, and the Water Use Regulatory Database
- University of Florida/Institute of Food and Agricultural Services Citrus Research and Education Center (UF/IFAS 2012)
- Florida Department of Agriculture and Consumer Services (FDACS 2013)
- United States Geological Survey (USGS 2009)
- Local agricultural extension offices
- Florida Farm Bureau and other SFWMD agricultural stakeholders
- Special reports from agencies such as the Florida Citrus Commission (2013)
- Media reports and agriculture industry publications (Glinksi 2013, Lambert and Lambert 2014)

Where data from these sources are insufficient for indicating trends and no empirical knowledge of future changes in a crop's acreage is available, the acreage for that crop category was projected to remain at its most recently reported level. The sections below discuss in more detail the information used to determine estimates for each crop type.

Agricultural water demand calculations for this 2014 LKB Plan are generated using the AFSIRS Model. The model uses soil types, growing seasons, irrigation system types, and irrigation system efficiencies. The AFSIRS Model calculates the net irrigation requirements for each crop category and irrigation system. The net irrigation requirement reflects an estimate of the amount of water (expressed in inches per year) that should be delivered to a plant's root zone. The gross irrigation requirement is the amount of water that must be withdrawn from the source and includes both the net irrigation requirement and the losses incurred irrigating the plant's root zone. Irrigation efficiency as a modeled factor refers to the average percent of total water applied that is delivered to the plant's root zone. This relationship is expressed as follows:

Gross Irrigation Requirement = Net Irrigation Requirement / Irrigation Efficiency

Gross irrigation requirements for the average rainfall and 1-in-10 year drought conditions are calculated for each crop type. Historical weather data from local rainfall stations were used to represent the average rainfall and 1-in-10 year drought conditions for each crop/county combination to calculate the irrigation requirements.

Projections of gross irrigation demands are based on an assumed or estimated irrigation system type. The most common types of irrigation systems used in central and south Florida crop production are gravity-based seepage or flood (irrigation efficiency of 50 percent), sprinkler (75 percent), and low-volume, such as micro-jet systems (85 percent). A single irrigation efficiency is calculated for each crop at the county level based on percent use of the three different irrigation systems identified in a particular use type category. The information comes from the reported type system identified in the SFWMD Water Use Regulatory Database.

Citrus Acreage Estimates

Citrus is, and is projected to remain, the largest irrigated crop grown within the LKB Planning Area. Within the LKB, citrus accounts for an estimated 32,697 acres. Forty-three percent of the citrus acres in Glades, Highlands, and Okeechobee counties are with the LKB region. **Figure A-1** shows the distribution of active citrus acres within the LKB and across the total area of the three counties.

All categories of citrus, including oranges, grapefruit, and tangerines, are included in this category for projection purposes. Historical citrus acreage data were gathered from the annual Commercial Citrus Inventory published by the United States Department of Agriculture–National Agriculture Statistics Service (USDA-NASS), in cooperation with the Florida Department of Agriculture and Consumer Services (FDACS).

Recent trends show a slowing in the rate of loss as measured by inactive acres and stabilization in acres of fruit-bearing groves. This change is in part due to intensive research into occurance and treatment of citrus greening, canker, and other diseases currently being conducted by a variety of agencies and industry groups. . **Table A-8** shows the estimated historical citrus acreage. Okeechobee, Glades, and Highlands counties steadily increased production acres from the late 1960s to the turn of the century. However, after 2000, production in these three counties leveled off or decreased slightly. **Figure A-2** shows the inactive citrus acres since 2008 for the three counties partially within the LKB.

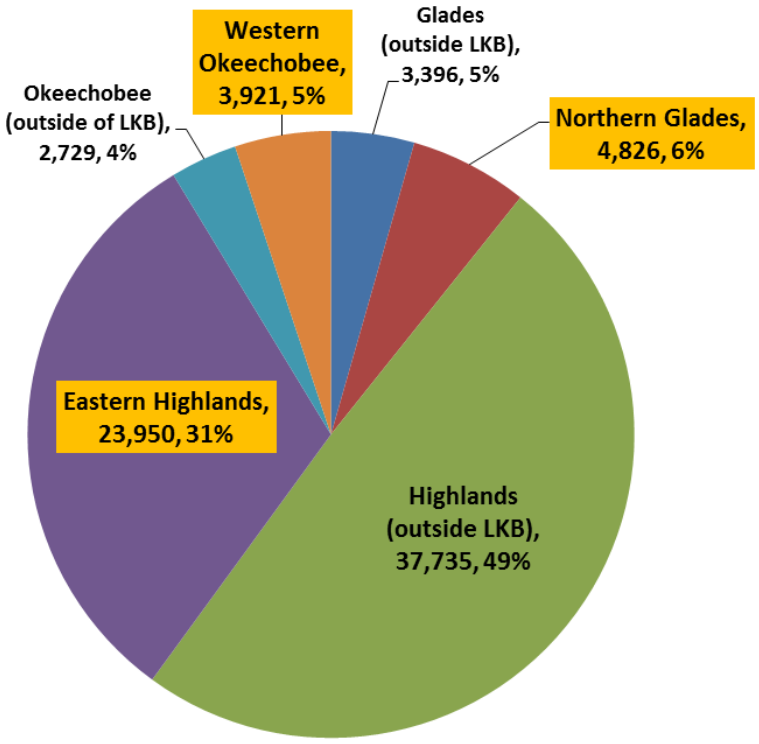

Figure A-1. 2013 citrus acres within Glades, Highlands, and Okeechobee counties (highlighted categories are within the LKB).

Table A-8. Historic citrus acreage in Glades, Okeechobee, and Highlands counties.

Year	Glades	Okeechobee	Highlands	Total
1966	1,413	2,508	37,409	41,330
1970	1,572	3,597	38,803	43,972
1974	1,661	4,087	37,996	43,744
1978	1,613	4,171	37,105	42,889
1982	4,026	6,954	37,661	48,641
1986	6,076	7,449	46,012	59,537
1990	7,523	5,541	57,048	70,112
1994	9,270	11,270	74,035	94,575
2000	10,506	12,170	78,132	100,808
2002	10,384	12,035	77,391	99,810
2004	10,103	11,891	74,623	96,617
2008	9,052	8,327	65,599	82,978
2009	9,090	7,930	62,443	79,463
2010	8,571	7,627	62,440	78,638
2011	8,433	7,079	62,301	77,813
2012	8,149	6,850	61,525	76,524
2013	8,222	6,650	61,685	76,557

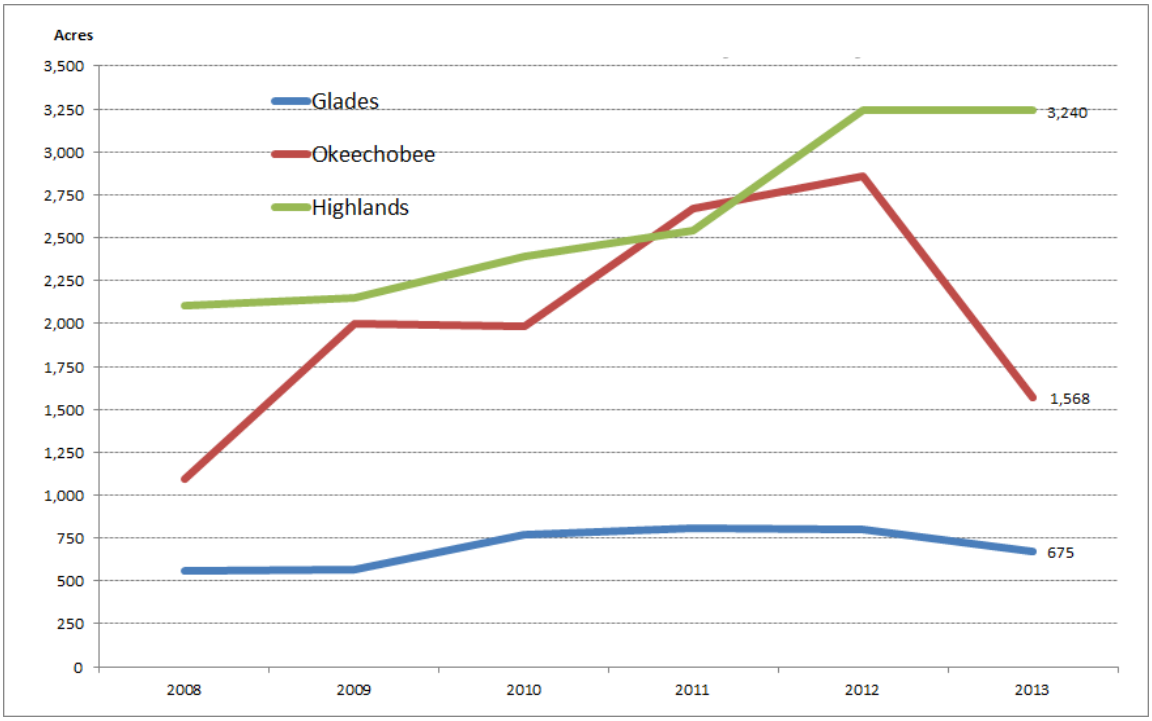

Figure A-2. Inactive citrus acres in Glades, Okeechobee, and Highlands counties (2008–2013).

The projections assume that citrus acres will remain at the current level for the portions of Glades and Okeechobee counties in the LKB Planning Area (**Table A-9**). Citrus acres in Highlands County are expected to decline by 9,300 acres (a 9,800 reduction is partially offset by 500 acres of new citrus production) to reflect the conversion of this land to grow sorghum and other feedstock for potential biofuel use. The values presented in **Table A-8** show citrus acreages by county, but the LKB Planning Area only contains a portion of each county. Therefore, GIS analysis using 2008 land use coverage was employed to allocate acres within the LKB Planning Area for each county.

Table A-9. Estimated citrus acreage within the LKB Planning Area (2010–2035).

County	2010	2015	2020	2025	2030	2035
LKB Glades	4,826	4,826	4,826	4,826	4,826	4,826
LKB Okeechobee	3,921	3,921	3,921	3,921	3,921	3,921
LKB Highlands	26,740	22,090	17,440	17,440	17,440	17,440
Total	35,487	30,837	26,187	26,187	26,187	26,187

Other Fruits and Nuts

There is believed to be no significant production of non-citrus fruit crops (e.g., avocados, mangos, and papayas) in the LKB Planning Area.

Field Crops – Vegetables, Melons, and Berries

The main crops in this category include tomatoes, peppers, squash, melons, and tropical vegetables. A small number of acres of blueberries are also identified for commercial production in Highlands County. The USDA's agriculture census did not include any information for the acreage of vegetable crop production in the LKB Planning Area (USDA-NASS 2007). Estimates for vegetables, melons, and berries were generated using 2008 land use maps and the SFWMD's water use permit database to estimate production in 2010. Vegetable and berry acreage projections were requested from agricultural stakeholders and agencies including University of Florida/Institute of Food and Agricultural Services (UF/IFAS), FDACS, and the Florida Farm Bureau.

The projections reflect a new water use permit issued in 2010 authorizing irrigation of 8,300 acres for new strawberry production in Highlands County beginning before 2015. **Table A-10** shows the estimated acreage growth from 2010 through 2035.

Table A-10. Estimated acreage for vegetable, melons, and berries.

County	2010	2015	2020	2025	2030	2035
LKB Glades	901	901	901	901	901	901
LKB Okeechobee	5,187	5,187	5,187	5,187	5,187	5,187
LKB Highlands	2,225	6,545	10,485	10,485	10,485	10,485
Total	8,313	12,633	16,573	16,573	16,573	16,573

Field Crops – Sugarcane and Sorghum

Historically, sugarcane has been the only significant field crop within the LKB and only within Glades and Highlands counties. In recent years there has been increased interest in planting sorghum for the generation of biofuels and energy production. Field crops including sorghum, rice, seed corn, and soybeans are estimated for about 14,000 acres throughout the planning area. Estimated amounts of sugarcane acreage were obtained from the USDA-NASS, the United States Geological Survey (USGS), and the District's 2005 land use maps combined with permit information for 2010. Historical sugarcane acreage was only available for Glades County and showed a stable number of harvested acreage from the mid-1980s through 2005. For this 2014 LKB Plan, acreage dedicated to sugarcane production was assumed to remain constant until 2035. Other identified field crops, including rice, corn, and soybeans, were also assumed to remain constant through 2035. The irrigation efficiency was estimated to be 50 percent in the LKB Planning Area.

The projections reflect the planting of 9,800 acres of sorghum for use as a biofuel feedstock within eastern Highlands County. The planting of this acreage is projected to be phased in and will likely be completed by 2020. **Table A-11** shows the estimated acreage from 2010 through 2035.

Table A-11. Estimated acreage of sugarcane and sorghum.

County	2010	2015	2020	2025	2030	2035
LKB Glades	11,432	11,432	11,432	11,432	11,432	11,432
LKB Okeechobee	2,084	2,084	2,084	2,084	2,084	2,084
LKB Highlands	403	4,903	10,203	10,203	10,203	10,203
Total	13,919	18,419	23,719	23,719	23,719	23,719

Sod Production

Estimates of sod acres refer to irrigated sod production within the LKB Planning Area. These estimates do not include sod harvested from pasture without irrigation. At least a small amount of irrigated sod is harvested in each of the three counties in the LKB Planning Area. Estimates of 2010 sod production were obtained from the USDA, District land use cover mapping, and estimates made by the USGS. Input on the estimates was provided by

the local UF/IFAS extension agent where possible. In all counties, the irrigation efficiency was estimated to be between 50 and 60 percent for sod irrigation.

Large changes in sod production acres are linked to the business cycle and housing activity. The District examined long-term and recent trends in sod acreage in relation to the housing market and considered potential new housing developments and activity measured by building permits. In addition, the District also considers fertilizer regulations and local ordinances that can impact plantings and acres under management. Given the current market, regulatory environment, and pace of the economic and housing recovery, the demands for sod production are expected to remain relatively constant over the planning horizon. For estimating water demands for sod production, sod acreages were kept stable and consistent with historic levels over the duration of the planning horizon. **Table A-12** shows the estimated acreages per county for 2010–2035.

Table A-12. Estimated acreage for sod.

County	2010	2015	2020	2025	2030	2035
LKB Glades	300	300	300	300	300	300
LKB Okeechobee	2,874	2,874	2,874	2,874	2,874	2,874
LKB Highlands	1,351	1,351	1,351	1,351	1,351	1,351
Total	4,525	4,525	4,525	4,525	4,525	4,525

Greenhouse/Nursery

This category includes crops grown for sale in containers, such as vegetables, herbs, fruits, berries, and garden plants. It may also include cut flowers and caladium bulbs. These plants may be grown in the open or in a nursery setting where they are the product for sale. In the 2005–2006 KB Plan Update, historical irrigated greenhouse/nursery acreage data were gathered from annual reports by the FDACS Division of Plant Industry, UF/IFAS extension offices, and water use permitting files. For this 2014 LKB Plan, information from the SFWMD water use permit database and the USDA-NASS (2007) were the primary sources to estimate greenhouse/nursery acreage. **Table A-13** shows the estimated acreage for 2010 through 2035.

Table A-13. Estimated acreage for greenhouse/nursery.

County	2010	2015	2020	2025	2030	2035
LKB Glades	300	300	300	300	300	300
LKB Okeechobee	2,295	2,350	2,406	2,463	2,522	2,582
LKB Highlands	1,014	1,107	1,204	1,302	1,399	1,496
Total	3,609	3,757	3,910	4,065	4,221	4,377

Irrigated Pasture

This plan update includes an estimate and projection of irrigated pasture. The SFWMD definition of improved pasture is any pasture with the facilities in place to carry out irrigation. The irrigated pasture acreage within the LKB was estimated from permits and is projected to remain stable over the planning horizon (**Table A-14**). The net irrigation requirement applied to estimate demands was obtained from the AFSIRS Model. There have been anecdotal reports that ranchers are also bringing livestock onto former citrus groves that have been inactive (J. Sumner, pers. comm.). These inactive citrus areas provide more opportunities for forage. With the ongoing disease strains placed on citrus groves, this trend is likely to continue over the short- to medium-term horizon.

Table A-14. Estimated acreage for irrigated pasture.

County	2010	2015	2020	2025	2030	2035
LKB Glades	21,543	21,543	21,543	21,543	21,543	21,543
LKB Okeechobee	8,715	8,715	8,715	8,715	8,715	8,715
LKB Highlands	44,503	44,503	44,503	44,503	44,503	44,503
Total	74,762	74,762	74,762	74,762	74,762	74,762

Field Crops – Other Field Crops

Other field crops in the LKB Planning Area include rice, seed corn, and soybeans, and totaled approximately 1,200 acres in 2010. Over the planning horizon from 2010 to 2035, it is anticipated that there will be only a slight net decline of 45 acres based on trends in this crop category within Glades and Okeechobee counties. The majority of field crop acreage (1,162 acres) will be retained to also support practices such as crop rotation and soil renewal in select areas (**Table A-15**). In all counties, the irrigation efficiency was calculated to be 50 percent.

Table A-15. Estimated acreage for other field crops.

County	2010	2015	2020	2025	2030	2035
LKB Glades	190	175	161	147	133	126
LKB Okeechobee	1,017	939	862	784	706	635
LKB Highlands	0	400	400	400	400	400
Total	1,207	1,514	1,423	1,331	1,239	1,162

Miscellaneous

Water required for cattle and aquaculture is included within this water use category. The water demand is calculated based on the number and type of cattle (i.e., beef or dairy) and their distribution across the service area. Demand projections for cattle watering are

assumed to be 12 gallons per head per day for beef cattle and 185 gallons per head per day for dairy cattle (35 gallons for drinking and 150 gallons for related barn washing).

The number of beef and dairy cattle is projected to remain constant in the LKB Planning Area so demands for miscellaneous cattle acreage and water are also projected to remain at the 2010 levels (**Table A-16**). As with previous Kissimmee Basin Water Supply Plans (2000 and 2005–2006), cattle numbers were obtained from the USDA-NASS.

Table A-16. Water requirements and acreage for miscellaneous – cattle watering acreage.

County/Area	Head of Beef Cattle	Head of Dairy Cattle	MGD
LKB Glades	34,000	0	0.4
LKB Highlands	57,000	6,299	1.8
LKB Okeechobee	70,000	33,000	6.9
Total	161,000	39,299	9.1

Demands associated with aquaculture (fish and aquatic plant farming) are shown in **Table A-17**. Water withdrawals are made for recirculation purposes and to replace losses to evaporation. Demands for aquaculture were determined using existing consumptive use permits. The demands are projected to remain relatively stable at the 2010 level. One new pending permit was identified at the time of drafting this plan for 20 acres of new use and so this additional demand is included in the 2035 estimate.

Table A-17. Water requirements for miscellaneous – aquaculture.

	Acres	Permitted Use Totals (MGD)	
County	2010	2010	2035
LKB Highlands	31	0.23	0.28
LKB Okeechobee	94	0.08	0.08
Total	125	0.31	0.36

Summary of Agricultural Results

The following tables summarize projected agricultural water demands and acres. The demand tables combine all crop categories. **Table A-18** shows the total gross demands for 2010 and 2035 for average rainfall year conditions. It is anticipated that by 2035, gross average demands will increase by 22.5 MGD. The change is expected to affect the portion of Highlands County in the LKB Planning Area. This net change works out to an approximate average increase of 1.1 MGD per year through 2035. **Table A-19** shows the total summary demands for 1-in-10 year drought conditions. **Table A-20** shows the net change in demands between 2010 and 2035 by crop type by area.

Table A-18. Gross water demands (MGD) for 2010 and 2035 under average rainfall conditions.

Average Rainfall Year Conditions Gross Demands for 2010

Category	LKB Glades	LKB Okeechobee	LKB Highlands	Total
Citrus	6.1	4.4	28.3	38.8
Field Crops – Sugarcane/Sorghum	34.4	3.2	0.8	38.4
Field Crops – Other	0.5	2.9	0.0	3.4
Vegetables, Melons & Berries	1.2	9.9	3.0	14.1
Sod	1.0	3.4	8.4	12.8
Greenhouse/Nursery	0.6	2.3	4.8	7.7
Irrigated Pasture	11.4	4.9	21.5	37.8
Miscellaneous	0.4	7.0	2.1	9.5
Total	**55.6**	**38.0**	**69.0**	**162.5**

Average Rainfall Year Conditions Gross Demands for 2035

Category	LKB Glades	LKB Okeechobee	LKB Highlands	Total
Citrus	6.1	4.4	18.5	29.0
Field Crops – Sugarcane/Sorghum	34.4	3.2	20.2	57.8
Field Crops – Other	0.3	1.8	1.1	3.2
Vegetables, Melons & Berries	1.2	9.9	14.3	25.4
Sod	1.0	3.4	8.4	12.8
Greenhouse/Nursery	0.6	3.5	5.4	9.5
Irrigated Pasture	11.4	4.9	21.5	37.8
Miscellaneous	0.4	7.0	2.1	9.5
Total	**55.4**	**38.1**	**91.5**	**185.0**

Table A-19. Gross water demands (MGD) for 2010 and 2035 under 1-in-10 year drought conditions.

1-in-10 Year Drought Conditions Gross Demands for 2010

Category	LKB Glades	LKB Okeechobee	LKB Highlands	Total
Citrus	12.0	9.0	60.8	81.8
Field Crops - Sugarcane	44.7	4.9	1.1	50.7
Field Crops - Other	0.6	3.6	0.0	4.2
Vegetables, Melons & Berries	1.5	9.9	4.0	15.4
Sod	1.6	4.4	13.6	19.6
Greenhouse/Nursery	0.8	2.9	5.7	9.4
Irrigated Pasture	11.4	4.9	21.5	37.8
Miscellaneous	0.4	7.0	2.1	9.5
Total	**73.0**	**46.6**	**108.8**	**228.4**

1-in-10 Year Drought Conditions Gross Demands for 2035

Category	LKB Glades	LKB Okeechobee	LKB Highlands	Total
Citrus	12.0	9.0	39.7	60.7
Field Crops - Sugarcane	44.7	4.9	27.2	76.8
Field Crops - Other	0.4	2.2	1.4	4.0
Vegetables, Melons & Berries	1.5	9.9	18.8	30.2
Sod	1.6	4.4	13.6	19.6
Greenhouse/Nursery	0.8	4.3	6.5	11.6
Irrigated Pasture	11.4	4.9	21.5	37.8
Miscellaneous	0.4	7.0	2.1	9.5
Total	**72.8**	**46.6**	**130.8**	**250.2**

Table A-20. Estimated average and change in agricultural demands (MGD) for 2010 and 2035.

Area	Citrus	Greenhouse/ Nursery	Vegetables/ Melons/ Berries	Sod	Sugarcane/ Sorghum	Field Crops (other)	Subtotal	Cattle Watering	Aqua-culture	Irrigated Pasture	Total
2010 Demands											
LKB Glades	6.1	0.6	1.2	1.0	34.4	0.5	**43.8**	0.4	0	11.4	**55.6**
LKB Highlands	28.3	4.8	3.0	8.4	0.8	0.0	**45.4**	1.8	0.23	21.5	**69.0**
LKB Okeechobee	4.4	2.3	9.9	3.4	3.2	2.9	**26.2**	6.9	0.08	4.9	**38.0**
Total	**38.8**	**7.7**	**14.1**	**12.8**	**38.4**	**3.4**	**115.3**	**9.2**	**0.31**	**37.8**	**162.5**
2035 Demands											
LKB Glades	6.1	0.6	1.2	1.0	34.4	0.3	**43.6**	0.4	0	11.4	**55.4**
LKB Highlands	18.5	5.4	14.3	8.4	20.2	1.1	**67.9**	1.8	0.28	21.5	**91.5**
LKB Okeechobee	4.4	3.5	9.9	3.4	3.2	1.8	**26.2**	6.9	0.08	4.9	**38.1**
Total	**29.0**	**9.5**	**25.4**	**12.8**	**57.8**	**3.2**	**137.7**	**9.1**	**0.36**	**37.8**	**185.0**
Change in Demands (2010 to 2035)											
Total Change	**-9.8**	**1.7**	**11.3**	**0.0**	**19.4**	**-0.2**	**22.4**	**-0.1**	**0.1**	**0.0**	**22.5**

Most of the anticipated growth in demands reflects an expected increase in vegetables/melons and berries, and the anticipated increase in sorghum or other grass to support future biofuel facilities. These expected increases are offset by lower projected demand for water for citrus groves.

Although estimates and projections for the agricultural subsections have been discussed in terms of crop/use categories, it is also important to summarize the results in terms of total acreage and use by county. Total irrigated agricultural crop acreages are listed in **Table A-21**. Agricultural acres for the crop categories covered under this plan are expected to show a net increase of close to 9,500 acres by 2035 compared to 2010. Total agricultural irrigation demands are expected to increase by 22.5 MGD from 2010 to 2035 as shown in **Table A-22**.

Table A-21. Total agricultural acres projected for the LKB Planning Area (2010–2035)

County	2010	2015	2020	2025	2030	2035
LKB Glades	39,492	39,477	39,463	39,449	39,435	39,428
LKB Highlands	23,289	23,304	23,324	23,344	23,363	23,389
LKB Okeechobee	79,040	83,665	88,311	88,368	88,427	88,487
Total	**141,821**	**146,446**	**151,098**	**151,161**	**151,225**	**151,304**

Table A-22. Total agricultural demands (MGD) projected for the LKB Planning Area (2010–2035)

County	2010	2015	2020	2025	2030	2035
LKB Glades	55.6	55.5	55.5	55.4	55.4	55.4
LKB Highlands	38.0	38.1	38.1	38.1	38.1	38.1
LKB Okeechobee	69.0	80.1	91.3	91.3	91.4	91.5
Total	**162.5**	**173.7**	**184.7**	**184.8**	**184.9**	**185.0**

SUMMARY

Table A-23 shows the combined demands for all water use classes. It is anticipated that total water demands within the LKB will rise by 37.5 MGD between 2010 and 2035. On an average annual basis, expressed over a 21-year period (2014–2035) these average annual demands equate to about 1.8 MGD per year.

Table A-23. Total demands by use class for the LKB Planning Area (2010–2035)

Use Category	2010 MGD	2010 % of Total	2035 MGD	2035 % of Total	Absolute Change 2010–2035 MGD	Percent Change, 2010–2035
Estimated Average Rainfall Conditions Total Water Demands in the Lower Kissimmee Basin						
Public Water Supply	2.8	1.5%	3.4	1.5%	0.6	21.4%
Domestic Self-Supply	2.1	1.1%	2.6	1.2%	0.5	23.8%
Industrial/Commercial/ Institutional Self-Supply	19.5	10.2%	23.9	10.8%	4.4	22.6%
Power Generation Self-Supply	4.4	2.3%	6.4	2.9%	2.0	45.5%
Recreational/Landscape Self-Supply	0.61	0.3%	0.65	0.3%	0.04	6.6%
Agricultural Self-Supply	162.5	84.7%	185.0	83.3%	22.5	13.8%
Total Water Use	**192.0**	**100.0%**	**222.0**	**100.0%**	**30.0**	**15.6%**
Estimated 1-in-10 Year Water Demands in the Lower Kissimmee Basin						
Public Water Supply	3.4	1.3%	4.1	1.4%	0.7	20.6%
Domestic Self-Supply	2.5	1.0%	3.2	1.1%	0.7	28.0%
Industrial/Commercial/ Institutional Self-Supply	19.5	7.5%	23.9	8.3%	4.4	22.6%
Power Generation Self-Supply	4.4	1.7%	6.4	2.2%	2.0	45.5%
Recreational/Landscape Self-Supply	0.85	0.3%	0.91	0.3%	0.06	7.1%
Agricultural Self-Supply	228.4	88.2%	250.2	89.1%	21.8	9.5%
Total Water Use	**259.1**	**100.0%**	**288.7**	**100.0%**	**29.6**	**11.4%**

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B

Minimum Flows and Levels Criteria and Recovery and Prevention Strategies

Section 373.709, Florida Statutes (F.S.), requires each regional water supply plan to be based on at least a 20-year planning period and include, among other items, the minimum flows and levels (MFL) criteria and associated recovery or prevention strategies adopted within the planning region. The plan must also identify any surface water or aquifers for which MFLs are scheduled to be adopted. This appendix provides additional and updated information for the Lower Kissimmee Basin since the development of the *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan) (SFWMD 2000b) and the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update) (SFWMD 2006).

MINIMUM FLOWS AND LEVELS CRITERIA

The overall goal of Chapter 373, F.S., is to ensure the sustainability of water resources of the state (Section 373.016, F.S.). Chapter 373, F.S., provides the South Florida Water Management District (SFWMD or District) with several tools to carry out this responsibility, including authority to establish MFLs. MFLs are the flow or level at which further withdrawals would cause significant harm to water resources or ecology of the area. Significant harm is defined as the level of harm that requires multiple years for the water resource to recover. This is considered more severe than the harm standard imposed in the water use permitting process, which relates to impacts that would occur during a 1-in-10 year drought. Therefore, MFLs in a recovered natural system would not be exceeded until conditions had already exceeded the 1-in-10 year drought level of certainty criteria. Serious harm, the ultimate harm to the water resources contemplated under Chapter 373, F.S., is defined as long-term, irreversible, or permanent loss to water resource functions. MFL water bodies approaching their MFL are a factor the District Governing Board considers when contemplating water shortage restrictions. However, the MFL criteria are not utilized to trigger water shortage restrictions during climatic conditions less severe than a 1-in-10 year level of drought. The District Governing Board may impose water shortage restrictions if an MFL exceedance occurs or is projected to occur during climatic conditions more severe than a 1-in-10 year drought, to the extent consumptive uses contribute to such exceedance.

The levels of impacts—harm, significant harm, and serious harm—are relative resource protection terms. Each plays a role toward achieving a sustainable water resource. The role of MFL criteria is shown conceptually in **Figure B-1**.

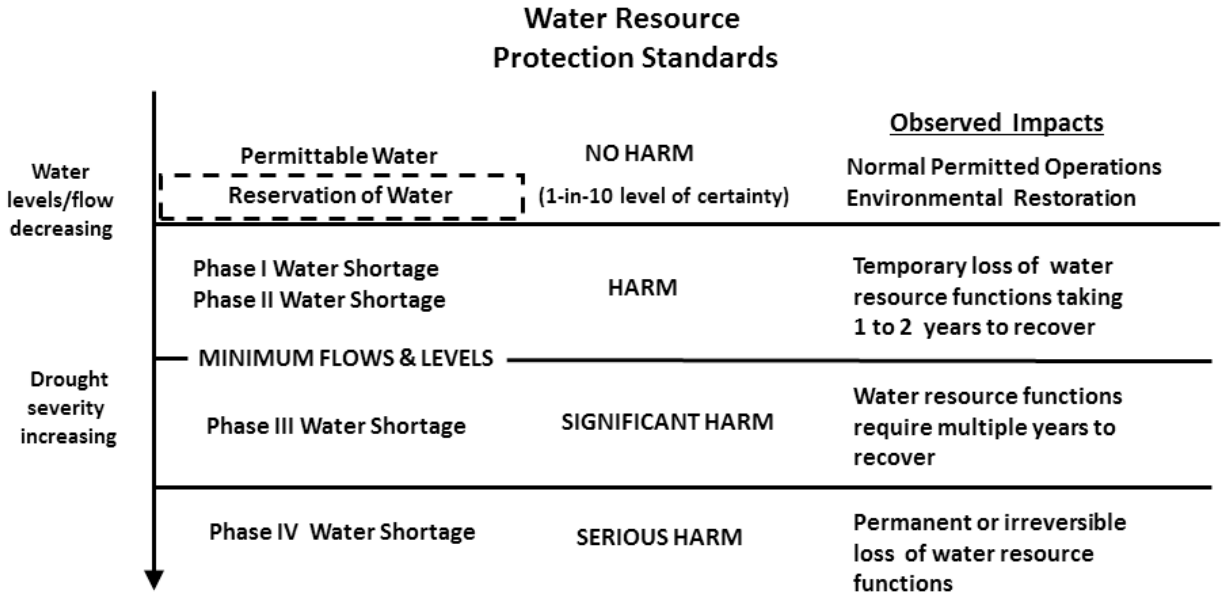

Figure B-1. Conceptual relationship among the harm, significant harm, and serious harm water resource protection standards.

Water use permitting protects water resources from harm by ensuring water use is reasonable-beneficial, does not interfere with existing legal users, and is consistent with the public interest. During the 2000 Districtwide water supply planning process, rulemaking to incorporate additional resource protection criteria, level of certainty, special designations, and permit durations were recommended as part of the plan implementations. A series of rulemaking efforts was completed in September 2003, resulting in amendments to Chapters 40E-1, 40E-2, 40E-5, 40E-8, 40E-20, and 40E-21, Florida Administrative Code (F.A.C.) and the *Basis of Review for Water Use Permit Applications within the South Florida Water Management District* (since replaced by the *Applicant's Handbook for Water Use Permit Applications* [Applicant's Handbook, SFWMD 2014]). Among the most significant changes were the amendments to permit duration, permit renewal criteria, wetland protection, supplemental irrigation requirements, saltwater intrusion, aquifer storage and recovery, and model evaluation criteria.

During this time, it was recommended that rulemaking should proceed when sufficient information was available and evaluated in the planning process. As a result, additional rules were adopted as technical information to establish MFL criteria became available. Within the Lower Kissimmee Basin (LKB) Planning Area, between 2001 and 2006, MFLs were adopted for two water bodies, Lake Istokpoga (SFWMD 2005) and Lake Okeechobee (SFWMD 2000a). The 2014 Priority Water Bodies List and Schedule submitted to the Florida Department of Environmental Protection included adoption of the reservation for

the CERP Caloosahatchee River (C-43) West Basin Storage Reservoir Project and the Kissimmee River Basin.

Lake Istokpoga

MFL criteria for Lake Istokpoga were adopted in December 2005. Significant harm criteria were based on the relationship between water levels in the lake and the health of littoral zone wetlands which provide habitat for ecologically and economically important fish and wildlife; navigational and recreational access; and maintenance of the historic runoff from Lake Istokpoga through the Indian Prairie Basin and canal system to Lake Okeechobee (SFWMD 2005). An MFL violation occurs in Lake Istokpoga when surface water levels fall below 36.5 feet in relation to the National Geodetic Vertical Datum of 1929 (NGVD) for 20 or more weeks within a calendar year more often than once every four years (Rule 40E-8.351, F.A.C.).

As part of the management plan for the Lake Istokpoga MFL, the SFWMD installed monitoring gauges at two stations on the lake and integrated these stations into the remote monitoring network to provide data needed for operational decision-making for the S-68 Structure, the downstream discharge point for Lake Istokpoga.

Lake Okeechobee

MFL criteria for Lake Okeechobee were adopted in September 2001. Significant harm criteria were based on the relationship between water levels in the lake and the ability to 1) protect the coastal aquifer against saltwater intrusion, 2) supply water to Everglades National Park, 3) provide littoral zone habitat for fish and wildlife, and 4) ensure navigational and recreational access (SFWMD 2000a). Consideration was also given to the lake's function as a storage area for supplying water to adjacent areas, such as the Everglades Agricultural Area, the Seminole Tribe of Florida reservations, and the Lake Okeechobee Service Area. An MFL violation occurs in Lake Okeechobee when an exceedance occurs more than once every six years. An exceedance is a decline in lake level elevation below 11 feet NGVD for more than 80, nonconsecutive or consecutive, days during an 18-month period. The 18-month period is initiated following the first day Lake Okeechobee falls below 11 feet NGVD, and does not include more than one wet season, defined as May 31 through October 31 of any given calendar year (Rule 40E-8.221[1], F.A.C.).

Revised Lake Okeechobee Regulation Schedule Effects

In 2000, with the transition to the Water Supply and Environment regulation schedule, an analysis was conducted to determine whether the proposed Lake Okeechobee MFL criteria could be expected to be violated over the next 20 years. This information was needed to assess whether a prevention or recovery strategy would be needed for Lake Okeechobee. The South Florida Water Management Model was used to evaluate the proposed MFL criteria in five-year increments through 2020. The analysis considered projected growth in water use demands on the lake, the scheduled delivery and performance of the Central and Southern Florida Flood Control Project Comprehensive Review Study project components

(USACE and SFWMD 1999), and the Water Supply and Environment regulation schedule proposed for the lake. Details regarding the modeling analysis are available in the *2000 Lower East Coast Water Supply Plan* (SFWMD 2000c).

Under these assumptions, the SFWMD found the proposed Lake Okeechobee MFL criteria would not be violated, and existing, as well as projected, users would have a 1-in-10 level of certainty provided the water shortage trigger line for Lake Okeechobee that existed in 2000 (Chapter 40E-22, F.A.C.) was lowered 0.5 feet. The proposed Water Supply and Environment regulation schedule was adopted by the United States Army Corps of Engineers (USACE) in July 2000. The SFWMD conducted rulemaking to modify the water shortage trigger line and adopted the Lake Okeechobee MFL criteria with the associated prevention strategy in 2001.

However, in response to a series of hurricanes, high lake stage events, and the resulting harmful discharges to the Caloosahatchee and St. Lucie estuaries during 2004 and 2005, the USACE initiated a process to revise the Water Supply and Environment regulation schedule to improve management of Lake Okeechobee during high water conditions. The goals of the regulation schedule modification process—known as the Lake Okeechobee Regulation Schedule Study—were later amended to address public health and safety concerns related to the structural competency of the Herbert Hoover Dike. In July 2007, after extensive public participation, the USACE published the *Final Environmental Impact Statement Including Appendices A through G – Lake Okeechobee Regulation Schedule* (USACE 2007). The revised lake regulation schedule would effectively reduce lake stages until the completion of Herbert Hoover Dike repairs for Reaches 1, 2, and 3.

In developing the environmental impact statement, the SFWMD, working with the USACE, conducted modeling to evaluate the effects of the proposed regulation schedule in terms of frequency, duration, and severity of water shortage cutbacks, and the lake's MFL performance. Results of the modeling indicated that while the regulation schedule would effectively provide protection for public health and safety, the Lake Okeechobee MFL criteria were projected to be violated and existing legal uses were projected to experience significantly greater water shortage cutbacks. Attempts to mitigate the impacts to existing legal users of Lake Okeechobee water were evaluated, including the use of portable water supply pumps (to access lake water at lower stages) and dropping the water shortage trigger line an additional foot. While lowering the water shortage trigger line would reduce the duration and severity of water shortage cutbacks associated with the proposed schedule, it was found that lowering it was inconsistent with the MFL criteria; therefore, the SFWMD rejected it as an option. Despite the increased water shortage impacts to existing legal users, the protection of public safety as related to the structural integrity of the Herbert Hoover Dike was the overarching factor. The USACE issued its record of decision approving the revised lake regulation schedule, referred to as the 2008 Lake Okeechobee Regulation Schedule (2008 LORS), on April 28, 2008.

While 2008 LORS is temporary, it is unclear when a revision can be made to the regulation schedule or what the schedule will entail. As a result, the original MFL prevention strategy

included in the 2000 LEC Plan and Chapter 40E-8, F.A.C. was revised to a recovery strategy. The recovery strategy is discussed later in this appendix.

RECOVERY AND PREVENTION STRATEGIES

Section 373.0421, F.S. requires that once the MFL technical criteria have been established, the water management districts must develop and expeditiously implement a recovery or prevention strategy for those water bodies currently exceeding, or expected to exceed, the MFL criteria. Analyses of current and future conditions were conducted for each water body for which MFL criteria had been defined. When the evaluation showed MFL criteria were not being achieved or will not be met in the future, MFL recovery strategies were developed. When evaluations demonstrated the MFL criteria would not be expected to be violated for the next 20 years, an MFL prevention strategy was developed. The recovery or prevention strategy must include a list of projects that develop additional water supplies and other actions. The phasing or timetable for each project must be included within the strategy. Section 373.0421(2), F.S., provides the following in part:

> *The recovery or prevention strategy shall include phasing or a timetable which will allow for the provision of sufficient water supplies for all existing and projected reasonable-beneficial uses, including development of additional water supplies and implementation of conservation and other efficiency measures concurrent with, to the extent practical, and to offset, reductions in permitted withdrawals, consistent with the provisions of this chapter.*

Section 373.709, F.S., requires regional water supply plans to contain recovery and prevention strategies needed to achieve compliance with MFLs during the planning period. These strategies may include development of additional water supplies and implementation of conservation and other efficiency measures. The implementation of projects will allow for the orderly replacement or enhancement of existing water sources with alternative supplies to provide sufficient water for all existing and projected reasonable-beneficial uses, consistent with Section 373.0421, F.S. Additional information concerning the MFL prevention and recovery strategies can be found in Rule 40E-8.421, F.A.C.

The following sections discuss the MFL recovery and prevention strategies developed for the LKB Planning Area water bodies. These include a prevention strategy for Lake Istokpoga and recovery strategy for Lake Okeechobee. Recovery and prevention strategies consist of multiple components and may include: 1) capital projects, 2) regulatory, 3) water shortage, and 4) environmental projects.

Capital Projects Element

Projects have been identified that will provide water to meet MFL criteria, some of which have been completed and are operational. The scale of these projects ranges from relatively simple water control structures to overall rehabilitation of the Herbert Hoover Dike. Multiple agencies support the projects including Comprehensive Everglades Restoration

Plan (CERP) projects, USACE projects, and SFWMD initiatives and programs. Details and the status of projects and programs identified can be found in **Chapter 4.**

Regulatory Element

Where a recovery strategy has been established for an MFL water body, existing permitted allocations will not be modified or revoked prior to permit expiration unless a new or alternative source is in place and operating to supply the water provided from the MFL water body or the permit use changes. When existing permits are renewed, the permittees are required to comply with all conditions of issuance. The rules implementing water resource protection tools, including Chapters 40E-2 and 40E-8, F.A.C., as well as the *Applicant's Handbook*, identify the specific factors and conditions that will be applied to evaluate consumptive uses making withdrawals from MFL water bodies. Factors considered specific to compliance with the MFL are 1) the extent of MFL shortfall directly caused by existing legal uses and 2) the practicality of avoiding the need for reductions in permitted supplies, including structural and operational measures, by maximizing the beneficial uses of the existing water source.

Water Shortage Element

Water use cutbacks during drought conditions can also be implemented (e.g., phased water shortage restrictions to prevent significant or serious harm), if necessary, to minimize or avoid MFL criteria being exceeded, to the extent consumptive uses contribute to such exceedance. The SFWMD may impose water shortage declarations to curb water use withdrawals pursuant to Sections 373.175 and 373.246, F.S. The SFWMD implemented its water shortage authority by restricting water uses based on the concept of shared adversity between users and the water resources (Chapters 40E-21 and 40E-22, F.A.C.). Under this program, different levels or phases of water shortage restrictions with varying levels of severity are imposed relative to drought conditions. The four phases of current water shortage restrictions are based on progressively increasing resource impacts leading up to serious harm. Under the current program, Phase I and II primarily reduce water use through conservation techniques and minor use restrictions that affect all users including residential, commercial/industrial, landscape/recreation, and agriculture. While each phase has cutbacks for agriculture, the latter phases, Phases III and IV, require use cutbacks associated with increased likelihood of more significant economic impact to the users, such as the potential for crop damage due to agricultural irrigation restrictions.

Established MFLs are considered in the evaluation of current water conditions (Section 40E-21.221[3][d], F.A.C.), and as one of the criteria for imposing water use restrictions (Section 40E-21-271[3][d], F.A.C.). This plan update does not propose use of Chapter 40E-21, F.A.C. as an MFL recovery strategy nor do Chapter 40E-8, F.A.C. However, when a drought occurs, the SFWMD will rely on this water shortage plan, as needed, to address regional system water availability.

To the extent practicable, the SFWMD attempts to implement water deliveries to reduce or prevent the MFL criteria from being exceeded. In the example of Lake Okeechobee, operational guidelines needed for implementation of water supply deliveries to avoid MFL exceedances, in concert with meeting other required water demands, are identified in the *Final Adaptive Protocols for Lake Okeechobee Operations* (SFWMD 2010).

SPECIFIC MFL RECOVERY AND PREVENTION STRATEGIES

Lake Istokpoga Prevention Strategy

A prevention strategy for Lake Istokpoga was adopted simultaneously with the MFL rule to minimize the likelihood that a violation of the lake's MFL criteria would occur in the future. Based on an evaluation of future demands associated with this MFL water body, the MFL criteria are not anticipated to be exceeded in the next 20 years. The prevention strategy for Lake Istokpoga consists of continuing the current operational plan and regulation schedule, and planning and operation of extreme lake drawdowns for environmental purposes in a manner that avoids an MFL violation (Section 40E-8.421[7], F.A.C.). If significant changes to the lake's water level management occurs due to new information, altered operational plans, or regulation schedule, a re-evaluation of the MFL criteria will be conducted. The re-evaluation will occur as part of the next Lake Istokpoga MFL update, or sooner, if significant changes to lake management are proposed.

Since adoption of the Lake Istokpoga MFL in 2005, there have been no exceedances or violations of MFL criteria (**Figure B-2**). From 2006–2011, however, water shortage restrictions were implemented, occurring every year within the downstream Indian Prairie Basin. Through the implementation of these actions, the MFL for Lake Istokpoga was prevented from being exceeded.

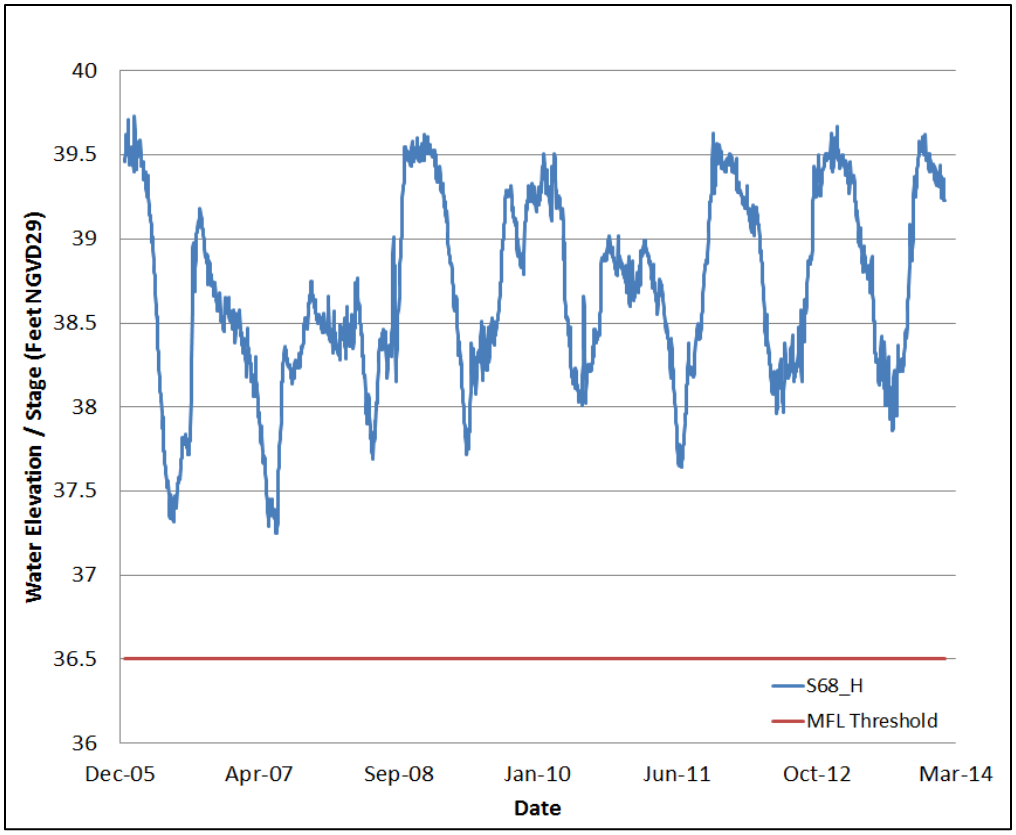

Figure B-2. Water elevations in Lake Istokpoga, from MFL adoption to the present, showing no MFL exceedances or violations.

Lake Okeechobee Recovery Strategy

As previously discussed, implementation of 2008 LORS is projected to result in MFL violations. As a result, the MFL recovery strategy is used to moderate impacts of an MFL violation during drought conditions, mitigate impacts of MFL violations during drought conditions, and depending on the USACE's lake regulation schedule in effect, minimize or avoid MFL violations. To achieve these goals, the Lake Okeechobee MFL recovery strategy includes four components, consisting of 1) environmental enhancement projects to be implemented during low lake stages, 2) regulatory constraints on consumptive use of lake water, 3) water shortage restrictions, and 4) capital projects that improve storage capacity both within and adjacent to the Lake.

Capital Project Element

The capital projects are presented in **Table B-1**. The USACE is in the process of rehabilitating the Herbert Hoover Dike. The initial step—construction of a 21.4-mile cutoff wall component in Reach 1—was completed in 2012. Completion of Reach 1 satisfies the majority of the risk reduction goals. As part of this risk reduction approach, the 32 water control structures (culverts) operated by USACE will be replaced, removed, or abandoned by 2019. Rehabilitation to Reaches 2 and 3 is scheduled for completion by 2022. The USACE

indicated it will consider revisions to the lake regulation schedule at that time. Any increase in the lake's regulation schedule as a result of the repairs will likely be evaluated by the USACE through a National Environmental Policy Act analysis of multiple objectives including flood protection, water supply, and the ecological health of the lake and downstream ecosystems. The SFWMD anticipates any additional water resulting from a revised regulation schedule could return the lake to MFL prevention status, enhance the level of certainty to existing permitted users, and support other environmental objectives.

Additional capital projects include the construction of reservoirs north of Lake Okeechobee that will store wet season flows that would otherwise be discharged to tide under 2008 LORS.

Table B-1. Capital projects that provide water supplies for Lake Okeechobee MFL recovery strategy.[a]

Capital Projects	Program	Status
Lake Okeechobee Watershed	CERP	To be determined
Lake Okeechobee Watershed – Lakeside Ranch STA[b]	SFWMD	Phase I operational
USACE Herbert Hoover Dike Major Rehabilitation	USACE	2022 [c]

a. MFL rules identify the general programs that will be used to develop and implement prevention or recovery, rather than specific projects. The potential role of specific projects to address MFL water needs is generally considered in the respective MFL technical supporting documentation.

b. CERP project initiated by the SFWMD.

c. Time shown is for rehabilitation of Reaches 1, 2, and 3, which may be sufficient to allow additional storage in Lake Okeechobee necessary to prevent MFL violations.

Regulatory Element

The SFWMD implemented regulatory strategies for water uses of the lake that are expected to remain in effect until the Herbert Hoover Dike repairs and structural projects provide sufficient storage and adoption of an associated revised regulation schedule that minimizes or avoids Lake Okeechobee MFL violations. Since 2008 LORS effectively reduced water availability for existing users to less than the 1-in-10 year drought level of certainty and is projected to contribute to MFL violations, modifications to the water use permit application rules affecting users of Lake Okeechobee water were necessary.

A restricted allocation area rule was adopted for Lake Okeechobee in 2008. This rule protects existing legal users of Lake Okeechobee water by preventing increases in total allocations. Increased demands over the base condition water use within the Lake Okeechobee Service Area may be accommodated through reallocation of retired permits, use of alternative sources (such as groundwater), and implementation of offsets to recharge volumes equal to increased withdrawals in accordance with the rule's provisions. The rule also prevents expansion of Public Water Supply uses that exceed a specified threshold as these uses are determined incompatible with the operations, reliability, and limited availability of lake water. Temporary increases in base condition water use are allowable for limited periods as related to development of alternative water supply projects. Compliance with these rules will also assure that such uses are consistent with Everglades restoration implementation.

Water Shortage Element

Implementation of 2008 LORS will also result in more frequent and severe lake-based water shortages. To address this, the SFWMD changed the water shortage rules pertaining to Lake Okeechobee—Lake Okeechobee Water Shortage Management (Chapter 40E-21, F.A.C.)—in November 2007 to clarify how water restrictions would be calculated and applied to agricultural uses within the Lake Okeechobee Basin. The MFL recovery strategy also includes water shortage restrictions as described in Chapter 40E-22, F.A.C.

Habitat Enhancement Element

Several lake management options can be implemented to improve Lake Okeechobee habitat and mitigate impacts from extreme low lake levels associated with droughts. Periods of low water conditions will allow the SFWMD to conduct native aquatic and tree plantings, as well as sediment scraping and other habitat enhancements, and potentially include efforts to supplement natural apple snail populations. **Table B-2** identifies some of the stage-dependent initiatives that will be undertaken by SFWMD and other agencies.

Table B-2. Habitat enhancement components of the Lake Okeechobee recovery strategy.

Lake Level	Recovery Component	Benefits
At 11 feet NGVD and stage is falling	Sediment scraping and other habitat enhancements, including removal of tussocks and other aggregations of organic material, such as the western berm.	Promote natural compaction, removal, and/or oxidation of accumulated organic muck sediments. Remove barriers to fish migration in and out of the western littoral zone.
At or below 11 feet NGVD	Conduct controlled burns if fuel load and weather conditions permit.	Facilitate the removal of exotic species, such as torpedograss (*Panicum repens*).
Below 11 feet NGVD	Allow maintenance and repair work on public boat ramps, and docking and marina facilities.	Restore original design depth of the waterways and provide navigable access.
At 10.5 feet NGVD and stage is falling	Plant native terrestrial and emergent vegetation, such as bulrush (*Scirpus* spp.) (if a method for reestablishment proves to be feasible), native pond apples (*Annona glabra*), and cypress trees (*Taxodium distichum*) on the southern shore islands and on rim canal spoil islands.	Reestablish native trees on the islands to help prevent expansion of exotic and invasive vegetation and provide essential habitat for wading birds, raptors, and endangered species, such as the Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and Okeechobee gourd (*Cucurbita okeechobeensis*).
Between 10 and 11 feet NGVD and stage is rising	Plant native vegetation species, such as SAV and emergent vegetation, such as bulrush.	Reestablish native plant species, which can prevent the expansion of exotic and invasive vegetation, assist in restoring fish and wildlife habitats, prevent uprooting of emergent and submerged plants, and reduce turbidity, which, in turn, promotes and maintains SAV growth.
At 11 feet NGVD and stage is rising	Assess the feasibility of introducing apple snail (*Pomacea paludosa*) populations via an apple snail hatchery or other techniques.	Supplement native apple snail populations for the endangered Everglade snail kite.
Nonlake stage dependent components	Investigate sediment management strategies in the tributaries and the pelagic zone of the lake.	Remove phosphorus-laden sediment that has the potential to resuspend, and thus, reduce light transparency, which discourages growth of SAV and encourages phytoplankton bloom activity.

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C

Potable Water and Wastewater Treatment Utilities

POTABLE WATER TREATMENT FACILITIES

Potable water produced in the Lower Kissimmee Basin (LKB) Planning Area is generated by large water treatment facilities, some smaller "package" water treatment facilities, and self-supply (i.e., private wells) for some individual users. This portion of the appendix focuses on the limited number of larger facilities with average pumping equal to or greater than 100,000 gallons per day (GPD) or 0.1 million gallons per day (MGD). Those facilities withdrawing 100,000 GPD or less are classified as Domestic Self Supply and are not covered in this appendix.

Descriptions of Existing Water Facilities

Raw water withdrawal sources in the LKB Planning Area include groundwater from the surficial aquifer system (SAS) and the Floridan aquifer system (FAS). Surface water from Lake Okeechobee is also used as a primary source of public supply by the Okeechobee Utility Authority. **Table C-1** describes each potable water treatment facility located in the LKB Planning Area. **Figure C-1** shows the locations of the potable water treatment facilities and their service areas in Glades, Okeechobee and Highlands counties. Additional information about each Public Water Supply utility is available from the South Florida Water Management District's (SFWMD or District) Water Use Regulatory Database (http://www.sfwmd.gov/ePermitting).

Since the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update), the Seminole Tribe of Florida Brighton Reservation constructed a new water treatment plant and wellfield. The new plant supplies areas of the reservation and provides bulk water to the unincorporated community of Lakeport through the Lakeport Water Association, a private utility. The locations of other public water supply treatment plants in the LKB Planning Area remain unchanged since publication of the 2005–2006 KB Plan Update.

Table C-1. Potable water treatment facilities in the LKB Planning Area.

Supply Entity-Facility	Water Use		Method of Treatment				Water Treatment	
	SFWMD Permit Number and Expiration Date	Annual Allocation (MGD)	Chlorination	Coagulation/ Filtration	Aeration	Nanofiltration	FDEP Permit Number	2010 Rated Capacity (MGD)
Glades County								
Brighton (STOF)	NA	NA	X	X		X	NA	0.8
Glades County Total		**NA**						**0.8**
Highlands County								
City of Sebring Utilities Dept.	28-00139W, Apr 29, 2031	0.12	X				6280250	1.0
Spring Lake Improvement District	28-00122W, Nov 13, 2018	0.32	X				5280266	0.5
Highlands County Total		**0.44**						**1.5**
Okeechobee County								
Okeechobee Correctional Institution	47-00421W, Jan 15, 2015	0.2	X		X		4474497	0.86
Okeechobee Utility Authority	47-00004W, Apr 2, 2032	3.48	X	X	X		4470257	6.0
Okeechobee County Total		**3.68**						**6.86**
LKB Planning Area Total		**4.12**						**9.16**

FDEP: Florida Department of Environmental Protection

STOF: Seminole Tribe of Florida

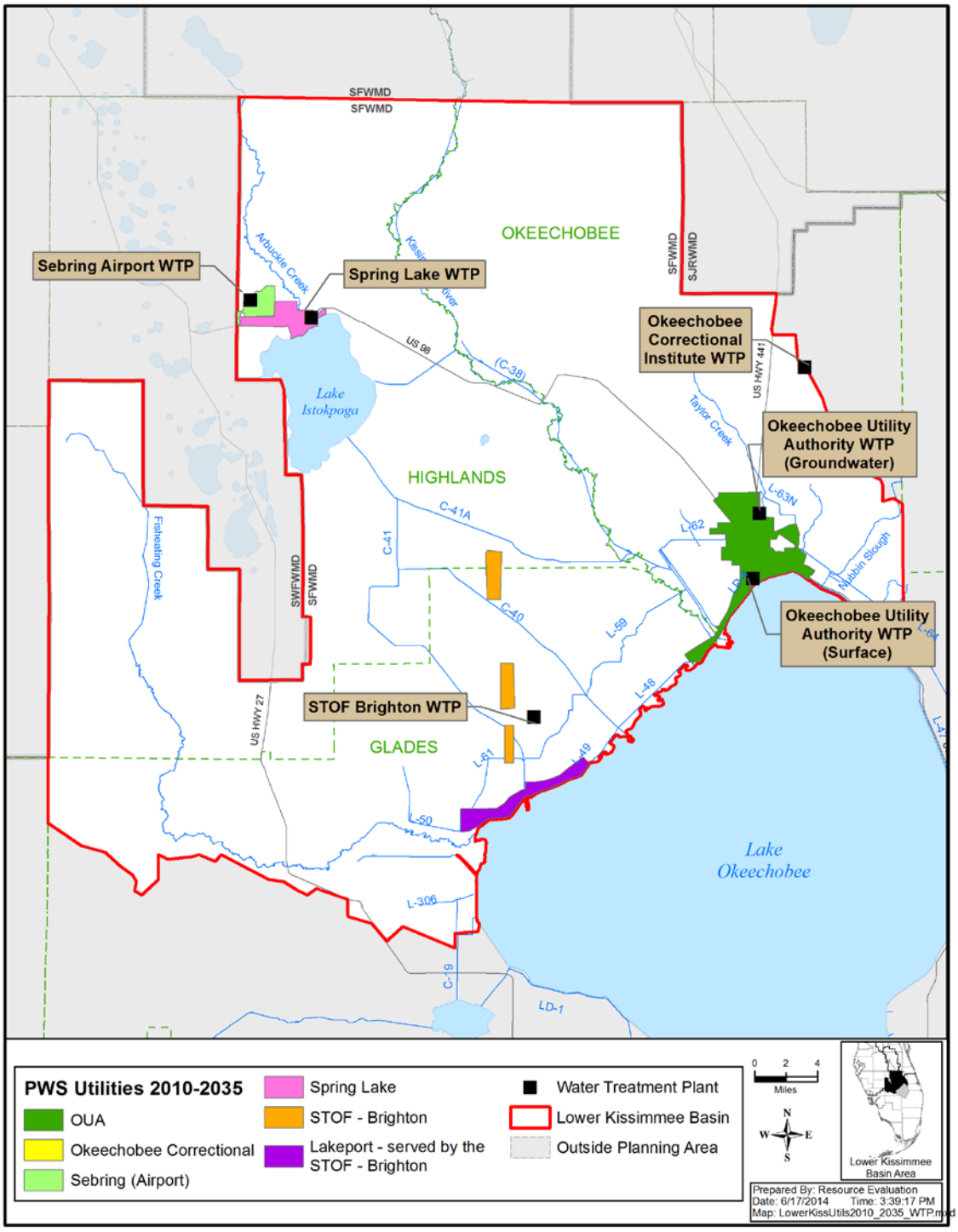


Figure C-1. PWS treatment plants and service areas in the Lower Kissimmee Basin (WTP: Water Treatment Plant; STOF: Seminole Tribe of Florida)

Okeechobee Utility Authority Potable Treatment Facilities Descriptions

Existing Facilities

The Okeechobee Utility Authority (OUA) operates two water treatment plants that serve approximately 22,896 residents (2010 estimate) in portions of Okeechobee and Glades counties. The surface water plant withdraws water from the north shoreline of Lake Okeechobee and is rated for up to 5.0 MGD. The groundwater plant utilizes seven existing surficial aquifer wells and can withdraw up to 1.0 MGD (**Table C-2**). The OUA is currently permitted for a total of 3.48 MGD between the two facilities. The OUA's consumptive use permit expires on April 2, 2032. In 2010, water use averaged 2.23 MGD with 68 percent from the surface water plant and 32 percent from the groundwater plant.

Table C-2. Okeechobee Utility Authority potable water supply wells.

Well Number	Status	Active	Aquifer	Total Depth (ft)	Cased Depth (ft)	Well Diameter (in)	Pump Capacity (GPM)	Year Drilled
1	Existing	Yes	Surficial	155	88	10	300	1993
2	Existing	Yes	Surficial	165	98	10	400	1993
3	Existing	Yes	Surficial	155	108	10	300	1993
4	Existing	Yes	Surficial	175	108	10	250	1993
5	Existing	Yes	Surficial	175	108	10	300	1993
6	Existing	Yes	Surficial	175	108	10	300	1993
7	Existing	Yes	Surficial	175	108	10	300	1993

GPM: gallons per minute

Future Facilities

OUA has no plans to expand its current facilities.

Okeechobee Correctional Institute Potable Treatment Facilities Descriptions

Existing Facilities

Okeechobee Correctional Institute's (OCI) water treatment plant is located on site and has a rated capacity of 0.86 MGD. It is supplied by two wells (**Table C-3**) drawing from the Floridan aquifer. Potable water is treated by aeration and chlorination. Water use at the facility averages approximately 0.17 MGD and is projected to remain at that level into the foreseeable future.

Table C-3. Okeechobee Correctional potable water supply wells.

Well Number	Status	Active	Aquifer	Total Depth (ft)	Cased Depth (ft)	Well Diameter (in)	Pump Capacity (GPM)	Year Drilled
1	Existing	Yes	Floridan	1000	550	12	1000	1994
2	Existing	Yes	Floridan	820	504	12	1000	1994

Future Facilities

There are no current plans for future facilities.

Spring Lake Improvement District Potable Treatment Facilities Descriptions

Existing Facilities

The Spring Lake Improvement District operates a single water plant supplied by three Floridan aquifer wells. **Table C-4** provides the construction details of the utility's wells. Water use at the facility in 2010 average 0.21 MGD.

Table C-4. Spring Lake Improvement District potable water supply wells.

Well Number	Status	Active	Aquifer	Total Depth (ft)	Cased Depth (ft)	Well Diameter (in)	Pump Capacity (GPM)	Year Drilled
1	Existing	Yes	Floridan	900	300	8	300	1971
2	Existing	Yes	Floridan	1150	350	10	500	1972
3	Existing	Yes	Floridan	1000	350	10	500	1992

Future Facilities

There are no current plans for future facilities.

Sebring Airport Potable Treatment Facilities Descriptions

Existing Facilities

The Sebring Airport water treatment plant consists of four Floridan aquifer wells (**Table C-5**) and a 200,000-gallon storage tank. The water treatment plant is also integrated with the city of Sebring's utilities system via a 12-inch water main to the Desoto City Water Plant.

The Sebring Airport system operates under Permit 28-00139-W with an allocation of 0.12 MGD. This allocation is based on projected water use demands estimated using non-residential land use water rates provided by the SFWMD's *Guidebook for the Analysis of Developments of Regional Impact* (1988). Sebring Airport's 2,141-acre service area is composed of non-residential commercial and industrial users.

Table C-5. Sebring Airport potable water supply wells.

Well Number	Status	Active	Aquifer	Total Depth (ft)	Cased Depth (ft)	Well Diameter (in)	Pump Capacity (GPM)	Year Drilled
1	Existing	Yes	Floridan	800	400	10	220	1940
2	Existing	Yes	Floridan	1060	380	10	890	1940
3	Existing	Yes	Floridan	1200	500	12	622	1997
4	Existing	Yes	Floridan	1260	500	12	1040	2002

Future Facilities

There are no current plans for future facilities.

Seminole Tribe of Florida Brighton Reservation Potable Treatment Facilities Descriptions

Existing Facilities

The Brighton Seminole Indian Reservation operates the Brighton Water Treatment Plant to provide potable water to users within the Brighton Reservation and the neighboring community of Lakeport. The Seminole Tribe of Florida maintains a bulk water user agreement with Lakeport Water Association, Inc. for supply of up to 300,000 GPD of finished potable water.

The Tribe completed the Brighton Water Treatment Plant in 2009. It replaced a leased off-site wellfield and water treatment plant. The Brighton Water Treatment Plant and its associated wellfield are located on the Brighton Seminole Indian Reservation and are operated under authorizations provided in the Water Rights Compact Among the Seminole Tribe of Florida, the State of Florida, and the South Florida Water Management District (Second Amendment to the Seventeenth Annual Work Plan). Once the new treatment facility became operational, the Seminole Tribe of Florida ceased utilization of the leased water treatment plant and withdrew the related water use permit (22-00183-W).

The Brighton Water Treatment Plant's water source consists of eight surficial aquifer wells. The wellfield is designed to produce up to 1 MGD. The treatment train at the plant consists of coagulation, microfiltration, and nanofiltration. The filtration reject water is blended with surface water and disposed of via a sprayfield near the plant. The plant's designed capacity is for an annual average demand of 0.4 MGD and maximum daily production of 0.8 MG. In 2010 the Brighton Water Treatment Plant produced 0.41 MGD of finished potable water and withdrew 0.46 MGD of raw water from the wellfield.

Future Facilities

There are no current plans for future facilities.

WASTEWATER TREATMENT UTILITIES/FACILITIES

Wastewater treatment is accomplished through regional wastewater treatment facilities (WWTFs), smaller "package plants," and septic tanks. The focus of this portion of this appendix is on the larger facilities with a Florida Department of Environmental Protection (FDEP) permitted capacity of 0.1 MGD or more. These larger treatment facilities allow economy of operation and have sufficient flows that could positively impact water resources through use of reclaimed water. Many facilities are located in areas close to potential reclaimed water users.

As of 2014, there are two domestic wastewater treatment facilities, the Okeechobee Utility Authority and the Okeechobee Correctional Institution (**Figure C-2**), with permitted treatment capacity of 0.1 MGD or greater. Additional wastewater treatment facilities are operated at the Sebring Airport, Spring Lakes subdivision and the Seminole Tribe of Florida, but these have capacities below 0.1 MGD. **Table C-6** lists the LKB Planning Area's WWTFs and provides the 2010 average daily reuse flows. **Table C-7** shows reuse predictions for 2035 for the same utilities. Existing reclaimed water use within the LKB Planning Area is based on FDEP's 2010 Reuse inventory (FDEP 2011) with projections for 2035 based on a ratio or percentage of the projected potable water used by the same utility. Secondary sources of information include planning documents, such as 10-Year Water Supply Facilities Work Plans prepared by the local governments (City of Okeechobee 2009, Okeechobee Utility Authority 2008).

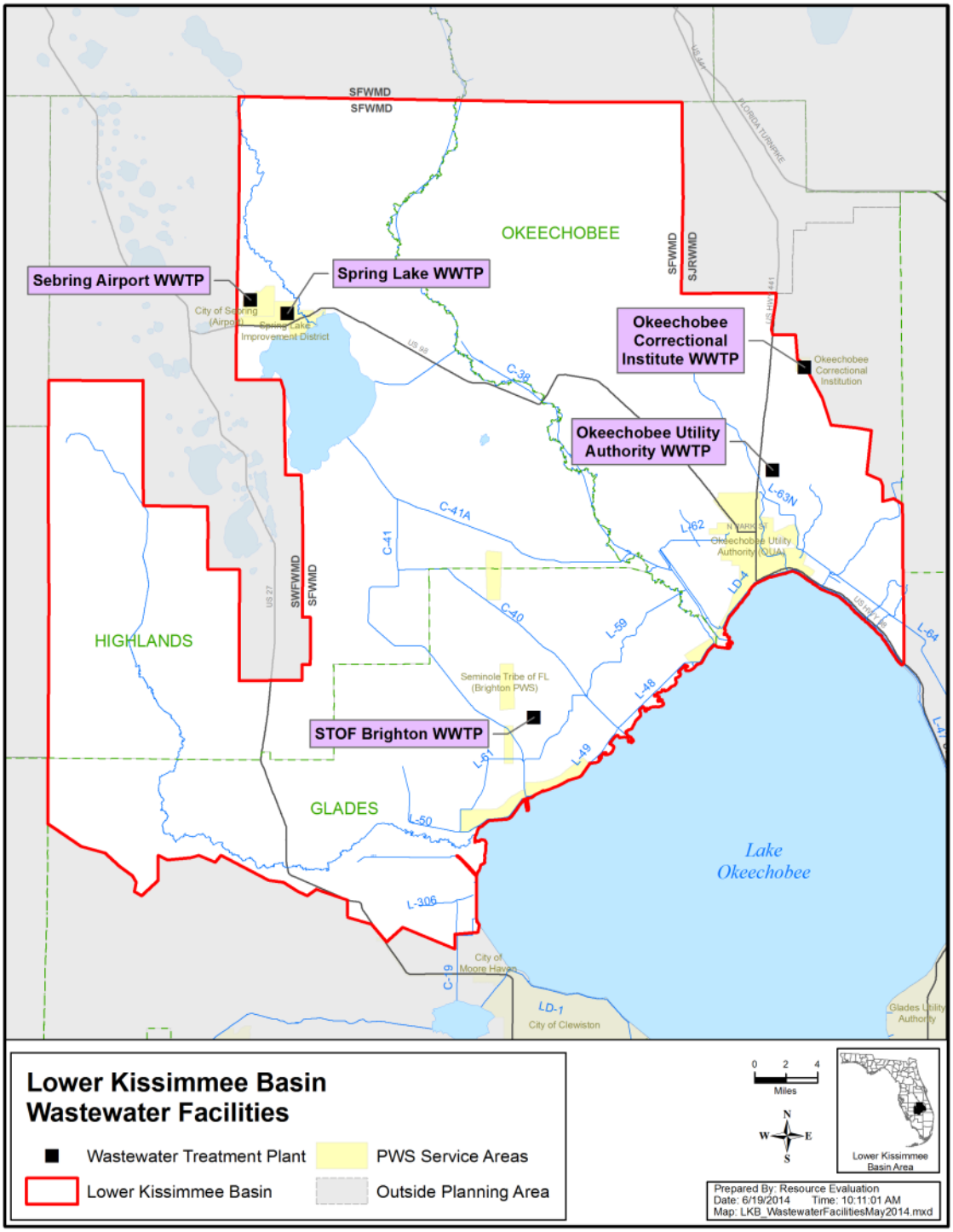


Figure C-2. Wastewater treatment facilities in the Lower Kissimmee Basin.

Table C-6. Summary of 2010 reuse by wastewater facilities within the LKB (FDEP 2011).

Entity/Facility[a]	Residential Irrigation (MGD)	Golf Course Irrigation (MGD)	Agricultural Irrigation (MGD)	Other Public Access Irrigation[b] (MGD)	Groundwater Recharge[c] (MGD)	Other Reuse Types[d] (MGD)
Okeechobee Correctional Institution	0.00	0.00	0.09	0.00	0.00	0.00
Okeechobee Utility Authority	0.00	0.00	0.73	0.00	0.00	0.04
Total	**0.00**	**0.00**	**0.82**	**0.00**	**0.00**	**0.04**

a. Sebring Airport and the Seminole Tribe of Florida are not included as reclaimed flows were less than 0.1 MGD.
b. Other Public Access Irrigation = Parks, schools, common areas, etc.
c. Groundwater Recharge = rapid infiltration basins, percolation ponds, etc.
d. Other Reuse Types = other permitted uses, such as cooling water at the treatment facility or at other facilities, toilet flushing, etc.

Table C-7. Predicted 2035 reuse by wastewater facilities within the LKB.

Entity/Facility[a]	Residential Irrigation (MGD)	Golf Course Irrigation (MGD)	Agricultural Irrigation (MGD)	Other Public Access Irrigation[b] (MGD)	Groundwater Recharge[c] (MGD)	Other Reuse Types[d] (MGD)
Okeechobee Correctional Institution	0.00	0.00	0.09	0.00	0.00	0.00
Okeechobee Utility Authority	0.00	0.00	0.92	0.00	0.00	0.05
Total	**0.00**	**0.00**	**1.01**	**0.00**	**0.00**	**0.05**

a. Sebring Airport and the Seminole Tribe of Florida are not included as reclaimed flow are expected to be less than 0.1 MGD.
b. Other Public Access Irrigation = Parks, schools, common areas, etc.
c. Groundwater Recharge = rapid infiltration basins, percolation ponds, etc.
d. Other Reuse Types = other permitted uses, such as cooling water at the treatment facility or at other facilities, toilet flushing, etc.

Okeechobee Utility Authority WWTF Description

Existing Wastewater/Reclaimed

The OUA WWTF has an FDEP-rated capacity of 1.23 MGD. In 2010, the average daily wastewater flow treated by the facility was 0.77 MGD, of which 0.68 MGD was reused for irrigation of an adjoining 761-acre citrus grove. According to computer-based modeling, the annual irrigation demand of the grove is estimated at 310 million gallons, which is at or more than the utility currently provides on an annual basis. Additionally the utility provides reclaimed water for on-site irrigation and other incidental uses related to production.

Future Wastewater/Reclaimed

The OUA currently has no plans to expand its reclaimed water system beyond its current design. The OUA has examined expanding its wastewater service into the remaining areas of the City of Okeechobee and surrounding unincorporated areas of Okeechobee and Glades counties. Based on projected growth, the wastewater flows at the OUA WWTF are projected to increase to 0.97 MGD by 2035 and reuse to increase to 0.92 MGD.

Okeechobee Correctional Institute WWTF Description

Existing Wastewater/Reclaimed

The OCI WWTF has an FDEP-rated capacity of 0.2 MGD. The system uses extended aeration and disposal by spray irrigation after basic disinfection. Reclaimed water use in 2010 was 0.09 MGD.

Future Wastewater/Reclaimed

The OCI currently has no plans to expand its wastewater system beyond its current design. Given that the facility is not growing, reclaimed water use is expected to remain stable at 0.09 MGD.

REFERENCES

City of Okeechobee. 2009. *City of Okeechobee Proposed 10-Year Water Supply Facilities Work Plan 2009 – 2019*. Prepared by LaRue Planning & Management Services, Inc. for the City of Okeechobee, FL.

FDEP. 2011. *2010 Reuse Inventory.* Water Reuse Program, FDEP, Tallahassee, FL.

Okeechobee Utility Authority. 2008. *Okeechobee Utility Authority Wastewater Master Plan*. Prepared by Metzger & Willard, Inc. for the Okeechobee Utility Authority, Okeechobee, FL.

SFWMD. 1988. *Guidebook for the Analysis of Developments of Regional Impacts*. South Florida Water Management District, West Palm Beach, FL.

D

Information for Local Government Comprehensive Plans

The SFWMD prepares water supply plans for each of its four planning areas to effectively support planning initiatives and address local issues. The regional water supply plans encompass a 20-year future planning horizon and are updated every five years. All local governments are required by statute to update their water supply facilities work plan (work plan) and adopt revisions to their comprehensive plan within 18 months following the approval of the applicable regional water supply plan.

This appendix contains water supply planning information useful to local governments in preparing and amending comprehensive plans. In addition to this appendix, the following chapters and appendices are particularly relevant for local governments:

Water Sources	Chapters 4 and 6; Appendix C
Utility Areas Served (2010 and 2035)	Chapter 6; Appendices B and D
Population Projections (2010–2035)	Chapter 2; Appendix A
Demand Projections (2010–2035)	Chapter 2; Appendix A
Water Supply Projects (2005–2035)	Chapter 6; Appendix C

This appendix includes the following information useful for the review and revision of local government comprehensive plans:

1. The SFWMD Checklist of Needed Comprehensive Plan Data
2. Relevant portions of cited statutory provisions
3. Tables identifying which utilities serve each Lower Kissimmee Basin (LKB) Planning Area jurisdiction
4. Maps of utility areas currently served (2010) and future utility service areas expected to be served (2035)

1. CHECKLIST OF NEEDED COMPREHENSIVE PLAN DATA

Local governments are required to plan for their water and wastewater needs along with other infrastructure and public service elements of their comprehensive plan. This section provides a general checklist of the type of data and information the SFWMD water supply planning staff look for during their review of the water supply element, policies, and other topics in the local government comprehensive plans. This checklist is not all inclusive, but provides a broad, general framework for use with the more detailed Florida Department of Economic Opportunity (FDEO) related guidelines and SFWMD comments on specific water supply topics.

Checklist guidance is given for three water supply-related aspects of comprehensive plans:

A. Work plans and other potable water sub-element revisions
B. Evaluation and appraisal of comprehensive plan requirements
C. Plan amendments (future land use change)

A. Work Plan and Other Potable Water Sub-Element Revisions

(Within 18 months following publication of this 2014 LKB Plan)

Overall Guidance

For consistency in the water supply planning process, the SFWMD, local governments, and utilities work closely with the Florida Department of Economic Opportunity (FDEO), projecting demands and proposing water supply projects for the future. This 2014 LKB Plan provides water demand estimates, water source options, and water supply development projects to ensure adequate water supplies to support the region. Local governments should demonstrate consistency with the regional water supply plan and updates when developing or updating their work plans. The following guidance is provided to local governments for updating their work plans.

Review this 2014 LKB Plan and Confirm Public Water Supply Entities Providing Service within Local Government's Jurisdiction

To be consistent with the regional water supply plan and updates, the local government's work plan should be in agreement with the major Public Water Supply (PWS) entities serving most of the urban population. This 2014 LKB Plan identifies PWS entities with projected average pumpages greater than 0.1 MGD, serving most of the urban population. Some smaller communities or municipalities may not be identified. The FDEO guidance for work plans recommends including all small community systems and Domestic Self-Supply (DSS) users on private wells.

This 2014 LKB Plan provides information about PWS entities and urban water use by PWS service area. To be consistent with the regional water supply plan, at a minimum, the local government's work plan should identify the urban water demand and adequacy of PWS water sources within the municipal boundary to meet such water demand. If appropriate, the sale or purchase of water from PWS entities with service areas outside of the municipal boundary should also be identified.

Review PWS Utility Summaries Provided in Chapter 6 of this 2014 LKB Plan

The SFWMD worked with staff from PWS entities whose withdrawals average greater than 100,000 gallons per day (GPD) to identify water supply development projects for this 2014 LKB Plan. Utility summaries were compiled using information from various sources, including input from PWS entities. The utility summaries provide baseline information about finished water demands, existing permitted sources and allocations, and recently constructed and proposed projects that create water capacity, as well as other related information. Multiple sources of water supply may be needed to accommodate projected water demand in future years. Public Water Supply entity staff should confirm the information provided in the utility summaries of this 2014 LKB Plan. Within 12 months of adoption of this plan, PWS entities must respond to the SFWMD with their intentions to develop and implement the projects identified by this plan, or provide a list of other projects or methods to meet water demands.

The local government's work plan should be in general agreement with this 2014 LKB Plan utility summaries' water sources and schedule of water sources to be made available to meet projected water demands. However, it is not necessary to use the same population projections or per capita use rates used by the regional water supply plan to project water demand. Generally accepted professional planning methods may be used as input to the local planning process, which may result in differences between the demand and supply estimates provided in this Plan's utility summaries. If planning assumptions or information differs from what is provided in the utility summaries, the work plan should identify and explain the basis for any differences.

Furthermore, consistency between a work plan and regional water supply plan does not require the same planning period. The minimum planning period for regional water supply plans is 20 years (referred to as the 20-year planning horizon). However, a minimum 10-year planning period is required (Section 163.3177[6][c][3], Florida Statutes [F.S.]) and a 20-year planning period is preferred.

Additional information about developing a work plan is available from the FDEO website, http://www.floridajobs.org/community-planning-and-development/programs/technical-assistance/planning-initiatives/natural-resource-planning/water-supply-planning.

Checklist of Key Considerations

Water Supply Demand Projections

- Review the 2014 LKB Plan and revise the local government's adopted work plan to be consistent with the water demand estimates and population projections cited in this plan.

  The objective is to provide best available data. If the local government can provide data that improves data in this 2014 LKB Plan, then the local government data should be used in the work plan. All differences in water demand estimates and population projections used in the work plan should be identified and explained.
  - Plan for both raw and finished (i.e., water volume after any losses due to water treatment) water supply demands within the city or county jurisdiction for each supplier.
  - The projections should cover at least a 10-year planning period, but projections for the entire established local government comprehensive plan's planning period are preferred.
  - The projections should plan for the building of all public, private, and regional water supply facilities and bulk sales of water that will be necessary to provide water supply service within the local government's jurisdiction.

Water Source Identification

- Review the water supply sources identified by the local government or its water suppliers as necessary to meet and achieve the existing and projected water use demand for the established planning period.
  - Compare this information with the available sources in this 2014 LKB Plan .

- Provide separate projections for existing and future DSS.
  - Identify the general areas served by DSS.

Water Supply Project Identification

- Either incorporate water supply project(s) selected by the local government's utility or utilities providing PWS to the local government, as identified in the regional water supply plan, or propose alternatives for inclusion in the work plan.
  - All other public and private water supply capital improvements, including wells, treatment plants, distribution systems, etc., necessary to maintain level of service standards within the jurisdiction should also be included in the work plan.

- Coordinate the work plan water supply projects with this 2014 LKB Plan and the water supplier(s) annual progress reports.
  - Update the work plan accordingly.

- Identify sufficient water conservation, reclaimed water, and water supply projects necessary to meet projected demands.

- Update the capital improvements element as required.

Water Supply Intergovernmental Coordination

- The work plan should address ongoing and future coordination with existing and future water supply and reuse providers for meeting future demands. This should occur before, during, and after the regional water supply plan update process.

- Review existing and future utility service areas for each provider within the jurisdiction. Refer to the maps provided in this appendix. Compare and update the work plan as needed.
  - Identify existing or potential service area conflicts and solutions. Include a conflict resolution policy.
  - Ensure all areas of the local government are accounted for by the local governments' own utility or other providers.

- Review and update the work plan language concerning needed coordination with water supplier(s), other local governments and entities, and others.
  - Include updates to agreements (e.g., bulk service agreements and interconnect agreements).

Related Comprehensive Plan Amendments

- If additional revisions are needed for coordination with this 2014 LKB Plan, but not listed here, incorporate changes into the comprehensive plan and work plan, as appropriate.

  This 2014 LKB Plan will require changes to the work plan and possibly other elements within the comprehensive plan. Revisions may include population projections, established planning period, existing and future water resource projects, intergovernmental coordination activities, conservation and reuse measures, and the capital improvements element.
  - Review the comprehensive plan for consistency between all elements of the work plan and other comprehensive plan elements in consideration of all proposed modifications to the comprehensive plan. Other comprehensive plan elements include, but may not be limited to, future land use, potable water, sanitary sewer, conservation, intergovernmental coordination, and capital improvements.

B. Evaluation and Appraisal Report of Comprehensive Plans Sections 163.3191(1–3), F.S.

(Evaluation of the comprehensive plan after the adoption of a work plan)

Water Supply Project Identification and Selection

At least every seven years, local governments must evaluate whether there is a need to amend their comprehensive plan since the last comprehensive water supply plan update. The evaluation should address changes in state requirements since the last update of the comprehensive plan.

While an evaluation and appraisal report is not required, local governments are encouraged to comprehensively evaluate, and as necessary, update comprehensive plans to reflect changes in local conditions. The evaluation could address the following issues related to their work plans.

- Identify the extent to which the local government has been successful in identifying water supply projects, including water conservation and reuse, necessary to meet projected demands.
- Evaluate the degree to which the work plan has been implemented for building all public, private, and regional water supply facilities within the jurisdiction necessary to meet projected demands.
- Include recommendations for revising the work plan and the applicable comprehensive plan elements to address the conclusions of the evaluation, as necessary.

C. Plan Amendments (Future Land Use Change)

Water Supply Demand Projections

- Address both raw and finished (i.e., after any losses due to water treatment) water supply needs for both potable and non-potable (i.e., irrigation) demands, using professionally acceptable methodologies for population projections and per capita use rates.
- Address existing and future water conservation and reuse commitments, and levels of service (i.e., per capita use rates), for both the proposed future land use change and the comprehensive plan.
- Address both the build-out time frame for a proposed future land use change and the established planning time frame for the comprehensive plan.

Water Source Identification

- For existing demands, reflect water source(s) from supplier's consumptive use permit (CUP).
- For future demands covered by a supplier's commitment to provide service under remaining available capacity of an existing consumptive use permit, reflect the source(s) from the supplier's CUP, including bulk supply contracted quantities, duration, and provider.

- For future demands not covered by an existing CUP, provide sufficient planning-level data and analysis to demonstrate the availability of a sustainable water source as identified in the appropriate SFWMD regional water supply plan.

Availability of Water Supply and Public Facilities

- Demonstrate that there is an availability of raw water supply from the proposed source(s) of raw supply for the future land use change, given all other approved land use commitments within the local government's jurisdiction over both the proposed amendment's build-out and the established planning period of the comprehensive plan (see Section 163.3167[9], F.S., and Section 163.3177[6][a], F.S.).
- Demonstrate that there is an availability of both treatment facility capacity and permitted, available finished water supply for the future land use change, given all other commitments for that capacity and supply over the proposed build-out time frame.
- If the availability of either water supply and/or public facilities is not currently demonstrable, this will require either phasing of the future land use (see Section 163.3177[6][h], F.S.), and/or appropriate amendments to the capital improvements element/potable water sub-element, to ensure the necessary capital planning and timely availability of the needed infrastructure and water supply (see Sections 163.3177[3][a], 163,3177[6][c], and 163.3177[6][h]3.b., F.S.).
- If the water provider is an entity other than the local government responsible for the comprehensive plan amendment, demonstrate that coordination of the plan amendment has occurred between the water provider and the local government (see Section 163.3177[6][h]3.b., F.S.).

Related Comprehensive Plan Amendments

- A future land use change may also require amendments to other specific elements within the comprehensive plan if it requires an adjustment to either the plan's future population or demand projections, the comprehensive plan's established planning period, the water supply sources, or water providers required to be addressed in the comprehensive plan (see Sections 163.3167[9], 163.3177[5][a], 163.3177[6][a], 163.3177[6][c], 163.3177[6][d], and 163.3180, F.S.).

2. CITED FLORIDA STATUTE PROVISIONS (RELEVANT PORTIONS)

163.3167(9): Each local government shall address in its comprehensive plan, as enumerated in this chapter, the water supply sources necessary to meet and achieve the existing and projected water use demand for the established planning period, considering the applicable plan developed pursuant to s. 373.709.

163.3177(3)(a): The comprehensive plan shall contain a capital improvements element designed to consider the need for and the location of public facilities in order to encourage the efficient use of such facilities and set forth:

1. A component that outlines principles for construction, extension, or increase in capacity of public facilities, as well as a component that outlines principles for correcting existing public facility deficiencies, which are necessary to implement the comprehensive plan. The components shall cover at least a five-year period.

2. Estimated public facility costs, including a delineation of when facilities will be needed, the general location of the facilities, and projected revenue sources to fund the facilities.

3. Standards to ensure the availability of public facilities and the adequacy of those facilities including acceptable levels of service.

4. A schedule of capital improvements which includes any publicly funded project of federal, state, or local government, and which may include privately funded projects for which the local government has no fiscal responsibility. Projects necessary to ensure that any adopted level-of-service standards are achieved and maintained for the five-year period must be identified as either funded or unfunded and given a level of priority for funding.

163.3177(4)(a): Coordination of the local comprehensive plan with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region; with the appropriate water management district's regional water supply plans approved pursuant to s. 373.709; and with adopted rules pertaining to designated areas of critical state concern shall be a major objective of the local comprehensive planning process. To that end, in the preparation of a comprehensive plan or element thereof, and in the comprehensive plan or element as adopted, the governing body shall include a specific policy statement indicating the relationship of the proposed development of the area to the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, as the case may require and as such adopted plans or plans in preparation may exist.

163.3177(5)(a): Each local government comprehensive plan must include at least two planning periods, one covering at least the first five-year period occurring after the plan's adoption and one covering at least a 10-year period. Additional planning periods for specific components, elements, land use amendments, or projects shall be permissible and accepted as part of the planning process.

163.3177(6)(a): A future land use plan element designating proposed future general distribution, location, and extent of the uses of land for residential uses, commercial uses, industry, agriculture, recreation, conservation, education, public facilities, and other categories of the public and private uses of land. The approximate acreage and the general range of density or intensity of use shall be provided for the gross land area included in each existing land use category. The element shall establish the long-term end toward which land use programs and activities are ultimately directed.

163.3177(6)(a)2. The future land use plan and plan amendments shall be based upon surveys, studies, and data regarding the area, as applicable including:

a. The amount of land required to accommodate anticipated growth.

b. The projected permanent and seasonal population of the area.

c. The character of undeveloped land.

d. The availability of water supplies, public facilities, and services.

e. The need for redevelopment, including the renewal of blighted areas and the elimination of nonconforming uses which are inconsistent with the character of the community.

163.3177(6)(c): A general sanitary sewer, solid waste, drainage, potable water, and natural groundwater aquifer recharge element correlated to principles and guidelines for future land use, indicating ways to provide for future potable water, drainage, sanitary sewer, solid waste, and aquifer recharge protection requirements for the area. The element may be a detailed engineering plan including a topographic map depicting areas of prime groundwater recharge.

1. Each local government shall address in the data and analyses required by this section those facilities that provide service within the local government's jurisdiction. Local governments that provide facilities to serve areas within other local government jurisdictions shall also address those facilities in the data and analyses required by this section, using data from the comprehensive plan for those areas for the purpose of projecting facility needs as required in this subsection. For shared facilities, each local government shall indicate the proportional capacity of the systems allocated to serve its jurisdiction.

2. The element shall describe the problems and needs and the general facilities that will be required for solution of the problems and needs

including correcting existing facility deficiencies. The element shall address coordinating the extension of, or increase in the capacity of, facilities to meet future needs while maximizing the use of existing facilities and discouraging urban sprawl; conserving potable water resources; and protecting the functions of natural groundwater recharge areas and natural drainage features.

3. Within 18 months after the governing board approves an updated regional water supply plan, the element must incorporate the alternative water supply project or projects selected by the local government from those identified in the regional water supply plan pursuant to s. 373.709(2)(a) or proposed by the local government under s. 373.709(8)(b). If a local government is located within two water management districts, the local government shall adopt its comprehensive plan amendment within 18 months after the later updated regional water supply plan. The element must identify such alternative water supply projects and traditional water supply projects and conservation and reuse necessary to meet the water needs identified in s. 373.709(2)(a) within the local government's jurisdiction and include a work plan, covering at least a 10 year planning period, for building public, private, and regional water supply facilities, including development of alternative water supplies, which are identified in the element as necessary to serve existing and new development. The work plan shall be updated, at a minimum, every five years within 18 months after the governing board of a water management district approves an updated regional water supply plan. Local governments, public and private utilities, regional water supply authorities, special districts, and water management districts are encouraged to cooperatively plan for the development of multijurisdictional water supply facilities that are sufficient to meet projected demands for established planning periods, including the development of alternative water sources to supplement traditional sources of groundwater and surface water supplies.

163.3177(6)(d): A conservation element for the conservation, use, and protection of natural resources in the area, including air, water, water recharge areas, wetlands, water wells, estuarine marshes, soils, beaches, shores, flood plains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources, including factors that affect energy conservation.

1. The following natural resources, where present within the local government’s boundaries, shall be identified and analyzed and existing recreational or conservation uses, known pollution problems, including hazardous wastes, and the potential for conservation, recreation, use, or protection shall also be identified:

    a. Rivers, bays, lakes, wetlands including estuarine marshes, groundwaters, and springs, including information on quality of the resource available.

    b. Floodplains.

2. The element must contain principles, guidelines, and standards for conservation that provide long-term goals and which:

    b. Conserves, appropriately uses, and protects the quality and quantity of current and projected water sources and waters that flow into estuarine waters or oceanic waters and protect from activities and land uses known to affect adversely the quality and quantity of identified water sources, including natural groundwater recharge areas, wellhead protection areas, and surface waters used as a source of public water supply.

    c. Provides for the emergency conservation of water sources in accordance with the plans of the regional water management district.

3. Current and projected needs and sources for at least a 10-year period based on the demands for industrial, agricultural, and potable water use and the quality and quantity of water available to meet these demands shall be analyzed. The analysis shall consider the existing levels of water conservation, use, and protection and applicable policies of the regional water management district and further must consider the appropriate regional water supply plan approved pursuant to s. 373.709, or, in the absence of an approved regional water supply plan, the district water management plan approved pursuant to s. 373.036(2). This information shall be submitted to the appropriate agencies…

163.3177(6)(h)1: An intergovernmental coordination element showing relationships and stating principles and guidelines to be used in coordinating the adopted comprehensive plan with the plans of school boards, regional water supply authorities, and other units of local government providing services but not having regulatory authority over the use of land, with the comprehensive plans of adjacent municipalities, the county, adjacent counties, or the region, with the state comprehensive plan and with the applicable regional water supply plan approved pursuant to s. 373.709, as the case may require and as such adopted plans or plans in preparation may exist…

a. The intergovernmental coordination element must provide procedures for identifying and implementing joint planning areas, especially for the purpose of annexation, municipal incorporation, and joint infrastructure service areas.

163.3177(6)(h)3.b: Ensure coordination in establishing level of service standards for public facilities with any state, regional, or local entity having operational and maintenance responsibility for such facilities.

163.3180, F.S.: Concurrency.—

163.3180(1)(a): Sanitary sewer, solid waste, drainage, and potable water are the only public facilities and services subject to the concurrency requirement on a statewide basis…

163.3180(1)(b): The local government comprehensive plan must demonstrate, for required or optional concurrency requirements, that the levels of service adopted can be reasonably met. Infrastructure needed to ensure that adopted level-of-service standards are achieved and maintained for the 5-year period of the capital improvement schedule must be identified pursuant to the requirements of s. 163.3177(3). The comprehensive plan must include principles, guidelines, standards, and strategies for the establishment of a concurrency management system.

163.3180(2): Consistent with public health and safety, sanitary sewer, solid waste, drainage, adequate water supplies, and potable water facilities shall be in place and available to serve new development no later than the issuance by the local government of a certificate of occupancy or its functional equivalent. Prior to approval of a building permit or its functional equivalent, the local government shall consult with the applicable water supplier to determine whether adequate water supplies to serve the new development will be available no later than the anticipated date of issuance by the local government of a certificate of occupancy or its functional equivalent…

163.3180(3): Governmental entities that are not responsible for providing, financing, operating, or regulating public facilities needed to serve development may not establish binding level-of-service standards on governmental entities that do bear those responsibilities.

163.3191: **Evaluation and appraisal of comprehensive plan.—**

163.3191(1): At least once every 7 years, each local government shall evaluate its comprehensive plan to determine if plan amendments are necessary to reflect changes in state requirements in this part since the last update of the comprehensive plan, and notify the state land planning agency as to its determination.

163.3191(2): If the local government determines amendments to its comprehensive plan are necessary to reflect changes in state requirements, the local government shall prepare and transmit within 1 year such plan amendment or amendments for review pursuant to s. 163.3184.

163.3191(3): Local governments are encouraged to comprehensively evaluate and, as necessary, update comprehensive plans to reflect changes in local conditions…

3. UTILITIES AND JURISDICTIONS SERVED

This section contains two tables showing local government jurisdictions and the utilities that provide raw or finished water to those local governments. These utilities have treatment capacity and water use greater than 0.1 MGD.

Table D-1 identifies the local governments within the jurisdiction of the LKB Planning Area and the Public Water Supply (PWS) utilities serving those local governments. The first column in **Table D-1** lists the name of the local government, and the second column identifies whether that local government owns and operates a PWS utility (yes or no). If the local government does not own and operate a PWS utility, the third column identifies the other local government or private PWS utility or utilities providing raw or finished water to that local government.

Conversely, **Table D-2** identifies the PWS utilities providing raw or finished water to the local governments within the jurisdiction of the LKB Planning Area. The first column of **Table D-2** lists the name of the PWS utility, and the second column identifies whether the utility is local government-owned and operated (yes or no). The third column identifies the incorporated and unincorporated areas of the LKB Planning Area within that PWS utility's service area.

Table D-1. Utilities and entities that serve local governments in the LKB Planning Area.

Local Government	Local Government Utility	Other Utility Serving Local Government
Glades County		
Glades County *(unincorporated)*	No	Seminole Tribe of Florida (bulk sales from Brighton Seminole Indian Reservation to Lakeport Water Association); Okeechobee Utility Authority
Highlands County		
Highlands County *(unincorporated)*	No	Spring Lake Improvement District; City of Sebring Utilities Dept. (serving Sebring Regional Airport)
Sebring, City of	Yes	--
Okeechobee County		
Okeechobee County *(unincorporated)*	No	Okeechobee Utility Authority; Okeechobee Correctional Institution
Okeechobee, City of	Yes	Okeechobee Utility Authority

Table D-2. Utilities and local governments that serve the LKB Planning Area.

Utility Name	Local Government Utility	Local Governments Served
Glades County		
Lakeport Water Association	No	Glades County
Highlands County		
Sebring, City of	Yes	Highlands County, City of Sebring
Spring Lake Improvement District	No	Highlands County
Okeechobee County		
Okeechobee Correctional Institution	No	Okeechobee County
Okeechobee Utility Authority	Yes	City of Okeechobee; Okeechobee County; and a portion of Glades County

4. Map of Utility Areas Currently Served (2010) and Future Utility Area Service (2035)

The locations of the utilities listed in **Table D-2** are shown in **Figure D-1**. The map indicates the service areas listed for those potable utilities providing service in the portions of Glades, Okeechobee, and Highlands counties within the LKB Planning Area. Service areas in 2010 are not projected to significantly expand by 2035.

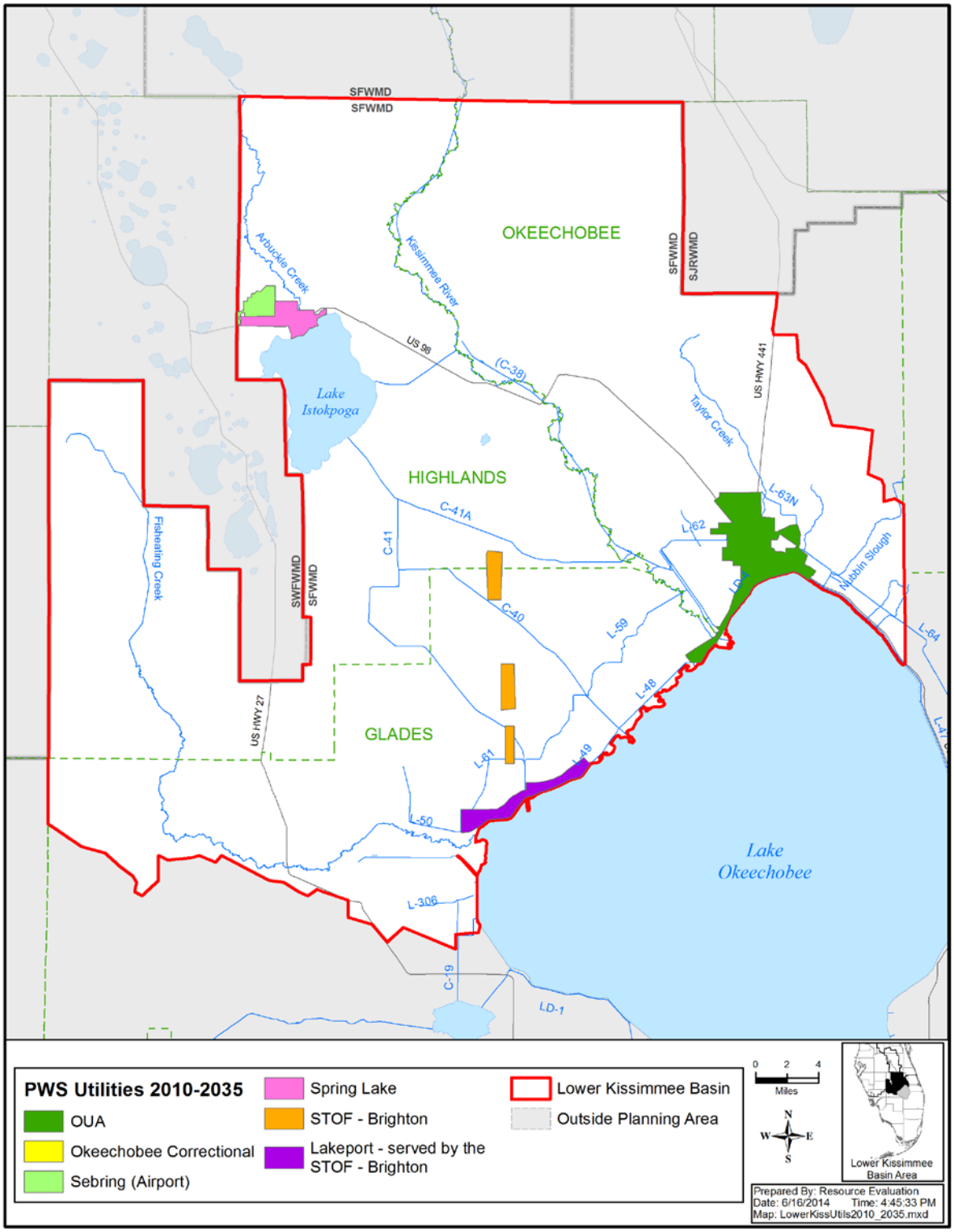
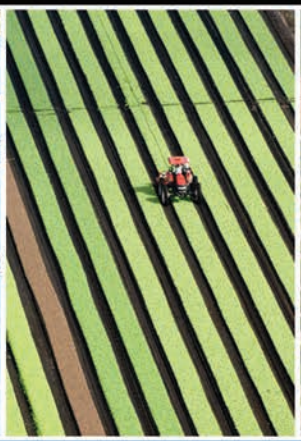
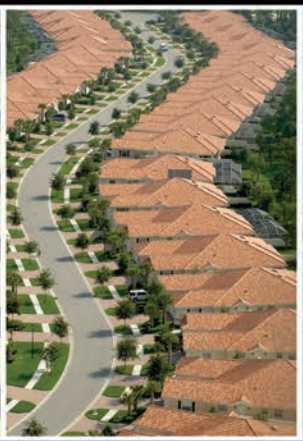


Figure D-1. 2010 Potable Utility Service Areas in LKB Planning Area.




Meeting South Florida's water supply needs while safeguarding its natural systems requires innovative solutions, cohesive planning, and a shared vision.

South Florida Water Management District

Committed to managing and protecting our region's water resources

South Florida Water Management District
3301 Gun Club Road • West Palm Beach, Florida 33406
561-686-8800 • FL WATS 1-800-432-2045 • www.sfwmd.gov
MAILING ADDRESS: P.O. Box 24680 • West Palm Beach, FL 33416-4680

sfwmd.gov