



KISSIMMEE BASIN Water Supply Plan

2005-2006 UPDATE

Acknowledgements

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Furthermore, the SFWMD expresses appreciation to all District staff who contributed to the development and production of this plan update.

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Executive Summary

The South Florida Water Management District's (SFWMD or District) strategic goal for its water supply planning efforts is to ensure an adequate supply of water to protect natural systems and to meet all existing and projected reasonable-beneficial uses, while sustaining water resources for future generations.

This *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update) supports the District's findings and recommendations in its *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan), which suggest that most future water needs be met through development of alternative water sources.

Almost 3,500 square miles in size, the Kissimmee Basin (KB) Planning Area generally reflects the drainage basin of the Kissimmee River. The KB Planning Area encompasses the portion of the SFWMD extending from southern Orange County, through the Kissimmee Chain of Lakes and the Kissimmee River, to the north shore of Lake Okeechobee. The planning area includes portions of Orange, Osceola, Polk, Highlands, Okeechobee and Glades counties.

The population in the KB Planning Area is expected to increase nearly 150 percent from Year 2000 estimates of almost 450,000 to over 1.1 million by 2025 (U.S. Bureau of the Census 2001). Portions of Orange County's population within the SFWMD are expected to more than double and Osceola County's population will triple over the next two decades. Combined growth for SFWMD's portion of Glades, Okeechobee and Highlands counties is projected to increase nearly 30 percent. Accordingly, urban water demand (public and domestic self-supply, recreational and commercial uses) in the planning area will increase by over 140 million gallons per day (MGD) along with population growth. In contrast to this growth, agricultural acreage growth trends (particularly citrus in the southern KB Planning Area) have flattened since publication of the 2000 KB Plan. However, estimated demand for agricultural water use is projected to rise approximately 1 percent to almost 118 MGD by the end of the planning period, and agriculture will be the second largest water user in the planning area.

As the KB Planning Area's population increases, demands on the region's water supply will increase 55 percent—reaching an estimated 401 MGD—within 20 years. Development of alternative water supplies will play a vitally important role in meeting water needs, as further development of traditional supplies becomes increasingly limited.

Historically, fresh groundwater from the Floridan Aquifer System and groundwater from the Surficial Aquifer System have served the KB Planning Area as traditional water sources. Additionally, in the Lower Kissimmee Basin, groundwater from the

Surficial Aquifer and surface waters from Lake Istokpoga and Lake Okeechobee have also been used as traditional sources.

Four sources were identified as possible alternative water supply source options for the KB Planning Area. These options include: brackish groundwater; fresh surface water from the Kissimmee River and Chain of Lakes and associated tributaries; runoff collection and storage; and, reclaimed water. Central Florida has long been a leader in the application of highly treated reclaimed water as a source of irrigation, industrial uses and as a means of recharging the local aquifer system. In the KB Planning Area, nearly 100 percent of wastewater is reused.

As part of the 2005–2006 KB Plan Update development process, the District solicited water supply projects from local suppliers. A total of 88 projects were submitted for evaluation, including 70 alternative water supply projects. The proposed alternative source projects include:

RECLAIMED WATER 44 projects with a combined capacity of 183 MGD by 2025.

SURFACE WATER 23 projects with a combined capacity of 91 MGD by 2025. (Several of these smaller proposed projects are stormwater collection systems for agricultural irrigation.)

BRACKISH GROUNDWATER 3 brackish groundwater projects with a combined capacity of 60 MGD by 2025.

In addition to listing proposed alternative water supply projects, this plan update provides regional project implementation strategies to planners, policy makers and utility directors. All local governments within the KB Planning Area are required to prepare 10-Year Water Supply Facilities Work Plans that identify water supply projects, and adopt revisions to their comprehensive plans within 18 months following the approval of this water supply plan update, which occurred in December 2006.

The Water Protection and Sustainability Program provides annual state revenues matched with District funds to support alternative water supply development. This combination of state and District funds is available each year through the District's Alternative Water Supply Funding Program for projects that are ready to be constructed. Eligible projects can receive up to 40 percent of the construction costs for work that can be completed within the funding period (October 1 through August 1). Funding proposals are solicited in the spring of each year.

To be eligible for cost-share funding, the specific alternative water supply projects must be identified in the appropriate water supply plan. While inclusion in this 2005–2006 KB Plan Update enables projects planned for the KB Planning Area to be eligible for funding assistance from the District's Alternative Water Supply

Funding Program, a project's inclusion in this plan update does not serve as an application for funding, nor does it guarantee funding. To apply for alternative water supply funding or for more information, see the SFWMD's Water Supply Web site at: <http://www.sfwmd.gov/watersupply>.

The 2005–2006 KB Plan Update is organized into seven chapters and 13 appendices. The following briefly summarizes each chapter:

Chapter 1 – Introduction explains the purpose of the water supply plan update, provides an overview of the planning process, and summarizes the SFWMD's accomplishments since publication of the 2000 KB Plan. New legislation as it relates to the responsibility of each of Florida's five water management districts, as well as the statutory requirements of local governments and water users are also briefly reviewed.

Chapter 2 – Demand Estimates and Projections provides an updated overview of population and water use trends, by use category, for the KB Planning Area through 2025. Water use definitions, new calculation methods and estimation models are also discussed.

Chapter 3 – Resource Analysis identifies and assesses the region's water sources. The studies, analyses and modeling tools supporting this 2005–2006 KB Plan Update are also summarized in this section of the plan update.

Chapter 4 – Issues identifies resource issues in the KB Planning Area, including the limitations on development of new traditional freshwater supplies, environmental protections for the region's natural systems, and developments related to interdistrict cooperation and coordination of planning efforts. Additionally, the State of Florida's new growth management laws as they pertain to water supply are reviewed.

Chapter 5 – Evaluation of Water Source Options reviews traditional sources, alternative water sources and storage options suitable for future use and further supply development. Comparative costs for supply development are also provided.

Chapter 6 – Water Resource Development Projects discusses the SFWMD's projects that support the Water Supply Development projects (in **Chapter 7**) for the KB Planning Area and the District's other planning areas. Water Resource Development projects are generally the responsibility of a water management district, and are intended to assure the availability of an adequate supply of water.

Chapter 7 – Water Supply Development Projects summarizes the projects anticipated to meet the KB Planning Area's water supply needs for the next 20 years. Local governments, government-owned and privately owned utilities, regional water supply authorities, multijurisdictional water supply entities, self-suppliers, and other water users are primarily responsible for Water Supply Development projects.

The primary focus is on alternative water supply projects, which are necessary to help meet future water demands.

The continued high rate of population growth in the KB Planning Area, through 2025, will require the region's increased commitment to water conservation and alternative water supply development. Comparison of water demand projections with the water supply development projects listed in this plan update indicates that existing and proposed new supplies are adequate to meet projected future water needs. The SFWMD continues to assess water resources, coordinate water resource and water supply development projects, and protect natural systems throughout the KB Planning Area, and the central and south Florida region.

The South Florida, Southwest Florida and St. Johns River water management districts have developed an action plan to facilitate coordination among these districts on water supply planning and resource regulation in the Central Florida Coordination Area. The SFWMD continues to work with adjacent water management districts and water providers in guiding the implementation of alternative water supply projects to meet future water demands.

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Acronyms and Abbreviations

ADF	average daily flow
AFSIRS	Agricultural Field Scale Irrigation Requirements Simulation
ASR	aquifer storage and recovery
AWS	alternative water supply
BEBR	Bureau of Economic and Business Research
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
CUP	consumptive use permitting
District	South Florida Water Management District
DSS	domestic self-supply
ED	electrodialysis
EDR	electrodialysis reversal
ET	evapotranspiration
F.A.C.	Florida Administrative Code
FAS	Floridan Aquifer System
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FPL	Florida Power & Light
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FY	fiscal year
GIS	geographic information system
GPD or gpd	gallons per day
HDPE	high density polyethylene
KB	Kissimmee Basin
KB Plan	Kissimmee Basin Water Supply Plan
KBMOS	Kissimmee Basin Hydrologic, Modeling and Operations Study
KUA	Kissimmee Utility Authority

Lake Toho	Lake Tohopekaliga
LEC	Lower East Coast
LOER	Lake Okeechobee and Estuary Recovery
LOPP	Lake Okeechobee Protection Program
LOW	Lake Okeechobee Watershed
LOWP	Lake Okeechobee Watershed Project
LWC	Lower West Coast
LWC Plan	Lower West Coast Water Supply Plan
MDL	maximum developable limit
MFL	minimum flow and level
MGD or mgd	million gallons per day
mg/L	milligrams per liter
MGY or mgy	million gallons per year
MIL	mobile irrigation laboratory
MODFLOW	MODular 3-dimensional finite-difference groundwater FLOW model
MOU	Memorandum of Understanding
MSL	Mean Sea Level
N/A	not applicable
NAVD	North American Vertical Datum
NGVD	National Geodetic Vertical Datum
OASIS	Operational Analysis and Simulation of Integrated Systems
OCU	Orange County Utilities
OUC	Orlando Utilities Commission
PWS	public water supply
RCID	Reedy Creek Improvement District
Restudy	Central and South Florida Comprehensive Review Study
RIB	rapid infiltration basin
RO	reverse osmosis
SAS	Surficial Aquifer System
SAV	Submerged Aquatic Vegetation
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
STA	stormwater treatment area
SWFWMD	Southwest Florida Water Management District

TBD	to be determined
TDS	total dissolved solids
TFC	thin film composite
TMDL	total maximum daily load
UEC	Upper East Coast
UKISS	Upper Kissimmee Chain of Lakes Routing Model
ULP	ultralow pressure
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA-NRCS	U.S. Department of Agriculture - Natural Resources Conservation Service
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WaterSIP	Water Savings Incentive Program
WRAC	Water Resources Advisory Commission
WSE	Water Supply and Environment
WTF	water treatment facility
WWRF	wastewater reclamation facility
WWTF	wastewater treatment facility

Introduction

The population of the Kissimmee Basin (KB) Planning Area is expected to grow by nearly 150 percent, increasing to more than 1.1 million residents between Years 2000 and 2025. Corresponding water supply and demand projections for the current 20-year planning horizon indicate traditional water sources will not continue to satisfy all of the region's growing water use demands. Meeting the updated water supply and demand projections for the current 20-year planning horizon will require a continued focus primarily on nontraditional water supply solutions. This *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update) supports the *2000 Kissimmee Basin Water Supply Plan's* (2000 KB Plan) findings and recommendations, which call for development of alternative water sources to meet most of the region's new water supply needs.

Working closely with the South Florida Water Management District (SFWMD or District), local governments and water suppliers play a key role in identifying the water supply projects to be included (or proposed for inclusion) in local comprehensive plans. This 2005–2006 KB Plan Update describes and meets current statutory requirements, including a listing of proposed alternative water supply projects and regional project implementation strategies for planners, policy makers and utility directors.

PURPOSE

This 2005–2006 KB Plan Update addresses the anticipated water supply needs of the KB Planning Area for the next 20 years and how these needs will be met. Although some traditional supply development may be possible given appropriate local conditions, the majority of new water needs will be met through the development and funding of alternative water supplies. In addition, this 2005–2006 KB Plan Update contains a list of alternative water supply projects for Fiscal Years 2006–2025. The alternative water supply projects listed in this plan update are eligible for cost-sharing consideration through a separate annual

NAVIGATE

The 2005–2006 KB Plan Update consists of this Planning Document and Appendices. In addition, the accompanying CD contains electronic versions of this update package, as well as the *Consolidated Water Supply Plan Support Document*, supporting studies, documentation, data and the previous 2000 KB Plan. This material is also available from the District's Water Supply Plan Web site: <http://www.sfwmd.gov/watersupply>.

funding process that is established by the SFWMD Governing Board consistent with statutory requirements.

Florida Water Law

LAW / CODE

Section 373.0361(1), Florida Statutes (F.S.), provides:

The governing board of each water management district shall conduct water supply planning for any water supply planning region within the district identified in the appropriate district water supply plan under Section 373.036, where it determines that existing sources of water are not adequate to supply water for all existing and future reasonable-beneficial uses and to sustain the water resources and related natural systems for the planning period.

The legal authority and requirements for water supply planning are included in Chapters 187, 373 and 403 of the Florida Statutes. During the State of Florida's 2005 legislative session, lawmakers revised state water law, strengthening the link between land use and water supply planning and creating the Water Protection and Sustainability Program. The alternative water supply portion of this program is intended to reduce competition between users and natural systems for available water by encouraging the development of alternative water supplies. Chapter 4 of the *Consolidated Water Supply Plan Support Document* (SFWMD 2005–2006) further describes the Water Protection and Sustainability Program.

The new statutory provision tightens the connection between regional water supply plans and the potable water provisions contained within each local government's comprehensive plan. This portion of the law is designed to ensure that adequate potable water facilities are constructed and concurrently available with new development. All local governments within the KB Planning Area are required to prepare 10-Year Water Supply Facilities Work Plans that identify water supply projects, and adopt revisions to comprehensive plans within 18 months following the approval of this water supply plan update.

The Water Protection and Sustainability Program

provides annual state revenues and matching District funds to support alternative water supply development, such as construction of desalination, reclaimed water and new storage facilities. This combination of state and District funds is specifically for



Strengthening the Link between Regional
Water Supply Planning and Local
Government Comprehensive Planning

cost-sharing alternative water supply project construction costs. The program also adds permitting incentives for water providers selecting projects recommended by the water supply plans.

Regional Water Supply Plans

DISTRICT 

Role of the South Florida Water Management District

The South Florida Water Management District (SFWMD or District) performs water supply planning for each region within its jurisdiction. The District’s mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems and water supply. The agency serves local governments by supporting efforts to safeguard existing natural resources and meet future water demands.

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 minimum 20-year future planning horizon and are updated every five years. Each regional water supply plan update provides revised water demand estimates and projections; an evaluation of existing regional water resources; identification of water supply-related issues; a discussion of present water source options; water resource and water supply development components including funding strategies; and, recommendations for meeting projected demands for the region. In

addition, the 2005–2006 KB Plan Update includes a discussion of minimum flows and levels (MFLs) established within the planning area; MFL recovery and prevention strategies where appropriate; water reservations adopted by rule; technical data; and, support information.

PLAN GOAL AND OBJECTIVES

The SFWMD’s strategic goal for all of its water supply planning efforts is to ensure an adequate supply of water to protect natural systems and to meet all existing and projected reasonable-beneficial uses, while sustaining water resources for future generations. Additionally, an objective of the 2005–2006 KB Plan Update is to identify sufficient sources of water to meet the needs of all reasonable-beneficial uses within the KB Planning Area (**Figure 1**) for the Year 2025 during a 1-in-10 year drought event, while sustaining the region’s water resources and related natural systems.

2005–2006 Kissimmee Basin Plan Objectives

The SFWMD established the Water Resources Advisory Commission (WRAC) to serve 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. Commission members

represent environmental, urban and agricultural interests from all four of the District's water supply planning areas.



The SFWMD held Water Supply Plan WRAC Issue Workshops throughout the water supply planning process. Stakeholders representing a cross-section of interests in the region—agricultural, industrial, environmental protection, utilities, local government planning departments, and state and federal agencies—attended the workshops. During the workshops, participants reviewed and provided comments for projected demands compiled by District staff. Individual meetings were held with local government planning departments and utilities, as well as agricultural industry representatives to discuss water demand

projections and coordinate planning processes.

At regional WRAC Issue Workshops, stakeholders developed the following objectives for this plan update, which provide an overall framework for the planning process. The objectives were modified from those developed for the 2000 KB Plan.

- ◆ Identify alternative water supply resources where deemed necessary.
- ◆ Protect natural systems from harm due to water uses.
- ◆ Provide options for a 1-in-10 year level of certainty for all reasonable-beneficial uses of water.
- ◆ Promote compatibility of plan with tribal and local government land use decisions.
- ◆ Promote compatibility and integration with other state and federal regional water resource initiatives.
- ◆ Promote water conservation and efficient use of water resources.
- ◆ Refine water supply demand projections for average and 1-in-10 year level of certainty.
- ◆ Identify adequate funding to support identified water resource development and supply development projects.

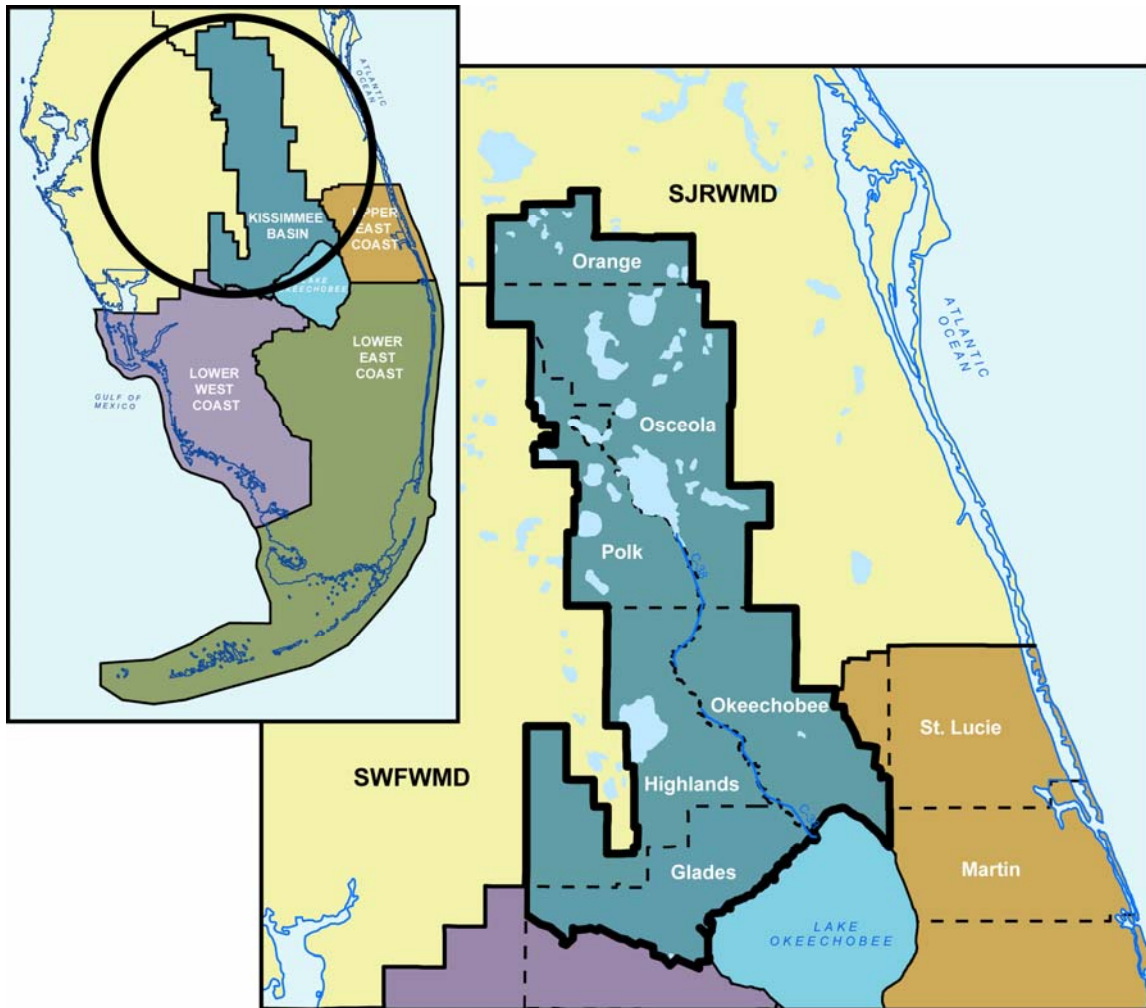


Figure 1. SFWMD Kissimmee Basin Planning Area.

Characteristics of the Kissimmee Basin Planning Area

The boundary of the Kissimmee Basin (KB) Planning Area generally reflects the drainage basin of the Kissimmee River. The KB Planning Area encompasses the portion of the South Florida Water Management District (SFWMD or District) extending from southern Orange County, through the Kissimmee Chain of Lakes and the Kissimmee River, to the north shore of Lake Okeechobee. The area includes parts of Orange, Osceola, Polk, Highlands, Okeechobee and Glades counties.

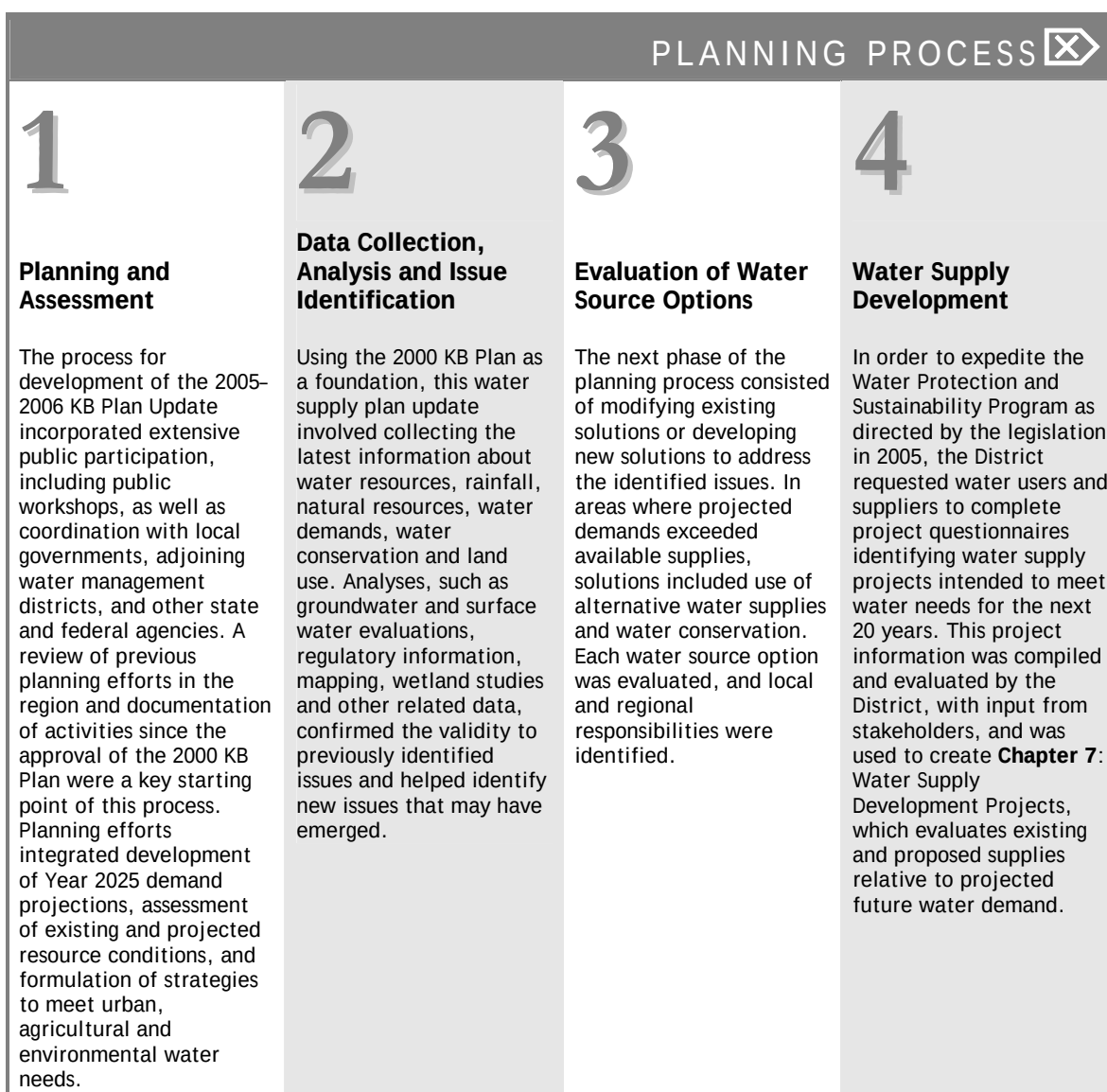
For planning purposes, the KB Planning Area can be divided into northern and southern portions at the outlet located at the southern end of Lake Kissimmee. The Northern KB Planning Area, which is also known as the Upper Kissimmee Basin, encompasses an area of 1,368 square miles, including 176 square miles consisting of

lakes. These lakes are linked by streams and canals, forming the Kissimmee Chain of Lakes. The Southern KB Planning Area, which is also known as the Lower Kissimmee Basin, covers 2,109 square miles (44 square miles are lakes).

The northern and eastern boundaries of the KB Planning Area are adjacent to the St. Johns River Water Management District (SJRWMD), and the western boundary of the planning area borders the Southwest Florida Water Management District (SWFWMD). Orlando and portions of Orange County reside in multiple water management districts. **Figure 1** shows the KB Planning Area in relation to the SWFWMD and other water management districts.

The following provides additional background about the KB Planning Area:

- ◆ The region covers approximately 3,490 square miles.
- ◆ Population is expected to exceed 1.1 million by 2025. (Over 90 percent of this growth will be in the Northern KB Planning Area).
- ◆ Metro-Orlando area (Orange, northern Osceola and northeast Polk counties) is undergoing rapid urban growth.
- ◆ Moderate urban growth and increased agricultural activity is expected for Okeechobee, Glades and Highlands counties.
- ◆ The primary source of water for the Northern KB Planning Area is groundwater from the Floridan Aquifer; the traditional source of water for the Southern KB Planning Area is surface water from Lake Istokpoga and Lake Okeechobee.
- ◆ Alternative water sources include reclaimed water and surface water in the Northern KB Planning Area and additional groundwater from the Floridan Aquifer in the Southern KB Planning Area.
- ◆ Projections for Year 2025 indicate average annual water demand will increase 55 percent to approximately 401 million gallons of water per day (MGD). Urban-related water demands during this time frame will increase to about 284 MGD, with public water supply surpassing agriculture as the area's largest water consumer. Agricultural demands will increase by about 1 MGD to almost 118 MGD, overall. County population data and related water usage are discussed in detail in **Chapter 2: Demand Estimates and Projections**.



Coordination with Other Partners

The SFWMD also works in cooperation with the adjacent St. Johns River Water Management District (SJRWMD) and the Southwest Florida Water Management District (SWFWMD). Jurisdiction boundaries of the three districts actually split the greater metropolitan Orlando area and multiple counties within the KB Planning Area.

Representatives of all three water management districts and the Florida Department of Environmental Protection (FDEP) attended several regional water supply workshops and subgroup meetings. Coordination between districts also occurs with water resource investigation, planning, regulation and water shortage declarations. A Memorandum of Understanding (MOU) between the three districts outlines terms of the agencies’ formal collaboration, processes and agreements.

During the development of this 2005–2006 KB Plan Update, the three districts initiated a new effort to address water supply issues in the region, which was identified as the Central Florida Coordination Area (CFCA). The planning document produced by the three districts provided the following summary:

“In general, the districts have jointly concluded that the availability of sustainable quantities of groundwater in central Florida is insufficient on a regional basis to meet future demands and there is an immediate need to develop and implement alternative water supply (AWS) projects in addition to continued aggressive conservation and reuse of reclaimed water. The time necessary to implement AWS projects will necessitate allocation of groundwater consistent with 2013 projected demands. Beyond the 2013 level of demand, AWS sources must be developed to meet future demands. In some instances, specific conditions may require allocations from traditional groundwater be less than 2013 demand or require specific actions be taken to avoid or mitigate harm that would occur from the 2013 demand at a specific location. In other areas, specific conditions may allow slightly increased allocation. But, the conclusion is clear, within the next 5 to 6 years PWS utilities in central Florida must be prepared to move to alternative water supplies as a critical component of meeting future demands.” (SFWMD *et al.* 2006)

Elements of this KB Plan Update will be incorporated into the CFCA planning process. This information will range from population and demand projections to potential alternative water supply projects.

Seminole Tribe Agreement

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 between the Tribe, the State of Florida and the District on issues concerning water resources. Of particular importance for development of this plan update are the Compact provisions concerning the Tribe’s Brighton Reservation water entitlement.

The Brighton Reservation water entitlement was further detailed in an agreement, which was executed by the Tribe and the SFWMD in November 1992 after publication of a District technical report. This agreement outlines surface water control strategies to assure maximum reliability of delivering the 15 percent water entitlement set forth in the Compact for the Brighton Reservation, which is located in Glades County. The Agreement also outlines the schedule of releases from Lake Istokpoga and operation schedules for the pumps at the S-71 and S-72 structures. The proposed development of the Southern Indian Prairie Basin Operation Plan has direct bearing on this agreement and is further explained in **Chapter 3: Resource Analysis**.

ACCOMPLISHMENTS

In preparing the 2000 KB Plan, the planning process analyses identified key regional issues. These issues included a significant increase in demand for public water supply use in the Northern KB Planning Area, limitations placed on surface water withdrawals in the Indian Prairie Basin, and potentially harmful environmental impacts to lakes, springs and wetlands.

To resolve these issues, the 2000 KB Plan contained seven strategies, which were organized into a series of recommendations and related project tasks. Responsibility for the development of each of the plan's projects required local and regional stakeholder participation.

Twenty-three of the 30 tasks outlined in the 2000 KB Plan were initiated during plan implementation. Seven tasks were not implemented due to funding shortfalls or as new information rendered specific projects economically or technically infeasible. Major efforts completed or initiated since development of the 2000 KB Plan include:

- ◆ Completion of the Regional Reuse Plan.
- ◆ Evaluation of Stormwater Systems.
- ◆ Studies and Investigations of Alternative Water Sources, including the Kissimmee River.
- ◆ Floridan Aquifer Modeling.
- ◆ Revision of the Operational Plan for the Indian Prairie Basin.
- ◆ Investigation of Regional Storage Options.
- ◆ Increased Regulatory and Planning Coordination Among Districts.

The Five-Year Water Resource Development Work Plan, contained in the SFWMD's annual *South Florida Environmental Report, Volume II*, provides the status of ongoing water resource or water supply related activities. **Appendix C** tracks all the projects as originally detailed in the 2000 KB Plan.

Reclaimed Water

Reclaimed water is expected to play an increasingly significant role in meeting future water demands of the KB Planning Area. Central Florida is a leading reclaimed water supply user (100 percent), using reclaimed water for potable replacement and aquifer recharge. Water Conserv II in Orange County is the largest water reuse project of its kind in the world. It currently provides reclaimed water for irrigation to golf courses, landscape and foliage, nurseries, tree farms, a fernery, six residential neighborhoods, and 3,200 acres of citrus groves. It also provides reclaimed water to 3,725 acres of rapid infiltration basins (RIBs) for recharge of the Floridan Aquifer.



Water Conserv II Reclaimed Facility

Strategy 1.0 in the 2000 KB Plan addressed minimizing Floridan Aquifer drawdown through recharge using reclaimed water and storm water, particularly in Orange, Osceola and western Polk counties. Recommendation 1.1 focused on reclaimed water use planning, which consisted of three major components: development of a reuse plan, hydrologic investigations of the shallow aquifer and a pilot project involving direct injection of reclaimed water into the Floridan Aquifer System (FAS).

The *2005 Central Florida Regional Reuse Evaluation* (SFWMD 2005) concluded that

reclaimed water availability is projected to increase 98 percent for the study area by 2025, totaling approximately 244 MGD. Potential demand for reclaimed water for the same period is estimated to increase to an amount in excess of 261 MGD. Nearly all reclaimed water providers have identified a plan to maximize projected reclaimed use as part of their alternative supply strategy. Additionally, aquifer recharge was determined to be a beneficial use of reclaimed water in the central Florida area. The completed study also identifies, by utility, possible reuse demand, locations and system improvements that can help maximize reclaimed water use in the future. A copy of this report is included in **Appendix H**.

The second component of this effort involved investigating the connection of the Surficial and Floridan aquifers in central Florida to gain greater insight into the benefits of reclaimed water use for aquifer recharge. This study also contributed to the District's understanding of the aquifer connection in the KB Planning Area. From 2002 to 2005, the SFWMD invested nearly \$1.1 million to place paired shallow and Floridan Aquifer wells at 32 sites. Each station contains continuous water level recorders monitored by the District.

The third component of the 2000 KB Plan Recommendation 1.1 proposed a Reclaimed Water Injection Aquifer Recharge Pilot Study be conducted by the District in partnership with a local sponsor. The purpose of the study was to evaluate the benefits of injecting treated reclaimed water into the Floridan Aquifer as a form of aquifer recharge. The District completed a feasibility assessment in 2002, which demonstrated that development and operational costs were similar to that of other water supply alternatives. As part of this work, a pilot-testing program was developed; however, efforts to begin pilot-testing with an exploratory well were postponed due to lack of local support.

Storm Water

Recommendation 1.2 was related to stormwater reuse, which, like reclaimed water, could potentially offset freshwater withdrawals from the Floridan Aquifer. Efforts undertaken in the KB Planning Area included evaluations of the regional stormwater drainage systems; the regulatory, water quality and recharge aspects of drainage wells; and, alternative treatment methods for storm water entering drainage wells.

From 2001 through 2003, the SFWMD participated in an Artificial Recharge Project, led by the SJRWMD, which reviewed passive treatment options for lake and street drainage wells. The project also studied methods for maximizing recharge through infiltration basins. Initial results showed bacterial components rapidly disappeared, but other chemical components, including arsenic, had longer residence times. The SJRWMD has made progress in monitoring the fate of chemical and biological contaminate concentrations of injected storm water in drainage wells and continues to monitor the water quality of this project.

Also in 2002, the SFWMD initiated a survey of stormwater drainage wells with the SJRWMD and Orange County Utilities. The purpose of the study, completed in February 2003, was to create a geographic information system (GIS)-based inventory and database of information about central Florida's 300 plus drainage wells. Many of the wells have been in place since the 1960s and provide an estimated 30 MGD to 50 MGD of aquifer recharge within the metro-Orlando area. A local consulting firm inspected the wells and completed an inventory of the drainage wells located in Orange, Seminole, Lake and Osceola counties. This inventory project was also used to address needed maintenance issues for some wells and helped identify potential sites for the stormwater treatment portion of the study.

In 2004 and 2005, the Nashville Street drainage well was selected as the site for testing a combined storage area and storm-scepter™ concept to improve water quality. The construction was completed in 2005. Water quality sampling, by Orange County, to determine possible water quality improvements resulting from the installation is ongoing.

Water Conservation

The 2000 KB Plan's Recommendation 2.1 relates to water conservation. In 2002, the District established an organizational unit within its Water Supply Program to address water conservation initiatives. This new division manages the Alternative Water Supply Funding Program, the Mobile Irrigation Lab Program and the Water Savings Incentive Program (WaterSIP). The WaterSIP is a 50-50 cost-sharing program, which funds noncapital cost projects for utilities and property owner associations. The WaterSIP Program has funded projects for weather station

irrigation controllers, indoor plumbing retrofits and outdoor irrigation retrofits, (e.g., rain sensors).

The Alternative Water Supply Grant Program was opened to the KB Planning Area in 2003. Over \$2 million in project funding has been awarded since the program's inception. The SFWMD conservation and regulatory division staff have worked with utilities throughout the planning area to identify opportunities for water conservation.

District staff members are actively involved in the Florida Water Conservation

Initiative led by the FDEP. In addition, the SFWMD continues to be a part of the Statewide Reuse Coordinating Committee to discuss statewide reuse issues.



A Mobile Irrigation Staff Member Teaches Water Conservation to Students

Alternative Water Resources



Lake Tohopekaliga

Following reclaimed water, the 2000 KB Plan identified the use of surface water as the second most viable alternative water source option. Surface water sources identified in Recommendation 3.1 for further investigation included the Kissimmee River, Kissimmee Chain of Lakes, Alligator Chain of Lakes and the St. Johns River.

The SFWMD conducted evaluations of Lake Tohopekaliga, East Lake Tohopekaliga and its tributaries, and Boggy and Shingle creeks, all of which are part of the Kissimmee Chain of Lakes

system. The study, which provides a preliminary estimate on the availability of supplies from the system, was completed in 2005. Results of the study suggest significant volumes of water might be withdrawn from the Kissimmee Chain of Lakes, while causing limited changes to the identified environmental criteria. The findings also show this source is drought-prone and development of storage is likely

an important component of source reliability. Boggy and Shingle creeks are slightly more reliable water sources, potentially yielding an average of 4 MGD and 6 MGD, respectively. A summary of these studies is located in **Appendix I**. Continued efforts to evaluate the potential water yield from these sources have been combined with the SFWMD's effort to review operation of surface water control structures for the Kissimmee Chain of Lakes.

In a related project, the SFWMD sponsored the Toho Water Authority's efforts to develop water supplies from Shingle Creek as a supplemental source of reclaimed water in 2003, 2004 and 2006. Estimated water generated from this effort is 4.0 MGD. District funding exceeded \$1.1 million for the project during Fiscal Years 2003–2006. This project was completed in 2006.



Shingle Creek

As recommended in the 2000 KB Plan, the SFWMD also coordinated efforts with the SJRWMD to investigate water resource development opportunities using surface water supplies from the St. Johns River. The largest of these projects is the St. Johns River/Taylor Creek Project, which is estimated to yield 40 MGD to 60 MGD of additional water supply.

In the 2000 KB Plan, Recommendations 4.1.a-e prescribed the pursuit of water resource development solutions involving water supplies originating from Lake Okeechobee and the Kissimmee River.

An investigation of the Kissimmee River as an alternative water resource was combined with efforts to model the Kissimmee River system, which is currently under way as part of the Kissimmee Basin Hydrologic, Modeling and Operations Study (KBMOS).

Groundwater Resources

The SFWMD spent over \$3 million (Fiscal Years 2000–2006) for the construction and testing of a series of wells designed to obtain new information about the Floridan Aquifer System (FAS) in central Florida, particularly the lower portion of the aquifer. Thirteen wells were constructed and tested in the Floridan Aquifer. Six of the wells were constructed into the Lower Floridan Aquifer. These sites were constructed in cooperation with the Reedy Creek Improvement District, Orange County, Orlando Utilities Commission and the SJRWMD.

Lake Istokpoga Management Plan



Lake Istokpoga

Strategy 5.0 in the 2000 KB Plan addressed development of a water management plan for the Lake Istokpoga–Indian Prairie Basin. Lake Istokpoga had been identified as a water source to supply expanding agricultural demands in the Southern KB Planning Area. As recommended in the 2000 KB Plan, the SFWMD performed a comprehensive evaluation of the lake’s basin resources as part of the effort to revise the operational plan for the Lake Istokpoga and Indian Prairie system. Additionally, the SFWMD installed two new water level monitoring stations in

Lake Istokpoga at a cost of approximately \$60,000. These stations will improve the District’s ability to monitor lake levels and make operational decisions based on this information.

Additionally, as part of this review, a study of the regulation schedule for Lake Istokpoga was performed. This review was combined with the Lake Okeechobee Watershed (LOW) effort for improving water quality within the Lake Okeechobee watershed. An Operational Analysis and Simulation of Integrated Systems (OASIS)-based model was developed for the review of Lake Istokpoga operations. The analysis showed that with the current flood control and environmental based requirements, little improvement could be made for water supply deliveries.

Each year the District updates the list of priority water bodies for the establishment of minimum flows and levels (MFLs). In December 2005, the SFWMD adopted, by rule, a minimum flow and level for Lake Istokpoga, which was also part of the recommended scope of the revised operational plan.

Regional Storage

Another recommendation in the 2000 KB Plan involved a review of surface water storage options, such as a regional reservoir or stormwater treatment areas (STAs), to improve water supply dependability within the Indian Prairie Basin in Glades and Okeechobee counties. The SFWMD’s regulatory staff worked with individual farmers to create storage areas to retain water on specific sites. Work on a regional reservoir was deferred until the Lake Okeechobee Watershed Project (LOWP), led by the U.S. Army Corps of Engineers (USACE), identifies a suitable location for the reservoir north of Lake Okeechobee.

Regulatory and Interdistrict Coordination

Recommendations based on Strategies 6.0 and 7.0 in the 2000 KB Plan emphasized the need for better agency coordination and continued rulemaking efforts, respectively. A Memorandum of Understanding (MOU) between the SFWMD and the KB Planning Area's neighboring water management districts, the SJRWMD and SWFWMD, has been in place since 2000. The MOU was updated in 2003.

In 2006, the three districts began a new program to address water supply issues in the Central Florida Coordination Area, as described earlier in this chapter. This effort includes a regulatory component. The CFCA Guiding Principles addresses regulatory issues:

“Until AWS projects are implemented, the parties recognize there may be a need to address several critical interests. These interests include the desire to: (1) allocate amounts of water that will not cause harm, (2) make and have equitable and sufficient allocations of water to satisfy short-term demands, and (3) require AWS development projects to help meet the future long-term needs of the entire central Florida region.”

Consumptive use permitting rules were revised regarding the 1-in-10 year level of certainty, resource protection criteria, water shortage triggers, saltwater intrusion, special designations and permit duration. The rules were revised and approved in 2002 and 2003 and included in the District's *Basis of Review for Water Use Permit Applications* (SFWMD 2003), which requires that withdrawals of water must not cause adverse impacts to environmental features that are sensitive to magnitude, seasonal timing and duration of inundation.

Recommendations Not Completed from the 2000 KB Plan

While the District accomplished a great deal of the work proposed by the 2000 KB Plan, certain recommendations were either not feasible, too costly or conflicted with ongoing efforts by the state within the KB Planning Area. Among the more significant efforts not completed are the Southern Indian Prairie Basin Operations Plan, the Reclaimed Water Injection Aquifer Recharge Pilot Study, and the determination of Surface Water Availability from the Kissimmee Chain of Lakes. As described in **Appendix C**, efforts to initiate all of these recommendations were made and some form of evaluation was completed for each.

WATER SUPPLY PLANNING FOR THE NEXT 20 YEARS

To determine the water supply needs of the KB Planning Area for the next 20 years, establishing baseline and projected water use information is part of the planning process. **Chapter 2** presents the demand estimates and projections by water use category.

SUMMARY

The 2005–2006 KB Plan Update represents an update to the 2000 KB Plan. Many of the objectives of the 2000 KB Plan were met and helped in the development of this plan update. Since the initial development of the 2000 KB Plan, several legislative changes have occurred to link the findings of subsequent planning efforts to local government comprehensive planning efforts, most notably the development of 10-Year Water Supply Facilities Work Plans, which are required within 18 months after the completion of this plan update.

Demand Estimates and Projections

The Year 2025 is identified as the planning horizon for the assessment of water use impacts. By the end of this 20-year water planning time frame, average water demand is projected to increase 55 percent. In 2000, the total estimated water use for the Kissimmee Basin (KB) Planning Area was approximately 258 million gallons per day (MGD). Current trends indicate average water demand will reach 401 MGD by 2025. Agriculture, historically the region's largest water user, will soon be surpassed by Public Water Supply as the area's population continues to increase and agricultural lands decrease. This significant shift in water demand poses several challenges for water supply planners, especially since water supplies available for new uses from the region's traditional resources are limited.

Year 2000 served as a baseline for the *2005–2006 Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update), as well as for the planning efforts of the St. Johns River Water Management District (SJRWMD) and the Southwest Florida Water Management District (SWFWMD). The estimations of baseline and projected water use information are important steps in assessing the impacts from increases in traditional water use. Establishing a baseline period allows for the collection of water use records and estimation of unit rates of use to make projections.

LAW / CODE

A 1-in-10 year drought event is an 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. Subsection 373.0361(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.

NAVIGATE

Appendix D provides a full description of the methods used to estimate water use for each major usage category and includes estimates of both the customer demands discussed here and the raw water withdrawals, which would result from implementation of the projects discussed in **Chapter 7**.

DEMANDS BY WATER USE CATEGORY

Under average water use conditions, total water demand for the KB Planning Area is projected to increase by over 140 MGD to 401 MGD. The region's more heavily populated Orange and Osceola counties will continue to require a majority of the Public Water and Domestic self-supplies. And, as urban development displaces additional farmland, agricultural activities will be concentrated in the Lower Kissimmee Basin.

Water demand estimates for Year 2000 and projections through Year 2025 were made in five-year increments for each of the six water use categories (defined to the right). Key points specific to the KB Planning Area for the period of 2005 to 2025 include:

- ◆ Regionwide, Public Water Supply demands are expected to double by the Year 2025. This water supply category will represent approximately 59 percent of the region's total water demands.
- ◆ Agricultural water use, which is projected to show modest overall growth of about 1 percent, will be the second largest consumer of water (29 percent of total demand) in the Kissimmee Basin Planning Area.
- ◆ Thermoelectric Power Generation Self-Supply is expected to grow by less than 1 percent. Future water demand projections for the Kissimmee Utility Authority (KUA) are expected to increase; however, this demand will be met by reclaimed water provided by the Toho Water Authority. The KUA's projected water use is included in the Toho Water Authority's water demand projections.
- ◆ The remaining water use categories—Domestic Self-Supply, Commercial and Industrial, Recreational and Landscape—will also experience increased demands totaling almost 12 percent of water usage by Year 2025.

DISTRICT

Water Use Categories

Public Water Supply refers to all potable (drinking quality) water supplied by water treatment facilities with projected average pumpages for 2025 greater than 100,000 gallons per day (GPD) for all types of customers. The remaining water use categories are all self-supplied.

Domestic Self-Supply reflects households served by small utilities (less than 100,000 GPD) and/or private wells.

Agricultural water is used for crop irrigation, livestock watering and aquaculture.

Commercial and Industrial water uses are business operations using a minimum water quantity of 100,000 GPD.

Thermoelectric Power Generation water is consumed by power plants in the production of electricity.

Recreational water use includes golf course irrigation demand. The Landscape subcategory includes water used for parks, cemeteries and other self-supplied irrigation uses with demands greater than 100,000 GPD.

Providing for these increased demands requires a commitment to a coordinated water planning effort. **Figure 2** shows the average water demands by use category.

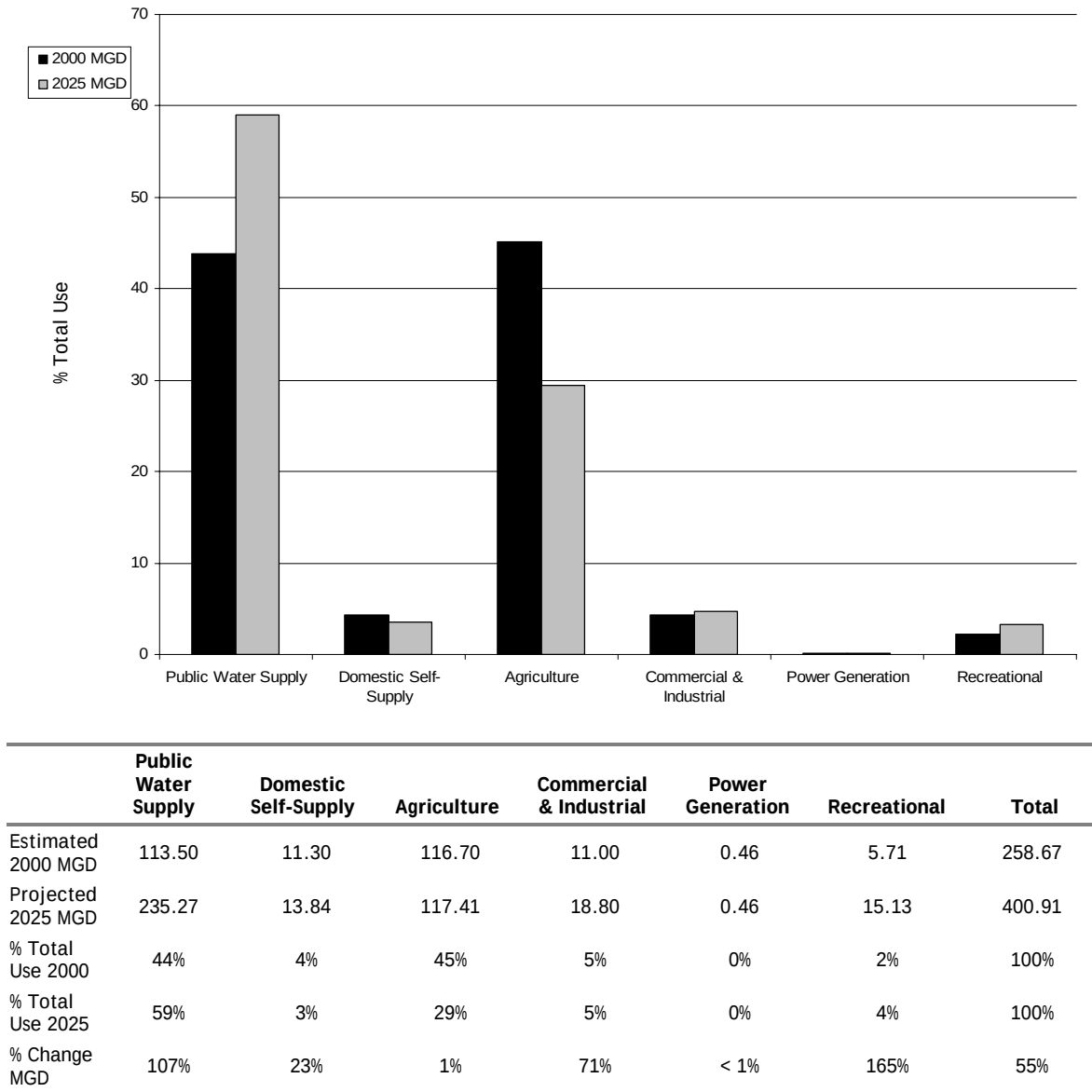


Figure 2. Water Categories as a Percentage of Total Demand in Bar Chart and Average Year Demands and Percentage of Growth in Tabular Chart.

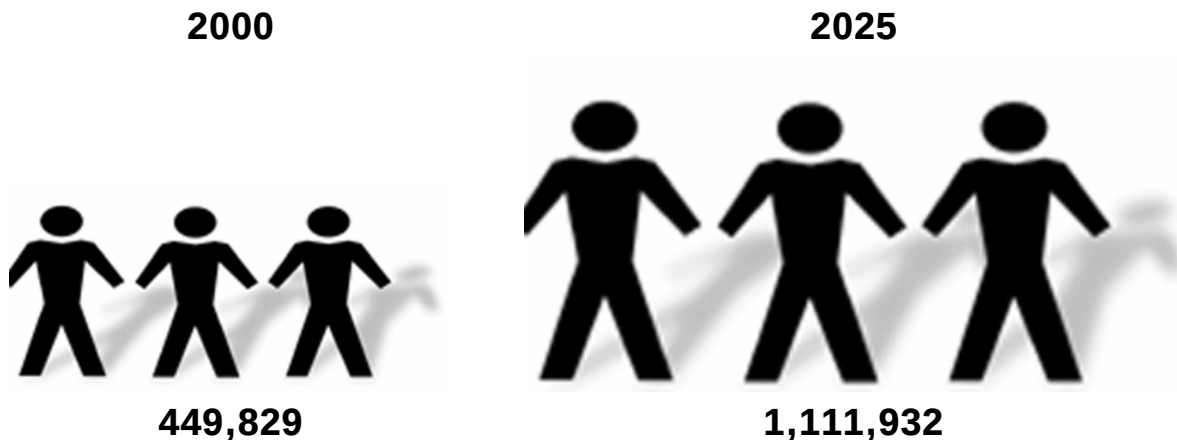
POPULATION AND WATER USE TRENDS

The region's population is expected to increase approximately 150 percent from Year 2000 to Year 2025. As indicated in **Table 1**, the portions of Orange and Osceola counties located within the KB Planning Area will experience the greatest rates of growth. **Table 1** provides a summary of the population estimates for the counties located in the KB Planning Area. The distribution of population estimates to individual utilities is based on historical data and projected distributions of population to traffic zone analyses and utility service areas. **Figure 2** provides a summary of the projected water demands under average year conditions between Year 2000 and Year 2025 for all water supply categories.

Table 1. Population in the KB Planning Area, 2000-2025.

County Area	Population	2000			2025	
		Public Water Supply	Domestic Self-Supply	Projected Population	Public Water Supply	Domestic Self-Supply
Southern Orange	220,065	216,508	3,557	513,619	491,118	22,510
Western Osceola	171,416	152,180	19,236	517,000	489,206	27,803
Eastern Polk	13,726	6,389	7,337	22,508	14,971	7,537
Eastern Highlands	7,636	1,722	5,914	10,794	2,168	8,626
Northern Glades	3,665	2,529	1,136	4,956	3,324	1,632
Western Okeechobee	33,321	19,742	13,579	43,055	28,557	14,498
Total	449,829	399,070	50,759	1,111,932	1,029,344	82,606

Source: U.S. Bureau of the Census, 2001, and University of Florida Bureau of Economic and Business Research, 2004.



Public Water Supply and Domestic Self-Supply

The population of Orange County is expected to more than double over the next two decades, and Osceola County's population will triple during the same time period. Combined growth for Glades, Okeechobee and Highlands counties is anticipated at a nearly 30 percent increase.

Public Water Supply and Domestic Self-Supply water use are tied to estimates and projections of permanent



Downtown Orlando

resident population and historical per capita water use rates. With the increase in the full-time resident population, seasonal fluctuations have less impact on overall water demand. County level estimates and projections of population for all counties are consistent with the 2000 Census of population and medium population projections from the University of Florida, Bureau of Economic and Business Research (BEBR 2001).

The urban demand assessment for Public Water Supply and Domestic Self-Supply water use incorporated medium population data from the U.S. Bureau of the Census and BEBR for all counties in the region with the exception of western Osceola County. Consistent with the requirements of Subsection 373.0361(2)(a), Florida Statutes (F.S.), the SFWMD used the county's BEBR high value estimate for its population. Osceola County received authorization from the Florida Department of Community Affairs (FDCA) to use the high BEBR estimate for its population as supported by that local government's comprehensive plan.

All projections were coordinated with the utilities and their local government comprehensive plan population projections using the best information available. Estimates for public and domestic water use were developed based on Year 2000 per capita use rates by utility and the distribution of BEBR population estimates into and outside of utility service areas using geographic information system (GIS) techniques.

The demand for Public Water Supply is expected to double from almost 114 MGD in Year 2000 to over 235 MGD by Year 2025 in the KB Planning Area. Domestic Self-Supply will increase 23 percent, from over 11 MGD to almost 14 MGD.

Conservation measures were not factored into the demand projections used in this chapter. Since conservation is considered a water source option, it is discussed in **Chapter 5: Water Source Options**.

Agricultural Water Use

Agricultural water demand reflects projected irrigated acreage, crop and soil types, growing seasons, and irrigation system types and strategies.

While the Agricultural water use category is expected to change from 45 percent of current total water demand to 29 percent by 2025, estimated demand for Agricultural water use is projected to rise approximately 1 percent to an estimated 118 MGD.



Irrigation of Field Crops

Economic forecasting for agricultural areas rapidly transitioning to urban use has been an added challenge for water planners. The 2005–2006 KB Plan Update estimates of new agricultural operations are more conservative than those created for the 2000 *Kissimmee Basin Water Supply Plan* (2000 KB Plan). Agricultural acreage growth trends (particularly citrus in the Southern KB Planning Area) have flattened in recent years. This trend was not observed at the time of the 2000 KB Plan. For example, the projection for irrigated agricultural acreage in the 2000 KB Plan anticipated

a significant increase in citrus acreage (the dominant crop in the region), whereas this 2005–2006 KB Plan Update anticipates a modest decline. Residential development, environmental restoration, and loss of citrus acreage to past freezes and disease are some reasons for the decline in irrigated agricultural acreage. Additionally, in 2000, several agricultural corporations in the region were indicating significant expansion plans for vegetable and row crops; however, as of this plan update, these expansions have not been fully pursued.

Agricultural Self-Supply demand calculations for this 2005–2006 KB Plan Update were made using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model. A change from the use of the Blaney-Criddle method to AFSIRS was made because the AFSIRS was regarded to more accurately predict actual water use. The AFSIRS Model can be used to predict gross and net irrigation requirements. The gross demand values were used to address soil and irrigation system impacts on water use. Estimates for pasture irrigation were not included in the total demand estimates, as water for this type of use is not typically used during

1-in-10 year drought event conditions. These changes from the 2000 KB Plan caused the overall water use estimated for agricultural water use to be reduced for this plan update.

Commercial and Industrial Self-Supply

Commercial and Industrial use is expected to keep pace with urban growth, but this growth is expected to be served primarily by local utilities. Data for the Year 2000 demand estimates for this use category were collected from consumptive use permit reporting and represents self-supply activities not served by a local utility.

Year 2025 demand projections are approximately 19 MGD, a 71 percent increase from Year 2000 Commercial and Industrial water use in the region. However, in total, this water use category will represent only 5 percent of the total projected water demand in the region. Projected water use in this category is higher than estimated in the 2000 KB Plan. This revised projection represents a number of new industrial projects previously not identified or permitted.

Thermoelectric Power Generation Self-Supply

The KB Planning Area's need for additional power supplies is expected to grow as its population expands. Florida Power & Light (FPL), the region's largest power utility, plans to use more fresh or brackish water in its new plant's cooling technology. FPL has proposed locating a new power plant in Glades County, within the SFWMD's Lower West Coast (LWC) Planning Area. Therefore, FPL's projected water demands related to its future power plant are included in the *2005–2006 Lower West Coast Water Supply Plan Update* (2005–2006 LWC Plan Update). The Kissimmee Utility Authority's (KUA) water supply needs represent the entire usage increase reported for this category. The KUA's water demands are included as part of the Toho Water Authority's future water use projections, which propose to use reclaimed water to meet these demands.

Recreational Self-Supply

Recreational Self-Supply water use projections primarily include water demands for golf course irrigation and are typically identified through consumptive use permits. Landscape irrigation demand projections are included within this category. Recreational and landscape use is expected to keep pace with urban growth, but most of this new growth is expected to be served using reclaimed water.

Demand for golf course irrigation is expected to exceed 15 MGD, a 165 percent increase in use, by Year 2025. In recent years, as the value of land has increased in central Florida, developers have converted several older golf courses into new

residential communities. This trend is projected to continue in certain areas, but related water use changes are projected to be minimal (and are captured within the Public Water Supply demand category). Many of these courses are likely to accept reclaimed water from local suppliers and, therefore, impact to the resource is projected to be minimal.

DEMAND PROJECTIONS IN PERSPECTIVE



Urban Development in the Kissimmee Basin
Planning Area

Demand projections are based on the extrapolation of trends, circumstances and industry intentions that change over time. For example, observed and projected growth in citrus acreage during the preparation of the 2000 KB Plan has since reversed into a decline. While there have been increases in acreage for ornamental nurseries, it is not equivalent to the reduction in citrus acreage. The five-year regional water supply plan updates incorporate such trend changes.

In summary, the major driving force behind the significant growth in water demands reflected in this 2005–2006 KB

Plan Update is the region's anticipated population growth. Most of this growth, in absolute terms, is expected to take place in the portions of Orange and Osceola counties located within the planning area.

People demand potable water and this demand is met by Public Water Supply and Domestic Self-Supply. People also demand water for irrigation of urban landscapes and recreational areas, such as golf courses. Additional population also leads to the formation of new businesses and more power generation.

For the 25-year period from Year 2000 to Year 2025, the planning area population growth of 662,103 is twice that projected in the 2000 KB Plan (which estimated a population growth of 324,000 from 1995 to 2020). The 2005–2006 KB Plan Update predicts a 25-year growth in urban water demands of over 140 MGD. The previous plan forecasted 89 MGD for Year 1995 to Year 2020. Clearly, an unanticipated and dramatic surge in demand has occurred and is projected to continue in the immediate future.

In contrast to the urban water demand increases, a modest 1 MGD growth in Agricultural water use to almost 118 MGD by Year 2025 is projected in this plan update. The 2000 KB Plan estimated 168 MGD in Agricultural growth due to the trends at that time. This difference in projected increased Agricultural demands from the 2000 KB Plan (168 MGD) to this plan update (less than 1 MGD) is primarily due to reduction of projected acreage in the Indian Prairie Basin near Lake Istokpoga. And, much of the previously projected growth was anticipated in the Southern KB Planning Area. In addition, agricultural demands are lower in this plan update because the present method of estimating demands (AFSIRS-based) generally gives lower estimates of irrigation requirements than the previously used Blaney-Criddle method.



Kissimmee Basin Planning Area
Residential Development

In the Kissimmee Basin (KB) Planning Area, the population is projected to increase by 150 percent and the average water demand is expected to increase by 55 percent from Year 2000 to Year 2025.

...Meeting the updated water supply and demand projections for the current 20-year planning horizon will require a continued focus primarily on nontraditional water supply solutions. This 2005–2006 KB Plan Update calls for development of alternative water sources to meet most of the region's new water supply needs.

Resource Analysis

Regional water supply plans provide strategies designed to assure adequate water availability to meet the future urban, agricultural and natural systems demands for at least a 20-year planning horizon. To implement these strategies, an analysis is used to identify water resource conditions that may affect the use of existing resources and development of new supplies to meet Year 2025 projected water demands in the Kissimmee Basin (KB) Planning Area. Information in this chapter summarizes previous and ongoing analyses that support this *2005–2006 Kissimmee Basin Plan Update* (2005–2006 KB Plan Update).

THE WATER RESOURCE

The hydrogeology of the KB Planning Area consists of three major hydrogeologic units: the Surficial Aquifer System (SAS), the intermediate confining unit and the Floridan Aquifer System (FAS), as shown in **Figure 3**. The region's water quality deteriorates, becoming more brackish, as it moves south and east. Chapter 6 of the *Consolidated Water Supply Plan Support Document* (on the enclosed CD) discusses the aquifer systems, hydrogeologic units and aquifer yields for this region in greater detail.

This discussion of the KB Planning Area's water resources distinguishes between its northern and southern regions. The northern basin (also referred to as the Upper Kissimmee Basin) is primarily influenced by urban driven demands, while the southern basin (also referred to as the Lower Kissimmee Basin) is agriculturally demand driven. The Upper Kissimmee Basin consists of those entities that contribute to the groundwater depression occurring in the Upper Floridan Aquifer in central Florida, including the portions of Orange, Osceola and Polk counties located in the South Florida Water Management District's (SFWMD or District) jurisdiction. The Lower Kissimmee Basin generally refers to areas south of Lake Kissimmee, including Okeechobee, Highlands and Glades counties.

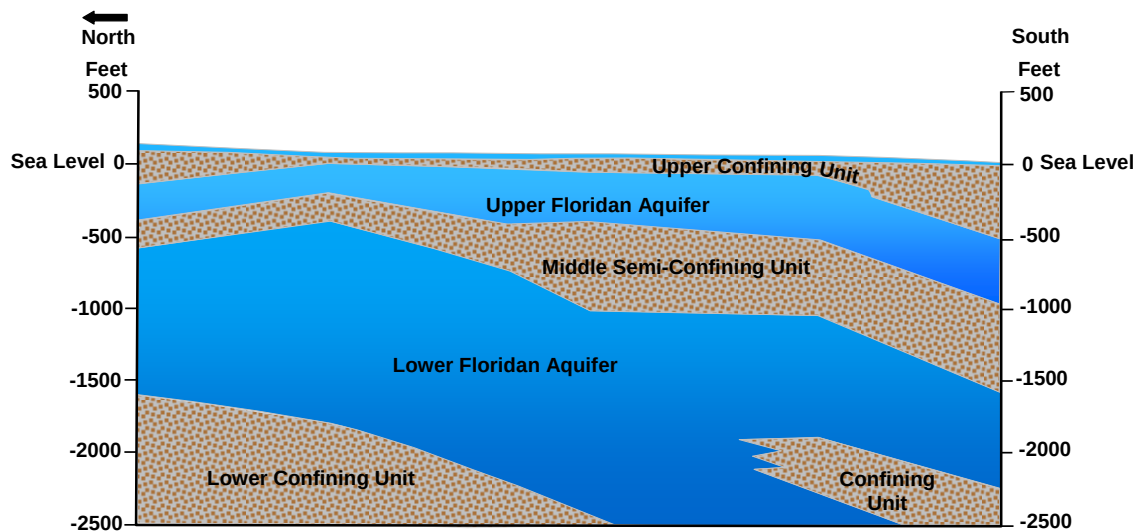


Figure 3. Generalized Geologic Cross-Section of the Kissimmee Basin Planning Area.

Traditional sources of water for the Upper Kissimmee Basin are the upper and lower portions of the Floridan Aquifer System. Water quality in the FAS is generally very good, but concentrations of chloride and total dissolved solids increase in eastern Orange and Osceola counties. The SAS is not considered a viable alternative as it has limited potential to satisfy large-scale water supply needs due to low production rates and poor water quality. In the western sections of the planning area and into Polk County, the water quality and productivity of the Lower Floridan Aquifer System deteriorates.

Surface water from Lake Istokpoga and Lake Okeechobee is a traditional water source for Okeechobee, Glades and Highlands counties in the Southern KB Planning Area. While groundwater from the Upper Floridan Aquifer System is available for use, water quality deteriorates closer to Lake Okeechobee. In addition, the Lower Floridan Aquifer contains saline water throughout the Lower Kissimmee Basin, with exceptions in the northwestern portion of Highlands County.

OVERVIEW OF SUPPLY SOURCES

Surficial Aquifer System

The SAS in the Upper Kissimmee Basin is low yielding. Moreover, the quality of water in this aquifer system is poor. Additional constraints on the use of this source include the fact that this system interacts with natural features, such as isolated wetlands, base flows to slough systems and potentially with lake systems. The SAS, therefore, has limited potential to satisfy large-scale demands. However, one of the major functions of the SAS is to provide recharge to the FAS, particularly in the

western portion of the Upper Kissimmee Basin. However, this function does not occur in the eastern half of the Upper Kissimmee Basin, where the SAS is hydrologically isolated from the FAS due to the occurrence of low permeable clays and sediments within the Hawthorne Group. Thus, withdrawals within the FAS do not readily affect surficial features, such as lakes and wetlands, unless a connection exists.

Floridan Aquifer System

The FAS is a high yielding aquifer, which provides substantial volumes of good quality water to a wide variety of use classes within central Florida. The FAS is currently the sole source of potable quality water within the Upper Kissimmee Basin. The FAS also currently provides the majority of supply for human demands occurring within central Florida, and the FAS also meets important environmental needs.

The FAS is confined throughout much of central Florida. In areas immediately north and east of the SFWMD's boundaries, the confined pressures within the aquifer are sufficient to cause the aquifer levels to exceed land surfaces. Within the St. Johns River Water Management District (SJRWMD), these conditions manifest themselves as free-flowing springs.

The FAS is confined by the Hawthorne Group. These confining beds thin and become discontinuous in the western portion of the Upper Kissimmee Basin where the SAS provides recharge to the FAS.

Also, there are wetland systems and lake systems that have a high degree of connection to the Floridan Aquifer. In these regions, withdrawals from the FAS have the potential to impact natural systems. One method of offsetting the effects of withdrawals on environmental features is to provide increased recharge to the FAS. An area where this occurs is in the western portion of the Upper Kissimmee Basin.

A method for recharge to occur is through rapid infiltration basins (RIBs). These RIBs provide highly treated wastewater recharge to the SAS and FAS. Studies have documented that recharge of the SAS has resulted in raising groundwater levels within the



Rapid Infiltration Basin

FAS. Opportunities exist within the area to expand the use of RIBs. Use of the recharge concept also provides the benefit of minimizing impacts to wetlands. Conversely, withdrawals from the FAS (in areas where withdrawals exceed recharge capacity of the Surficial Aquifer) can lower levels within the SAS where lakes and wetlands occur and have the potential to cause harm to environmental resources, including lakes, springs and wetland hydro patterns.

Over the years, concentrated withdrawals by users within all three water management districts in central Florida have resulted in declining groundwater elevations within the FAS in a broad area within the region. These declines are occurring as a result of rapid growth and the associated increase in the use of the FAS in central Florida. Declines in water levels within the FAS have the potential to impact environmental features in these areas, including springs, wetlands and lakes. Moreover, declines in the FAS have the potential to cause movement of the saltwater front located in the eastern portion of the Upper Kissimmee Basin.

ASSESSING WATER RESOURCES WITH MODELING TOOLS

Federal, state and local agencies are currently involved in numerous environmental restoration and water resource development projects that are needed to sustain the quality of life throughout the rapidly growing central and south Florida region. Since these projects can potentially cost billions of dollars, cost/benefit analysis is crucial. The SFWMD employs several modeling tools to assess water resource conditions and supply availability. Simulation models are used to assess systemwide impacts of proposed modifications to the water resource system.

UPPER KISSIMMEE BASIN ASSESSMENT

Spring Discharge Evaluation

Although no natural springs are located within the Kissimmee Basin Planning Area, several environmentally critical springs are located just outside of the SFWMD's boundary in the Wekiva Basin in northern Orange County. These springs contribute to the base flow of the Wekiva River and several of its tributaries. The SJRWMD has established minimum flow values for eight Wekiva Basin springs. Estimated spring flow requirements are based, in part, upon environmental demands of the Wekiva River and its tributaries.

Lake Wales Ridge Lake Level Evaluation

The Southwest Florida Water Management District (SWFWMD) has determined that several lakes located along the Lake Wales Ridge are stressed. These lakes lie west of the KB Planning Area, within a Water Resource Caution Area in the SWFWMD's jurisdiction. Lake level protection criteria were identified to address the SWFWMD's concerns over declining lake levels in 2000. These criteria remain unchanged as of 2006.

The SWFWMD recently established minimum flows and levels (MFLs) for eight lakes along the Lake Wales Ridge, which extends from Polk County to Highlands County. Additionally, the SWFWMD established a set of Floridan Aquifer monitoring wells to assist in the assessment of potentially adverse aquifer levels threatening the lakes.

LOWER KISSIMMEE BASIN ASSESSMENT



Lower Kissimmee Basin
Restored Kissimmee River

A new, upgraded groundwater model was created replacing the Glades, Okeechobee and Highlands model developed for use in conjunction with the *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan). The Lower Kissimmee Basin Groundwater Model includes all of Okeechobee and Highlands counties and most of Glades County. It also includes portions of Polk, Osceola, Indian River, St. Lucie, Martin, Palm Beach, Charlotte, DeSoto and Hardee counties.

The Lower Kissimmee Basin Groundwater Model is a four-layer, steady-state MODFLOW model. The new model revisits the aquifer structure in the area as a result of the recent investigations conducted in south Florida. The model will be used to evaluate the effects of projected increases in groundwater withdrawals from the Upper and Middle Floridan aquifers.

Water demand for uses within the SFWMD portions of Glades, Okeechobee and Highlands counties is projected to show only minimal increases before Year 2025.

Modeling simulations of projected groundwater withdrawals within these counties show only minor changes in the Floridan Aquifer levels. For the purpose of this analysis, groundwater demands for the SWFWMD were kept at the 1995 withdrawal rate, consistent with efforts by the SWFWMD to maintain Floridan Aquifer levels in western Highlands County for the purpose of limiting lake level impacts. Increases in withdrawals were modeled within the SFWMD, but potential increases in demands outside the District were not modeled. Interpretation of the results from

this base model simulation do not suggest concerns with future increases in groundwater use in the model domain through 2025 for lakes located along the Lake Wales Ridge portion within Highlands County. For this reason, the District believes that groundwater from the Floridan Aquifer within the agricultural areas of Highlands, Glades and Okeechobee counties is available to meet the projected future demands. Water quality issues within the Floridan Aquifer in Glades and Okeechobee counties may, however, limit the type of use for which this source may be used within those areas. **Appendix K** shows these areas of poorer water quality.

The Heartland Water Alliance (HWA)—representing Highlands, Desoto, Hardee and Polk counties—have identified several possible wells for location within the SFWMD that would be used to meet water demands within the SFWMD. The proposed wells would deliver an estimated 9 million gallons per day (MGD). While the facilities proposed by HWA are recognized as a potential use, the proposed demand was not included in the KB Planning Area estimates (see **Chapter 2**). The proposed facilities should be recognized as potentially impacting the use of groundwater within the SFWMD.

Lake Istokpoga-Indian Prairie Basin Analysis

The Lake Istokpoga-Indian Prairie Basin is defined as those areas with access to the C-40, C-41, C-41A canals and Lake Istokpoga, either directly or via other canals. **Figure 4** shows the features of the Indian Prairie Basin. The District's regulatory program, supported by earlier evaluations and historic operations, established a level of water use, which has restricted new uses of surface water in the Lake Istokpoga-Indian Prairie Basin.

As documented in the 2000 KB Plan, an evaluation of water use deliveries from Lake Istokpoga to the Indian Prairie Basin showed that projected surface water demands for 2020 could potentially be met by a combination of water resources. Proposed water supply solutions included increased water releases from Lake Istokpoga, reduction or removal of required releases for canal maintenance, and backpumping of water from Lake Okeechobee via the G-207 and G-208 surface water pumps.

Recommendation 4.1 of the 2000 KB Plan proposed that the District develop an operational plan for backpumping water from Lake Okeechobee into the Indian Prairie Basin. However, recent changes proposed for the Lake Okeechobee regulation schedule and public safety issues related to the Herbert Hoover Dike have created uncertainty concerning water availability for new demands. In addition, reliability of water supplies from Lake Okeechobee to the southern Indian Prairie Basin remains uncertain. Therefore, the development of alternative operational controls for structures within the Indian Prairie Basin have been postponed until issues surrounding updates to the Lake Okeechobee regulation schedule have been resolved.

Lake Istokpoga Resource Protection

Lake Istokpoga, at 27,692 acres, is the fifth largest lake in the State of Florida. The lake is generally shallow, averaging only 4 to 6 feet in depth. It is a vital regional resource being studied as part of the Kissimmee River Restoration Project and the Comprehensive Everglades Restoration Plan (CERP). A MFL rule for Lake Istokpoga was adopted by the SFWMD's Governing Board on December 14, 2005. According to 40E-8.351 of the Florida Administrative Code (F.A.C.), a MFL violation occurs in Lake Istokpoga when surface water levels fall below 36.5 feet National Geodetic Vertical Datum (NGVD) for 20 or more weeks, within a calendar year, more often than once every four years. While the present prevention strategy for Lake Istokpoga consists of continuation of the current operational plan and regulation schedule, it should be noted that Rule 40E-8.351, F.A.C., also 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 re-evaluation will occur as part of the next Lake Istokpoga MFL update, which is scheduled to occur in 2010, or sooner, if significant changes to Lake management are proposed."

LAW / CODE

The South Florida Water Management District (SFWMD or District) is responsible for implementing the statutory provisions in Section 373.042, Florida Statutes (F.S.), requiring the establishment of minimum flows and levels (MFLs) for surface waters and aquifers at which further withdrawals would be significantly harmful to the water resources of the area. The minimum flow is defined as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The minimum level is defined as the limit at which further withdrawals would be significantly harmful to the resources of the area.

Section 40E-8.021(29), Florida Administrative Code (F.A.C.), defines significant harm to be the temporary loss of water resource functions that takes more than two years to recover.

Section 373.0421, F.S., further requires that once the MFL technical criteria have been established, the District must develop and expeditiously implement a recovery and prevention strategy for those water bodies that are currently exceeding, or are expected to exceed, the MFL criteria.

Chapter 40E-8, F.A.C., contains the MFLs and criteria for specific water bodies and aquifers within the District and also includes the recovery and prevention strategies for each MFL. Additional MFL protection is identified in Chapter 40E-2, F.A.C., as consumptive use permitting criteria for MFLs, and in Chapters 40E-21 and 40E-22, F.A.C., as water shortage criteria for MFLs.

A further discussion of resource protection tools for the KB Planning Area is included in **Chapter 4**, Issue Identification.

OTHER RELATED STUDIES AND PROJECTS

Kissimmee Chain of Lakes Long-Term Management Plan



Kissimmee Chain of Lakes

The *Kissimmee Chain of Lakes Long-Term Management Plan* was initiated in April 2003 by the SFWMD Governing Board to work with the U.S. Army Corps of Engineers (USACE) and stakeholders to develop a long-term management plan for the Kissimmee Chain of Lakes. The intent of this plan is to improve, enhance and/or sustain the health of the lake ecosystems, while balancing impacts to the Kissimmee River and downstream ecosystems, such as Lake Okeechobee.

The proposed scope of the *Kissimmee Chain of Lakes Long-Term Management Plan*

was based on water resource issues in the Upper Kissimmee Basin. After identifying these issues and current initiatives, the partner agencies identified goals to address concerns aligned with the District's mission as defined by the SFWMD resolution. Among these goals are: hydrologic management; habitat preservation and enhancement; aquatic plant management; water quality improvement; water supply; and, recreation and public use (SFWMD *et al.* 2004).

This modeling and public review process is currently under way. Recommendations for modifying operational schedules for the structures located in the Upper Kissimmee Basin are planned for submission to the USACE by the end of 2007. These recommendations will consider the balancing of all the environmental, flood control and water supply expectations on the system.

LAKE OKEECHOBEE & ESTUARY RECOVERY

The Lake Okeechobee & Estuary Recovery (LOER) Plan has been developed to improve water quality, expand water storage, facilitate land acquisition and enhance the ecologic health of Lake Okeechobee and the St. Lucie and Caloosahatchee estuaries. The LOER Plan includes five “Fast-Track” construction projects and numerous interagency initiatives to provide short-term relief and long-term protection. Since the establishment of the LOER Plan, these Lake Okeechobee Fast-Track (LOFT) projects are being constructed as part of the accelerated restoration initiative known as Acceler8 (see **Chapter 4**). Planned construction projects in or adjacent to the KB Planning Area include the Taylor Creek Reservoir and Nubbin Slough Stormwater Treatment Area (STA) Expansion and Lakeside Ranch STA. The LOER Plan involves the continued implementation of the Lake Okeechobee Protection Program (LOPP) and the Comprehensive Everglades Restoration Plan’s (CERP) Lake Okeechobee Watershed Project (LOWP).

The USACE is expediting modifications to the Lake Okeechobee regulation schedule and the SFWMD is developing rules to modify its water shortage plans. The Critical Pilot Project STAs at Nubbin Slough and Taylor Creek are complete. Although these projects are water quality improvement projects, and not for water supply, they impact the timing of water availability from water sources close to these projects.

Additionally, in April 2006, an engineering study assessing the condition of the Herbert Hoover Dike around Lake Okeechobee was completed for the District. The study concluded that the dike does not meet current dam safety standards, and that internal erosion caused by seepage through the earthen structures is affecting the dike. High lake levels are believed to significantly increase this internal erosion.

Recommendations for addressing these conditions include fast-tracking repairs to the dike by the USACE, and lowering lake levels to minimize seepage. Although lowered lake levels have the potential to improve water quality and habitat conditions in the lake, the levels also reduce the water supply available from the lake for agriculture and public supply.



Lake Okeechobee

SUMMARY

The KB Planning Area's traditional water sources for urban and agricultural uses come from portions of the Upper and Lower Floridan Aquifer System, and surface water from Lake Istokpoga and Lake Okeechobee. The region's declining water levels and water quality issues require protective measures, such as the SFWMD's Consumptive Use Permitting Program (see **Chapter 4**) and minimum flows and levels (MFLs) established by the SFWMD and adjacent St. Johns Water Management District and Southwest Florida Water Management District. District studies, modeling efforts, and restoration and protection projects currently under way in the KB Planning Area include the *Kissimmee Chain of Lakes Long-Term Management Plan*, *Lake Okeechobee & Estuary Recovery (LOER) Plan*, and an engineering study assessing the condition of the Herbert Hoover Dike around Lake Okeechobee. The LOER Plan involves the continued implementation of the Lake Okeechobee Protection Program and the Lake Okeechobee Watershed Project. The U.S. Army Corps of Engineers is expediting modifications to the Lake Okeechobee regulation schedule, and the SFWMD is developing rules to modify its water shortage plans. The Critical Project Pilot Stormwater Treatment Areas at Nubbin Slough and Taylor Creek are complete.



Great Egret

It is important to understand the relationship between the different levels of harm referred to in statutes and the various programs the District has in place to protect the resources. The overall purpose of Chapter 373 of the Florida Statutes is to ensure the sustainability of water resources of the state (Section 373.016, F.S.). To carry out this responsibility, Chapter 373 provides the District with several tools, with varying levels of resource protection standards. Protection programs include the District's Consumptive Use Permitting Program, Minimum Flows and Levels (MFLs), MFL recovery and prevention strategies, minimum aquifer levels, maximum developable limits (MDLs), saltwater intrusion and wetland drawdown restrictions, reservations of water, and the District's Water Shortage Program. Determination of the role of each of these and the protection they offer are discussed in Chapter 4 of the Consolidated Water Supply Plan Support Document.

Issue Identification

Water users in the Kissimmee Basin (KB) Planning Area are challenged with meeting water supply demands, which are expected to increase 55 percent by Year 2025 to an estimated 401 million gallons per day (MGD). The South Florida Water Management District (SFWMD or District) is tasked with balancing the needs of the environment with those of the public. As part of this effort, the District is required to set environmental limits on sources of water where its use may conflict with protection of the environment. Where water supply sources appear to be limited, the region's water users, with assistance from the District, are expected to identify and develop alternative water supplies.

The common objective of water supply stakeholders in the KB Planning Area is identification and introduction of alternative sources of water to supplement traditional resources serving the region. This chapter examines the water supply planning issues facing the entire KB Planning Area through the planning horizon Year 2025, including issues related to alternative water supply development.

LIMITED TRADITIONAL SOURCES REQUIRE DEVELOPMENT OF ALTERNATIVE WATER SOURCES

The Upper Kissimmee Basin has historically relied on groundwater from the Floridan Aquifer as its primary water source. However, this relatively inexpensive natural resource cannot satisfy all of the region's growing water demands, especially in light of environmental constraints. To meet projected demands, the District has identified possible alternative water source options for the region. Water reuse, surface water and stormwater recharge are currently the area's main options. However, the development of each alternative water source will take time and planning to assure availability will coincide with potable and nonpotable demands. The SFWMD joined with the Southwest Florida Water Management District (SWFWMD) and St. Johns River Water Management District (SJRWMD) in 2006 to launch a Central Florida Coordination Area initiative to ensure equitable distribution of the available resources in the region, while jointly developing plans for alternative water supply projects.

In the Southern KB Planning Area, sufficient surface water supply has been identified to meet the area’s existing water supply needs, except in those instances beyond the 1-in-10 year level of certainty. However, the amount of water available for annual allocation is limited and still subject to shortage under drought conditions. To address water supply planning requirements for extreme drought events, the District is investigating aquifer storage and recovery (ASR), as well as reservoir options for local water users.

Lake Istokpoga

Surface water from Lake Istokpoga is the traditional source of water used to meet irrigation demands within the Indian Prairie Basin located in portions of Highlands and Glades counties. Historically, water availability was limited by storage issues and the conflicts inherent in management for flood control, causing temporary water shortages. Due to the limitations on surface water, the Indian Prairie Basin area



Lake Istokpoga

was designated a “Restricted Allocation Area” limiting the use of surface water resources [Rule 40E-2.091, Florida Administrative Code (F.A.C.), *Basis of Review for Water Use Permit Applications*, Section 3.2.1., Part A (SFWMD 2003)].

Lake Okeechobee Regulation Schedule Review

Since 1991, when pumps G-207 and G-208 were installed by the District to withdraw water from Lake Okeechobee and deliver it to southern Indian Prairie Basin, the level of Lake Okeechobee has fallen to a depth below 10 feet mean sea level (MSL). This occurrence happened in 2001 when a drought of 1-in-200 years occurred in the area.

The U.S. Army Corp of Engineers (USACE) is expediting modifications to the Lake Okeechobee regulation schedule. Adjustments to the schedule may include the lowering of lake levels. However, once the lake level falls below 9.6 feet MSL, the production capacity for pumps G-207 and G-208 is greatly diminished. Modeling for Lake Okeechobee operations management was under way at the time of the drafting of this plan update. Modeling and recommendations for modifying the current operation schedule are expected in 2007.

Regional Reservoir Construction

Another emerging issue for the KB Planning Area is the Comprehensive Everglades Restoration Plan (CERP) proposed regional storage and water quality treatment facilities, including a stormwater treatment area (STA) to be located north of Lake Okeechobee. The facilities will store and treat water prior to entry into the lake. Collectively, the storage facilities or reservoirs may be as large as 230,000 acre-feet in size and represent a potential new alternative water source. A location within the Indian Prairie Basin has been identified through a preliminary screening process as a possible site for STA construction. The new STA will be designed to accept water from Lake Istokpoga and the C-41 Basin for the purposes of water quality treatment and temporary storage. While the proposed reservoirs are likely to improve water supply availability for portions of the Lake Istokpoga–Indian Prairie Basin, it is difficult to quantify the water supply impact at this point in time. Construction of these facilities is anticipated to be completed after 2011.

DISTRICT

Comprehensive Everglades Restoration Plan and Acceler8

The Comprehensive Everglades Restoration Plan (CERP) is a framework for the restoration, preservation and protection of the natural systems that also provides for other water-related needs of the region, including water supply and flood protection, and is the centerpiece of the restoration effort to get the water right in south Florida. The CERP's 68 components are forecast to be implemented over a 30-year period. Together, these components are expected to benefit the ecological functioning of more than 2.4 million acres of the south Florida ecosystem, while improving regional water quality conditions, deliveries to coastal estuaries, urban and agricultural water supply, and maintaining existing levels of flood protection.

The CERP was designed as a 50-50 partnership between the state and federal governments. Since the *Water Resources Development Act of 2000*, authorization of projects for the federal partner, the U.S. Army Corps of Engineers (USACE), to move ahead with major storage projects, has not occurred as anticipated. In 2004, the state chose to fund \$1.5 billion for eight restoration projects, called Acceler8, through South Florida Water Management District's (SFWMD or District) issuance of "Certificates of Participation" bond revenue to expedite the funding, design and construction of 14 restoration components consistent with the CERP Master Implementation Sequencing Plan.

Some of the benefits of Acceler8 are achieving restoration goals sooner, increasing storage capacities for additional flood control and water supply options, providing water flows and hydrology, and improving water quality.

Kissimmee Chain of Lakes Management



Kissimmee Chain of Lakes

The Kissimmee Chain of Lakes and the Kissimmee River represent the largest surface water collection system within the KB Planning Area, and both sources represent significant water inflow into Lake Okeechobee. This system may also represent the single largest untapped alternative water supply source for the Upper Kissimmee Basin. At present, the Kissimmee River system is undergoing a major restoration, which will also require water to be stored in and released from the Kissimmee Chain of Lakes and its tributaries.

To address the issue of how much potential water is needed for the current restoration effort and how much is available for consumptive uses, the District is developing the *Kissimmee Chain of Lakes Long-Term Management Plan*. The plan also intends to address temporary deviations for aquatic plant management. The long-term plan is being developed as part of a multiagency effort, which includes participation by other state agencies, local governments, environmental agencies and the public. The completed plan will recommend lake management options to the USACE that will best balance the many demands on the lake and river system and help define water supply availability for consumptive uses.

Options - Water Reuse and Conservation



Reclaimed Water Facility

Central Florida has been a reclaimed water use leader for more than 20 years. In 2001, the 19 major wastewater utility providers within and surrounding the KB Planning Area generated just over 122 MGD of reclaimed water suitable for reuse. Additional reclaimed water was directed to surface water discharge or storage ponds in low recharge/discharge areas. By the Year 2025, projected reclaimed water flows are expected to exceed 243 MGD, an increase of 125 MGD. Demands for nonpotable water needs are estimated to exceed 260 MGD over the same period for the portions of

Orange, Osceola and eastern Polk counties located within the SFWMD's jurisdiction. Residential landscape irrigation represents the largest water user category demanding reclaimed water in the coming years.

Over the last few years, reclaimed water has become recognized as a valuable resource rather than discharge requiring disposal. With this new understanding comes the need to address efficient use of the resource. Addressing conservation in the reclaimed water system is an important part of meeting the future demand needs for the Upper Kissimmee Basin and surrounding region. The development of supplemental sources for reclaimed water supply is the second component needed to maximize the amount of reclaimed water available for delivery.

Aquifer recharge is also an important component for effective use of the reclaimed water system in central Florida. For over 20 years, the Water Conserv II and similar projects have been recharging highly treated reclaimed water to the Floridan Aquifer through the use of rapid infiltration basins (RIBs). The effective recharge of the Floridan Aquifer and mitigation of shallow aquifer drawdown is considered a very beneficial aspect of water reuse. Additional investigations are needed to identify effective locations for beneficial recharge to the Floridan Aquifer using reclaimed water.

ENVIRONMENTAL PROTECTION FOR NATURAL SYSTEMS

Allocating Water through Consumptive Use Permitting

The SFWMD's Consumptive Use Permitting (CUP) Program protects the supply and quality of groundwater and surface water resources by ensuring that water use is reasonable-beneficial, and consistent with the public interest, and that it does not interfere with existing legal uses. (Chapter 40E-2, F.A.C., and Section 373.223, Florida Statutes, (F.S.) Under Florida law, permitted uses and domestic water uses (which are exempt from requirements to obtain a permit) have the legal status of an "existing legal use."

Consumptive use permitting has a pivotal role in resource protection, as the criteria used for CUP are based on the level of impact that is considered harmful to the water resource. These criteria are applied to various resource functions to establish the range of hydrologic change that can occur without incurring harm. The hydrologic criteria include water level, duration and frequency components, and are used to define the amount of water that can be allocated from the resource.

Water Shortage Declarations

Pursuant to Section 373.246, F.S., water shortage declarations are designed to prevent serious harm from occurring to water resources. Serious harm, the ultimate harm to the water resource contemplated under Chapter 373, F.S., can be interpreted as long-term, irreversible or permanent impacts to the water resource. Declarations of water shortages by the District Governing Board are used as a tool to prevent serious harm.

Wetland Protection

Consumptive Use Permitting Rule 40E-2.301, F.A.C., requires that permitted withdrawals not cause harm to wetlands or surface waters. In 2003, the SFWMD adopted rule revisions that better defined wetland protections in the *Basis of Review for Water Use Permit Applications* (SFWMD 2003).

There are significant areas in western Orange and Osceola counties where the confining layer between the Floridan and Surficial aquifers is thinned and where the potential for harmful wetland impacts are greatest. In these areas, withdrawals from the Floridan Aquifer may induce lower water levels in the Surficial Aquifer. Wetland impacts are a significant water supply concern in the Upper Kissimmee Basin.

Aquifer Protection from Saltwater Intrusion

Saltwater intrusion is an important issue for eastern Orange and Osceola counties. An existing public water supply wellfield is located near the interface between fresh and saltwater zones in the Floridan Aquifer. The location of the saltwater interface in the proximity of existing and potential users constrains the availability of water for allocation. Declines in the Floridan Aquifer level, caused by cumulative withdrawals, have the potential to cause movement of this saltwater interface. Interdistrict cooperation is needed to prevent harm to the aquifer resulting from saltwater intrusion.

Protection of Lakes Along the Lake Wales Ridge

The Lake Wales Ridge, west of the KB Planning Area, is an environmentally sensitive area characterized by isolated lakes and wetland systems. The Southwest Florida Water Management District (SWFWMD) has established minimum flows and levels (MFLs) for eight lakes in the area to limit consumptive use withdrawals, which could adversely impact the water bodies. The SWFWMD relies on interdistrict cooperation with the SFWMD to prevent harm to the lakes along the ridge.

Protection of Spring Discharges in the Wekiva Basin

Although there are no natural springs located within the SFWMD Kissimmee Basin Planning Area, minimum flows and levels have been set for eight springs in the Wekiva Basin by the St. Johns River Water Management District (SJRWMD). **Figure 5** presents the location of springs within the SJRWMD's jurisdiction. The potential for impacts caused by cumulative water withdrawals from the Floridan Aquifer is a significant issue for central Florida. Interdistrict cooperation is proposed between the SFWMD and SJRWMD to prevent harm to these springs.

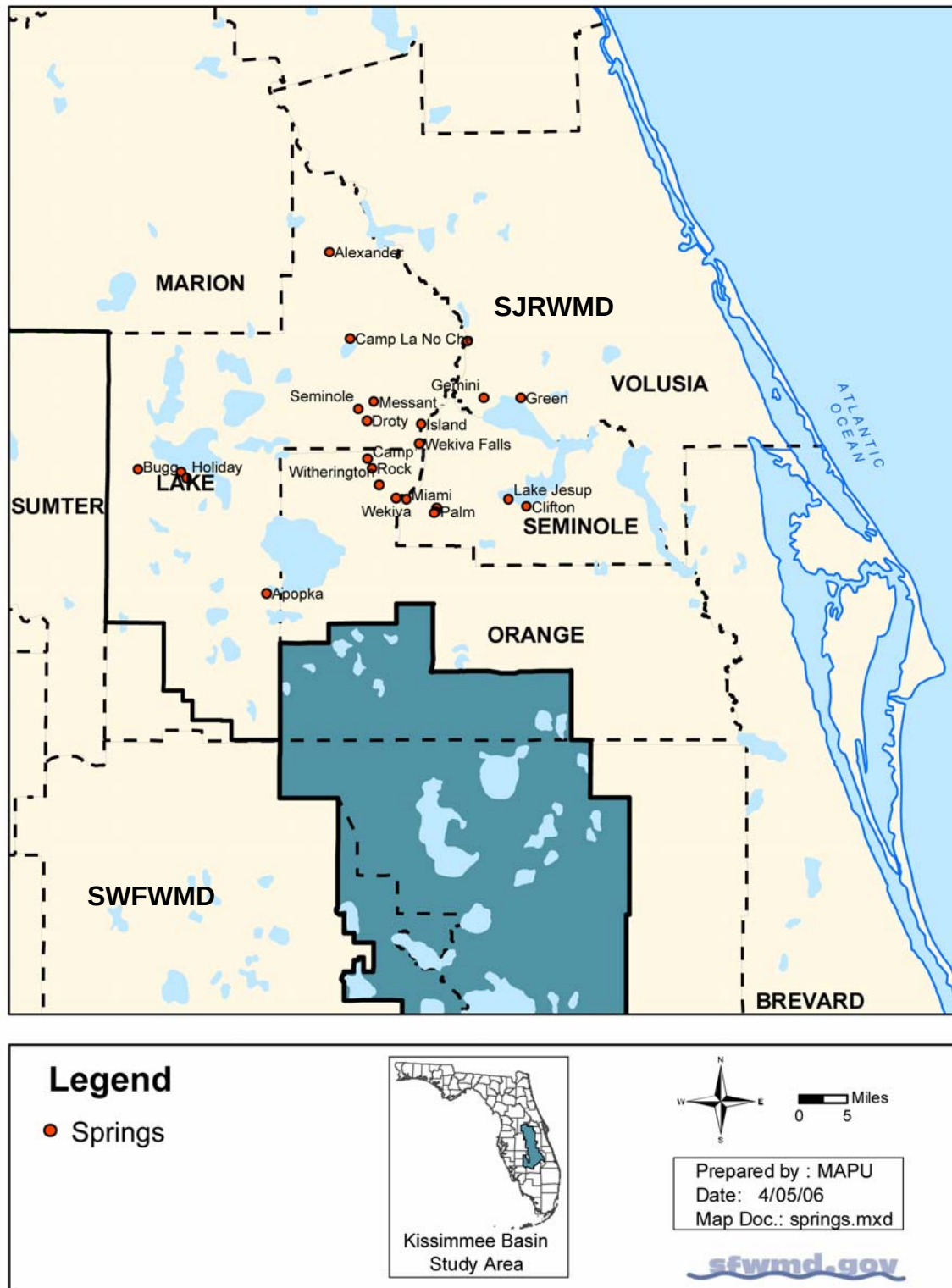


Figure 5. St. Johns River Water Management District Springs Located Within the Vicinity of the South Florida Water Management District and the Southwest Florida Water Management District.

Kissimmee River Restoration and Kissimmee Chain of Lakes Preservation

DISTRICT

Between 1962–1971, as part of the Central and Southern Florida Flood Control Project (C&SF Project), the meandering Kissimmee River and flanking floodplain were channelized and thereby transformed into a 30-foot deep central drainage canal. This drainage canal is compartmentalized with levees and dam-like water control structures into a series of five relatively stagnant pools.

The Kissimmee River Restoration initiative began as a grassroots movement during the latter stages of channelization when concerned citizens and members of the environmental community voiced concerns regarding perceived environmental impacts of the flood control project. Subsequent studies documented the nature of these impacts to the Kissimmee River and its surrounding ecosystem, which include the loss of 30,000–35,000 acres of wetlands, a tremendous reduction in wading bird and waterfowl inhabitants and a continuing long-term decline in game fish populations. These impacts provided the impetus for over 20 years of state and federally mandated restoration related studies, which culminated in the development of a restoration plan that was authorized for implementation as a state/federal partnership in the *1992 Water Resources Development Act*. The restoration project will restore over 40 square miles of river and associated floodplain wetlands, and will benefit over 320 fish and wildlife species, including the endangered bald eagle, wood stork and snail kite.

The Kissimmee River Restoration is a long-term goal of the SFWMD that will exceed \$500 million in costs when completed. In 2006, the District acquired the last of the 102,061 acres—land both within the river basin and within the area surrounding the Kissimmee Chain of Lakes—needed to achieve the river’s restoration. As part of the effort to restore the river, the District must balance several water resource-related objectives. Among these objectives are flood controls, environmental resources both in the river and downstream in Lake Okeechobee, aquatic plant management, water quality, and water supply for consumptive uses.

As the restoration effort proceeds, some positive changes have already been observed. Sandbars and a sandy river bottom are emerging as signs of improvement in the river’s hydrology. In formerly isolated sections of the river, oxbows are flowing again. Emergent and shoreline vegetation has reappeared and is thriving. Waterfowl are returning and water quality is improving.

ADDITIONAL ISSUES

Split Water Management District Responsibilities

The water resources in the central Florida metro-area are affected by the management decisions made by three water management districts. The St. Johns River Water Management District (SJRWMD) manages water resources in the northern half of Orange County, and Seminole and Lake counties. The South Florida Water Management District (SFWMD) manages the southern half of the municipal area, which includes portions of Polk and Osceola counties, and southern Orange County. In addition, the SFWMD shares a common boundary with the Southwest Florida Water Management District (SWFWMD) to the west of the KB Planning Area. A growing population along this area is searching for alternative water supply solutions, some of which are proposed within the SFWMD's jurisdiction within the KB Planning Area. Polk County lies within both the SWFWMD and the SFWMD jurisdictional boundaries.

The groundwater basin for the Floridan Aquifer System encompasses the entire Kissimmee Basin and links the water supply for all the users in the region. Thus, the identification of water supply issues and solutions requires a cooperative and coordinated effort between all three water management districts.

In 2006, the three water management districts launched a new initiative to address increasingly complex water supply issues within the central Florida region. The initiative is called the Central Florida Coordination Area Action Plan. This action plan (SFWMD 2006) outlines efforts to coordinate regulatory, planning and modeling activities between the three water management districts.

The three districts will work together and with stakeholders to identify the alternative water supply projects, and to establish a proposed schedule for alternative water supply project development and water utility implementation to meet additional water supply needs over the next 20 years. The selection and schedule should be accomplished by 2008. A number of alternative water supply projects have already been identified in this plan update and in water supply plans prepared by the SWFWMD and the SJRWMD.

The districts, in collaboration with the water utilities in central Florida, will focus initial efforts on the following alternative water supply development projects: St. Johns River/Taylor Creek Reservoir Project and the Upper Kissimmee Watershed. The SFWMD, with the assistance of the SJRWMD, the SWFWMD and water utilities, will identify quantities of water available for storage and recharge options associated with Public Water Supply use of water from the Upper Kissimmee Watershed and will implement the same expeditiously. Implementation

will be directly supported with funding from the Water Protection and Sustainability Program.

Transferring Water between Water Management Districts

Interdistrict transfer of surface water and groundwater is an important issue facing central Florida and those counties located along the Lake Wales Ridge. Several alternative water supply options have been identified to make withdrawals from or to import into the KB Planning Area. The interdistrict transfer of groundwater has been addressed in Section 373.2295, F.S. This section has had limited implementation. Under Section 373.2295, F.S., interdistrict transfers are defined as the withdrawal of groundwater from one water management district for use in another county outside that district's boundaries. Although the withdrawal and use of groundwater across water management district boundaries within the same county is not considered an interdistrict transfer, the applicant seeking the transfer still has to demonstrate compliance with the public interest test contained in Section 373.2295(4), F.S. Section 373.2295, F.S., requires the water management district in which the withdrawal is proposed to occur to review the consumptive use permit application. In addition to meeting the typical requirements related to reasonable-beneficial use and interference with existing legal users, users are required to satisfy a unique public interest test. In determining whether such a proposed transfer is consistent with the public interest, the reviewing water management district is to refer to the projected populations, as contained in future land use elements of the comprehensive plans of both the withdrawal and use areas together with other evidence on future needs of both areas. Section 373.2295(4), F.S., states that the proposed interdistrict transfer of groundwater will meet the public interest test: "...if the needs of the area where the use will occur and the specific area from which the groundwater will be withdrawn can be satisfied...."

A second significant definition of the consumptive use permit "public interest" test affecting long distance transport of water was adopted with the amendment of Section 373.223(3), F.S., which became known as the "local sources first" statute. It applies when transport of either groundwater or surface water across county boundaries is proposed, unless it involves the transport and use of water supplied by the Central and Southern Florida Flood Control Project, the transport and use of water supplied exclusively for bottled water or self-suppliers of water for which the proposed water source and area of use or application are located on contiguous private properties. In such applications, the water management district is to consider a variety of public interest factors. For example, the factors include consideration of sources that are closer to the area of use; alternatives to the proposed source, including alternative technologies, such as desalination; potential environmental impacts; and, whether sources are adequate to supply water for existing legal uses and reasonably anticipated future needs of the planning area where the proposed source is located.

The Florida Department of Environmental Protection's (FDEP) regulations require that both the sending and the receiving water management districts approve a proposed interdistrict transfer of surface water. The special public interest considerations that must be met include water conservation measures and reuse implementation in the receiving area; the costs and benefits and environmental impacts that may occur in both areas; and, the present and future needs of the supplying area, and whether these needs can be expected to be met.

As Florida's population continues to grow, the development of consensus on resource issues and conditions, and projected future needs along district boundaries are expected to become increasingly important.

Southern Indian Prairie Basin Water Supply Limitation

Under the *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan), an analysis was performed to assess the ability of the G-207 and G-208 pump stations to provide water from Lake Okeechobee into the Indian Prairie Basin during a 1-in-10 year drought event. This analysis was updated as part of the 2005–2006 Kissimmee Basin planning effort. It confirmed that water from Lake Istokpoga was available to meet the existing 1-in-10 year drought event demands, but indicates that water from Lake Okeechobee is needed to meet demands during more severe drought events.

The USACE is developing a new Lake Okeechobee regulation schedule. An interagency study team, including the SFWMD and other stakeholders, are participating in the USACE process. This new lake schedule may allow levels in Lake Okeechobee to fall below 10 feet MSL more frequently. Managing Lake Okeechobee at this level increases the risk of Lake Okeechobee dropping below 9.6 feet MSL at which point the G-207 and G-208 pumps are unable to withdraw water from Lake Okeechobee. Concerns have been raised by the Seminole Tribe (Tribe) and other stakeholders in the southern Indian Prairie Basin about the dependability of Lake Okeechobee when droughts occur. Securing a dependable source of water for the Tribe's Brighton Reservation is of particular importance considering the Tribe's surface water entitlement rights. Other avenues of making supply deliveries to agricultural operations in the southern Indian Prairie Basin are being reviewed and include dredging the C-40 Canal into deeper areas of Lake Okeechobee to maintain connection from Lake Okeechobee to the G-208, aquifer storage and recovery, and local reservoirs and deliveries of water from the Kissimmee River.

NEW CONNECTIONS TO LOCAL GOVERNMENT COMPREHENSIVE PLANS

During the 2002 through 2005 Florida legislative sessions, the statutory direction to link the water supply planning conducted by water management districts and the land use planning carried out by local governments was clarified and strengthened. In general, the changes coordinate local government land use with regional water supply plans and establish a closer link between development decisions and the availability of water and public facility planning and funding.

In addition to a general requirement to coordinate with regional water supply plans, some of the specific water supply-related connections under the new law that now must be addressed in local government comprehensive plans include:

GENERAL REQUIREMENT Identify water supply sources needed to meet existing and projected water use demands for the established planning period of the comprehensive plan. (Section 163.3167(13), F.S.)

FUTURE LAND USE ELEMENT Future land uses are to be based on the availability of water supplies, population projections and associated public facilities. (Subsection 163.3177(6)(a), F.S.)

POTABLE WATER ELEMENT This element must identify alternative and traditional water supply projects, conservation and reuse needed to meet the water needs identified in the regional water supply plan for the local government's jurisdiction. Within 18 months following an approved update of the regional water supply plan, comprehensive plans must: a) incorporate water supply projects from those identified in the regional water supply plan, or propose alternatives, and b) include a minimum 10-year work plan for building all public, private and regional water supply facilities needed to serve existing and new development. (Subsection 163.3177(6)(c), F.S.)

EVALUATION AND APPRAISAL REPORT Include an analysis of the implementation of the 10-year work plan for building all water supply facilities within the local government's jurisdiction. (Section 163.3191(2)(1), F.S.)

SUMMARY

There are multiple factors influencing water supply planning efforts for the KB Planning Area. While the Upper Kissimmee Basin has historically relied on groundwater from the Floridan Aquifer as its primary water source, this natural resource cannot satisfy the region's growing demands, especially in light of environmental constraints. In the Lower Kissimmee Basin, surface water supplies are insufficient to meet demands in the southern Indian Prairie Basin, including the needs of the Seminole Tribe's Brighton Entitlement, during severe drought events.

The SFWMD is tasked with balancing the needs of the environment with those of the public. And, limited traditional sources require development of alternative water sources. The District has identified possible alternative water source options for the region. However, the development of each alternative water source will take time and planning to assure availability will coincide with potable and nonpotable demands.

Evaluation of Water Source Options

Florida's 2005 legislative session created the Water Protection and Sustainability Program, which strengthens the link between water supply plans and local government comprehensive plans. In addition, the new legislation provides state and water management district cost-sharing funds for alternative water supply development. The law created additional requirements for the water supply development component of the regional water supply plans by making the plans more specific with regard to alternative water supply projects. The intent is to make the plans more useful to local water suppliers in developing alternative water supplies, and then provide permitting and funding incentives to local water suppliers if they choose a project included in the plan.

As prescribed by Section 373.0361(2), Florida Statutes (F.S.), water supply options, including traditional and alternative water supplies, as well as conservation projects, were evaluated to meet the future urban, agricultural and natural systems needs of the

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Section 373.0361(2), Florida Statutes (F.S.), provides:

A list of water supply development project options, including traditional and alternative water supply project options, from which local government, government-owned and privately owned utilities, regional water supply authorities, multijurisdictional water supply entities, self-suppliers and others may choose for water supply development. In addition to projects listed by the district, such users may propose specific projects for inclusion in the list of alternative water supply projects. If such users propose a project to be listed as an alternative water supply project, the district shall determine whether it meets the goals of the plan, and, if so, it shall be included in the list. The total capacity of the projects included in the plan shall exceed the needs identified in subparagraph 1., and shall take into account water conservation and other demand management measures, as well as water resources constraints, including adopted minimum flows and levels and water reservations. Where the district determines it is appropriate, the plan should specifically identify the need for multijurisdictional approaches to project options that, based on planning level analysis, are appropriate to supply the intended uses and that, based on such analysis, appear to be permissible and financially and technically feasible.

Kissimmee Basin (KB) Planning Area. Traditional sources, which vary by region, may include the Floridan and Surficial aquifers and fresh water from surface sources, such as lakes and rivers. Alternative water supplies or nontraditional sources include brackish water, surface water captured during wet-weather flows, new storage capacity, reclaimed water, storm water for consumptive uses and any other nontraditional source used by the planning area. 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 source of water in a given service area.

The following evaluations of water source options for the KB Planning Area are made within the context of the issues previously identified in **Chapter 4** and are specific to this region. Each water supply option includes a brief discussion on the sustainability of the resources, potential impacts to the natural systems and economic costs. The South Florida Water Management District's (SFWMD or District) *Consolidated Water Supply Plan Support Document* (SFWMD 2005–2006) provides additional information pertinent to the estimated costs of each option. The costs presented in this chapter and the *Consolidated Water Supply Plan Support Document* are intended primarily to enable comparison of the general costs of one type of supply relative to another. These costs must not be viewed as a substitute for the detailed evaluation that should accompany site- and utility-specific feasibility and design studies needed to make decisions about, and to construct, such facilities.

TRADITIONAL SOURCES

DISTRICT

Traditional sources include those sources that have historically been used as the primary source of water. Traditional sources can change from region to region based on the ease of source availability and water quality. For example, the Floridan Aquifer is a traditional freshwater source in central Florida, but is considered an alternative source of water in south Florida due to its brackish nature there. Where traditional sources have been determined to have limited availability, alternative sources of water must be identified and developed.

Traditional sources of water vary by region. The Floridan Aquifer is considered a traditional water source throughout the KB Planning Area wherever water quality is considered fresh. This planning process confirmed the findings of the *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan) that water supply quantities available for use from the Upper Floridan Aquifer are limited. This is consistent with determinations made by both the Southwest Florida Water Management District (SWFWMD) and the St. Johns River Water Management District (SJRWMD).

A planning document created by the three districts to address water supply issues in the Central Florida Coordination Area includes the following summary:

“The districts have each concluded—through detailed water supply planning and individual permit actions—that the growth in public water supply (PWS) over the next 20 years in central Florida from traditional groundwater sources is not sustainable. Recent water supply plan updates, permitting experience, and the increasing frequency that measures implemented by permit condition are required to avoid or mitigate unacceptable levels of harm, all confirm that if traditional groundwater sources continue to be developed to meet growing PWS demands in the area, harm to the water resources (rivers, streams, lakes, wetlands and aquifer quality) will occur.

“In general, the districts have jointly concluded that the availability of sustainable quantities of groundwater in central Florida is insufficient to meet future demands and there is an immediate need to develop and implement alternative water supply (AWS) projects in addition to continued aggressive conservation and reuse of reclaimed water.”

Due to recurring water supply shortages and potential water withdrawal restrictions, including consumptive use permitting limitations in the southern Indian Prairie Basin, the Southern KB Planning Area cannot continue to rely on surface water from Lake Istokpoga and Lake Okeechobee to meet agricultural water demands for the southern Indian Prairie Basin.

Groundwater Sources

The availability of groundwater from the Floridan Aquifer in central Florida improves southward from the Orange County and northern Osceola County region toward Okeechobee County and the Lower Kissimmee Basin. Water quality in the Floridan Aquifer, however, becomes saline in southern Okeechobee and eastern Glades counties. In the Lower Kissimmee Basin, traditional sources include groundwater from the Surficial Aquifer. Fresh groundwater sources throughout the KB Planning Area are limited and cannot continue to satisfy all of the region’s growing demands.

Surface Water Sources

In the Lower Kissimmee Basin, traditional sources include surface water from Lake Istokpoga and Lake Okeechobee. Historically, these lakes have met the agricultural demands of the Indian Prairie Basin, which is located between the lakes. Pending changes to the Lake Okeechobee regulation schedule may increase the uncertainty of the reliability of these sources for the southern Indian Prairie Basin.

A number of major water bodies, including the Kissimmee River and Chain of Lakes, Lake Istokpoga, and Lake Okeechobee, are potential surface water sources for the KB Planning Area. While Lake Istokpoga and Lake Okeechobee have historically been used for agriculture and public water supply, the Kissimmee River

and Chain of Lakes have served relatively minor consumptive uses and are generally considered an alternative water supply source within the Kissimmee Basin. For the purpose of this planning effort, the potential capture of seasonally available surface water from the Kissimmee River and Chain of Lakes is defined as an alternative water supply source. Additional investigations currently under way should help quantify the potential water supply availability from these sources.

Lake Istokpoga

In the Southern KB Planning Area, the District's analysis of surface water supplies from Lake Istokpoga and Indian Prairie Basin showed that water from Lake Istokpoga was available to meet existing demand during a 1-in-10 year drought event. During periods when water from Lake Istokpoga is insufficient to meet demand, Lake Okeechobee has been a source to supplement water supply to the Lower Kissimmee Basin, primarily to deliver water to the Seminole Indian Tribe's Brighton Reservation pursuant to the Water Rights Compact and implementing agreements. A discussion of previous proposals to increase the Lake Okeechobee withdrawals follows.

Lake Okeechobee

Lake Okeechobee is a vital natural resource for central and south Florida. In addition to water supply, the lake offers flood control protection, fishing, navigation and a habitat for wildlife, including endangered and threatened species. In July 2000, the U.S. Army Corps of Engineers (USACE) adopted the Water Supply and Environmental (WSE) Regulation Schedule to manage water levels for the lake. The schedule is currently under review for revision, and adjustments are expected to include the lowering of lake levels. Analyses of additional withdrawals from Lake Okeechobee to supplement the southern Indian Prairie Basin have been based on the current WSE schedule, and may not be valid once the schedule is modified. In addition, the use of existing facilities to move water from Lake Okeechobee into the southern Indian Prairie Basin cannot interfere with the ability to provide water to the Brighton Reservation.

ALTERNATIVE WATER SUPPLY SOURCES

Four sources were identified as possible alternative water supply source options for the KB Planning Area. These options include: brackish groundwater; fresh surface water from the Kissimmee River and Chain of Lakes and its tributaries; runoff collection and storage; and, reclaimed water. Each alternative water source option discussed in this chapter was considered for its potential use in the KB Planning Area.

Brackish Surface Water and Groundwater

DISTRICT

Brackish groundwater is typically defined as water with a total dissolved salt concentration between 1,000 milligrams per liter (mg/L) and 10,000 mg/L. The terms fresh, brackish, saline and brine are used to describe the quality of the water. Although brackish supplies in the low range of these salinities may be used for some agricultural purposes, they do not meet public drinking water standards. Advance treatment technologies, such as reverse osmosis (RO), electrodialysis (ED) or electrodialysis reversal (EDR), membrane technologies and lime softening must be employed before this type of supply is suitable for human consumption. If the salinity is below 1,000 mg/L, less expensive treatment technologies, such as microfiltration or nanofiltration may be used.

In eastern Osceola County, lower risks to existing legal uses and reduced environmental concerns offer opportunities for brackish water development. While brackish water may be available in eastern Orange County, the residing Cocoa Wellfield presents higher potential risk to development of brackish sources in this area. Sources of brackish groundwater may also exist in centrally located portions of the Lower Floridan Aquifer in each of these counties.

The SFWMD identified a potential brackish wellfield project in eastern Osceola County as a preliminary cost estimate for brackish sources. The SFWMD's design and cost estimation for the wellfield project included a membrane treatment plant, storage, an injection well for brine disposal and 25 miles

of transmission main. Costs per 1,000 gallons were developed for 10, 20 and 40 million gallons per day (MGD) capacities. Unit costs for production ranged from \$0.95 to \$1.57 per 1,000 gallons. Project construction costs are estimated at just over \$91 million for this project. More detailed cost estimates for this project are included in **Appendices F and M**, and Chapter 5 of the *2005–2006 Consolidated Water Supply Plan Support Document*.

Much of far eastern Osceola County contains brackish groundwater in portions of the Floridan Aquifer. Development of a potential brackish water source was evaluated for conceptual design, cost estimation of construction, and operation of a brackish water treatment facility and wellfield in southeastern Osceola County located near the Bull Creek Wildlife Management Area. Previous wellfield development attempts in this area have provided some information about the hydrology and risks associated with a wellfield in this location. However, in addition to this information, further studies of the wellfield need to be completed prior to permitting. Moreover, since location of the potential wellfield site is within the SJRWMD's jurisdiction, permitting of the facility falls under the SJRWMD's purview. Additionally, it should be noted that development of a wellfield in this location and transport of the water into the SFWMD would constitute an inter-district transfer.

Table 2. Estimated Project Costs for an Eastern Osceola County Brackish Wellfield.

System	Total Capital	Capital \$ per gallon of Capacity	Annual Operations & Maintenance	Unit Cost (\$/1,000 gallons)
20-MGD Saline Aquifer Wellfield in Eastern Osceola County, including 25 miles of piping and concentrate disposal	\$91,300,000	\$4.57	\$2,570,000	\$1.30

Upper Kissimmee Basin Surface Water Sources

Much of the storm water in southern Orange County and northern Osceola County drains southward toward one of three basins: Boggy Creek, Shingle Creek and Reedy Creek. As part of the District's efforts to implement recommendations associated with the 2000 KB Plan, assessments of surface water availability were conducted to determine new sources of water. In 2003, the SFWMD conducted a planning level evaluation of the surface water resources from Boggy Creek and Shingle Creek basins to identify potential water supply availability. A summary of findings from the study, *A Preliminary Evaluation of Water Availability in Boggy and Shingle Creeks* (Cai 2005), is included in **Appendix I**. An evaluation of the Reedy Creek Basin was not completed as part of this plan update, but has been proposed as a future water supply project.

Boggy and Shingle Creeks Evaluation

The purpose of the SFWMD's preliminary evaluations of Boggy and Shingle creeks was to determine water availability under current flow conditions and the impacts of potential withdrawals in terms of storage, supply dependability and downstream ecosystem restoration. The Boggy and Shingle creek evaluations identified environmental concerns and characterized technical issues associated with potential water withdrawal, which must be addressed in order to develop both surface water resources. Preliminary findings resulting from these studies suggest water may be withdrawn from Boggy and Shingle creeks, but further studies (which are ongoing) should provide better estimates of the availability and seasonality of these supplies.

As part of the 2003 study, the SFWMD entered into an agreement with the Toho Water Authority to provide design and cost estimates for development of Shingle Creek as a supplemental reclaimed water source. The project also reviewed delivering water, up to 4 MGD, to the Toho Water Authority's rapid infiltration basin (RIB) sites located in high recharge areas of western Osceola County.

The cost estimate to develop Shingle Creek as a supplemental reclaimed water source is \$5.2 million. In 2000, the District provided development grants to the Toho Water Authority to construct this project. Project completion was completed

in 2006. Costs for projects on Boggy Creek and Reedy Creek are expected to be comparable with the costs of the Shingle Creek Project.

A summary of the conceptual design and planning level cost estimates for a potable water supply project evaluation using surface water runoff from Lake Tohopekaliga as a source is provided in **Appendix F**.

East Lake Tohopekaliga and Lake Tohopekaliga Evaluations

The SFWMD conducted studies of East Lake Tohopekaliga (East Lake Toho) and Lake Tohopekaliga (Lake Toho) to evaluate the potential of surface water availability in the Kissimmee Chain of Lakes. The findings are contained in a document titled, *Technical Memorandum: A Preliminary Evaluation of Water Availability in East Lake Tohopekaliga and Lake Tohopekaliga* (Cai 2005). The Executive Summary of this study, which summarizes the study's purpose, analysis and findings, is provided in **Appendix I**.

To conduct this evaluation, the District used an existing surface water routing model, the Upper Kissimmee Chain of Lakes Routing Model (UKISS). The UKISS was originally developed to demonstrate the benefits of modifying lake operation schedules in Lake Kissimmee as part of the Kissimmee River Restoration Project.

The study found that water availability is limited by potential downstream impacts, especially reduced flows to the Kissimmee River Restoration project. Also, the total water availability varies significantly on an annual basis, reducing reliability of this source as a potable supply.

Water supply reliability is estimated to achieve 90 percent reliability at a water withdrawal rate of 15 MGD with the construction of a 1,200-acre surface storage reservoir to provide carry-over from the wet season into the dry season. Project construction costs for a 10-, 15- or 25-MGD potable water production facility located on Lake Tohopekaliga are estimated to range from \$25 million to \$33 million. Unit costs of production range from \$4.41 to \$7.26 per 1,000 gallons, based on construction, operation and maintenance costs amortized over 20 years. These estimates were based upon land cost in 2003. High demand for land caused by increasing development in the area of Lake Tohopekaliga has caused land costs to rise quickly throughout the region.

Although the study reveals uncertainty about water availability for a fixed-use type project, the study also suggests that during certain times of the year, substantial water is available to be delivered from the Kissimmee Chain of Lakes for aquifer recharge use. The western portions of Orange and Osceola counties and the ridge areas of Polk County are high recharge areas to the Floridan Aquifer and are being reviewed for potential recharge projects in those areas.

On April 10, 2003, the Governing Board of the South Florida Water Management District (SFWMD or District) accepted the Kissimmee Chain of Lakes recommendations (Resolution No. 2003-468) developed by the Water Resources Advisory Commission (WRAC). The resolution directed the SFWMD staff to work with other agencies to develop a Kissimmee Chain of Lakes Long-Term Management Plan for the purpose of improving the health and stability of the lakes.

The SFWMD staff coordinated efforts with the Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (FDEP), Florida Department of Agricultural and Consumer Services (FDACS), U.S. Army Corps of Engineers (USACE), U.S. Fish and Wildlife Service (USFWS) and U.S. Environmental Protection Agency (USEPA). Participating agency personnel identified issues of concern and mandated activities, initiatives and resource commitments within the Upper Kissimmee Basin.

St. Johns River / Taylor Creek Project

The St. Johns River/Taylor Creek Project proposes to divert water from the St. Johns River during periods of low salinity into the Taylor Creek Reservoir for storage and water supply. The Taylor Creek Reservoir is an existing 32,000 acre-foot storage area located in Osceola County near the juncture of Orange and Brevard counties. The SJRWMD is facilitating an effort in conjunction with the SFWMD and six local utilities to study the development of potable and nonpotable supplies from the combined sources. Initial estimates indicate 40 MGD to 50 MGD of potential water supply availability. Estimated total costs for this project are about \$200 million.

New Storage Capacity for Surface Water or Groundwater

Storage is an essential component of any supply system experiencing variability in the availability of supply. In Florida, the most common types of water storage include in-ground reservoirs, aboveground impoundments and aquifer storage and recovery (ASR).

Aquifer Storage and Recovery Technology

DISTRICT

Aquifer storage and recovery (ASR) is 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 later recover the water for use in the future during dry periods.

Aquifer storage and recovery technology shows promise both for treated and untreated water by providing a storage option during periods of water availability. This technology is currently being used by several utilities at the local level in other SFWMD planning areas. The City of Cocoa uses ASR technology in eastern Orange County (inside the SJRWMD) as part of its potable water system. The level of treatment required after storage and recovery depends on the use of the water—whether it's for public consumption, surface water augmentation, wetlands enhancement, irrigation or as a barrier for saltwater intrusion.

Because ASR provides for the storage of water that would otherwise be lost to tide or evaporation, it represents a crucial water supply management strategy for Florida's future.

The District, in cooperation with the USACE, is pursuing regional ASR systems as part of the Comprehensive Everglades Restoration Plan (CERP). More than 300 ASR wells are planned as part of the CERP, and most are planned around Lake Okeechobee. Project costs for two ASR systems were evaluated in the *2005–2006 Consolidated Water Supply Plan Support Document*, including a 2-MGD potable ASR system and a 5-MGD raw surface

water ASR system. Unit cost estimates ranged from \$0.54/1,000 gallons for the potable system to \$1.02/1,000 gallons for the surface water system. The unit cost difference between the potable ASR and the raw water ASR system reflects a remote location, and pipeline costs for the surface water ASR well and a microfiltration treatment system for the injected raw surface water.



Aquifer Storage and Recovery Well

Local and Regional Reservoirs

Surface reservoirs provide storage of seasonably available water resources for use during dry times to improve irrigation efficiency and to improve stormwater quality. For example, small-scale (local) reservoirs are used by individual farms for storage of recycled irrigation water or the collection of local stormwater runoff. These reservoirs are also useful in providing 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 (STAs) and for storage of seasonally available supplies for use during dry times.

Due to environmental and topographic considerations in central and south Florida, new surface reservoir storage is generally off-stream, meaning no damming of a river is involved to create the reservoir. Water is typically pumped from rivers and canals during wet-weather conditions and stored in an aboveground or at-grade reservoir for use in the dry season.

Off-stream reservoirs recently completed in Florida include the Tampa Bay Reservoir in southern Hillsborough County, which began operation in spring 2005. This system has the capacity to store up to 15 billion gallons of water from the Alafia and Hillsborough rivers and the Tampa Bypass Canal. Based on the pumping and treatment system installed, the annual average water supply yield of the two rivers and the Tampa Bypass Canal without the reservoir is about 40 MGD. Adding the reservoir to that system increased the average annual yield to over 60 MGD.

Recommendations published in an April 1999 report, the *Central and Southern Florida Flood Control Project Comprehensive Review Study* (Restudy) call for the construction of a storage reservoir to be located north of Lake Okeechobee within the KB Planning Area. The total reservoir storage capacity need is estimated to be 200,000 acre-feet from all of these reservoirs. No specific locations have been identified; however, a site feasibility study completed in 2005 identified potential locations in Glades and Highlands counties. Initial reservoir designs estimate 40,000 acre-feet for storage and treatment within these areas. Funding for this project is expected to be proposed in a future federally authorized *Water Resources Development Act* after Year 2010, with project completion before 2015. When finished, this reservoir may offer additional water supply opportunities for the Lower Kissimmee Basin. This potential water supply will be considered in the next plan update.

Reservoir construction costs are discussed in Chapter 3 of the *2005–2006 Consolidated Water Supply Plan Support Document*. Based on this information, capital costs per gallon of storage for a 5 billion gallon reservoir range from about \$0.015/gallon to \$0.017/gallon depending on the reservoir footprint. Analysis suggests land costs affect the total project costs more than berm height for reservoirs designed to accommodate water depths less than 12 feet. The only data readily available on reservoir operation and maintenance costs in southwest Florida are from Tampa Bay Water's C.W. "Bill" Young Reservoir in Hillsborough County

(Tampa Bay Water August 2005). The contracted annual reservoir operation and maintenance costs for this 1,200-acre, 15 billion gallon reservoir averages \$867,000 per year, including an optional algaecide application, which comprises about 40 percent of that average annual cost. Calculated per acre of water surface, this represents an annual operation and maintenance estimate of \$722/acre. Calculated per gallon of storage volume, the cost is \$0.0001/gallon. These annual costs reflect general operations, water quality maintenance and preventative maintenance. Annual costs do not reflect any significant capital repairs that may be periodically required.

Reclaimed Water

Reclaimed water is a key component of Florida’s regional water supply plans for both wastewater management and water resource management. Reclaimed water strategies in the regional water supply plans can include such measures as further development of urban reclaimed water systems, reclaimed water system interconnections, supplemental supplies for peak flow control, and ASR for storage and groundwater recharge.

DISTRICT 

Reclaimed water is water that has received at least secondary treatment and basic disinfection, and is reused after flowing out of a domestic wastewater treatment facility. Reuse is the deliberate application of reclaimed water for a beneficial purpose, in compliance with the Florida Department of Environmental Protection (FDEP) and water management district rules.

Central Florida has long been a leader in the application of highly treated reclaimed water as a source of irrigation, industrial uses and as a means of recharging the local aquifer system. In the KB Planning Area, nearly 100 percent of wastewater is reused.

IN THE KB PLANNING AREA, NEARLY 100 PERCENT OF WASTEWATER IS REUSED.

Potential uses of reclaimed water include landscape irrigation (e.g., residential lots and golf courses), agricultural irrigation, groundwater recharge, industrial uses, environmental enhancement and fire protection.

Reclaimed water offers an environmentally sound means for managing wastewater that reduces environmental impacts associated with discharge of secondary treated effluent. In addition, use of reclaimed water provides an alternative water supply for many activities that do not require potable quality water, such as irrigation, which serves to conserve available supplies of potable quality water. Finally, some types of reclaimed water offer the ability to recharge and augment available water supplies with high quality reclaimed water.

In addition to costs for transmission and distribution system installation, reclaimed water capital costs typically include upgrading wastewater treatment facilities to advanced secondary treatment by adding filtration and high-level disinfection. Additional upgrades to “advanced wastewater treatment,” which reduce nitrogen and phosphorous, may be needed if rehydration or wellfield recharge projects are contemplated.

A generalized cost example for adding 5 MGD in high-level disinfection and filtration (i.e., conversion to advanced secondary treatment) at a wastewater treatment facility (WWTF) currently using secondary treatment is provided in **Table 3**. To ensure consistency with other comparative cost estimates in this chapter, it was presumed an additional 5 acres of property adjacent to the existing facility would be required (1 acre per MGD of capacity) for this installation. Assumptions relative to debt service are consistent with the other examples in this chapter. The costs shown do not include capital costs for installation, and operation and maintenance costs for reclaimed transmission and distribution pipelines, which would be significant. It must also be noted that these costs also do not reflect the capital investment and operation and maintenance costs for the original secondary treatment wastewater treatment plant, as these costs would have been needed regardless of whether or not the facility provides reclaimed water. A listing of reclaimed water facilities and capacities is provided in the Potable and Wastewater Treatment Facilities **Appendix E**.

Table 3. Estimated Project Costs for Upgrade from Secondary to Advanced Secondary Treatment.

Treatment	Total Capital	Capital \$ per gallon of Capacity	Annual Operations & Maintenance	Unit Cost (\$/1,000 gallons)
Addition of 5 MGD filtration and high-level disinfection to existing secondary treatment WWTF	\$5,100,000	\$1.02	\$113,000	\$0.30

Reclaimed water is also emphasized in policy documents, such as the April 2002 *Florida Water Conservation Initiative* and the 2001 *Florida Water Plan*. The Water Resources Implementation Rule (Chapter 62-40, Florida Administrative Code), as amended in 2005, requires the Florida Department of Environmental Protection (FDEP) and water management districts to advocate and direct the reuse of reclaimed water as an integral part of water management programs, rules and plans. The South Florida Water Management District (SFWMD or District) requires all applicants for water use permits to use reclaimed water unless the applicant can demonstrate it is not available or it is not technically and environmentally feasible to do so.

Additional guidance relating to the implementation of water reuse in Florida is given in the 2003 FDEP *Water Reuse for Florida – Strategies for Effective Use of Reclaimed Water* report. The following strategies, identified in the report, are the ones most directly related to the development of regional water supply plans:

- ◆ Encourage groundwater recharge and indirect potable reuse.
- ◆ Encourage metering and volume-based rate structures.
- ◆ Encourage use of reclaimed water in lieu of other water sources.
- ◆ Encourage use of supplemental water supplies.
- ◆ Facilitate seasonal reclaimed water storage.
- ◆ Encourage reuse system interconnects.
- ◆ Encourage integrated water education.
- ◆ Link reuse to regional water supply planning.
- ◆ Implement viable funding programs.

The report provides a road map for the State of Florida's Water Reuse Program into the 21st century. The *Water Reuse for Florida Report* (Reuse Coordinating Committee 2003) is available from the FDEP Web site: <http://www.floridadep.org/water/reuse/techdocs.htm>.

Central Florida Reuse Study

As part of this 2005–2006 *Kissimmee Basin Water Supply Plan Update* (2005–2006 KB Plan Update), the District completed an inventory and assessment of reuse occurring in central Florida, including areas adjacent to the SFWMD's jurisdiction. All of Orange County, northern Osceola County and the northeastern portion of Polk County were included in the SFWMD's survey. The survey, called the *Central Florida Regional Reuse Evaluation*, is included as **Appendix H** of this plan update. According to the survey findings, an estimated increase in wastewater generation of 125 MGD is expected to occur by 2025. Additionally, the study reviewed potential site candidates where reclaimed water might be used and opportunities to address inefficient use of reclaimed water.

ACCORDING TO THE SURVEY FINDINGS, AN ESTIMATED INCREASE IN WASTEWATER GENERATION OF 125 MGD IS EXPECTED TO OCCUR BY 2025.

Figure 6 highlights the area reviewed for the *Central Florida Regional Reuse Evaluation* (see **Appendix H**, Section 3.4: Estimates of Potential Demands). In general, this study reviewed only those wastewater reclamation facilities with flow averaging greater than 0.1 MGD based on reported wastewater flows provided in 2001. This report was compiled to provide an inventory of existing and projected water reclamation facilities, document existing water supplies, estimate future supplies of reclaimed water and examine future reclaimed water demands. Additionally, the study reviewed methods to improve system reliability and efficient use of reclaimed water.

In 2001, the 19 major wastewater utility providers within the study area generated just over 122 MGD of reclaimed water suitable for reuse. While all of the supply generated was used in some beneficial manner, about 89 MGD, or 73 percent, was used for aquifer recharge, industrial application and irrigation replacement. The remaining supply of reclaimed water was directed to surface water discharge or ponds in low recharge/discharge areas. Section 3.1 of the *Central Florida Regional Reuse Evaluation* (**Appendix H**) discusses the distribution of reclaimed water uses in central Florida.

By 2025, projected wastewater flows are expected to almost double, exceeding 243 MGD. As part of the reuse study, potential reuse application sites were identified using the District's consumptive use permitting database, a GIS application using future land maps and interviews with local utilities. Results of this evaluation increased potential reclaimed water demand conservatively to 260 MGD by Year 2025 when looking at potential new growth and conversion of existing landscape using potable water irrigation. The projected quantity of wastewater—if captured, treated and distributed—could meet a substantial portion of the projected future nonpotable demands for the region. (Residential reuse is expected to represent the largest category for potential increase in reclaimed water use.)

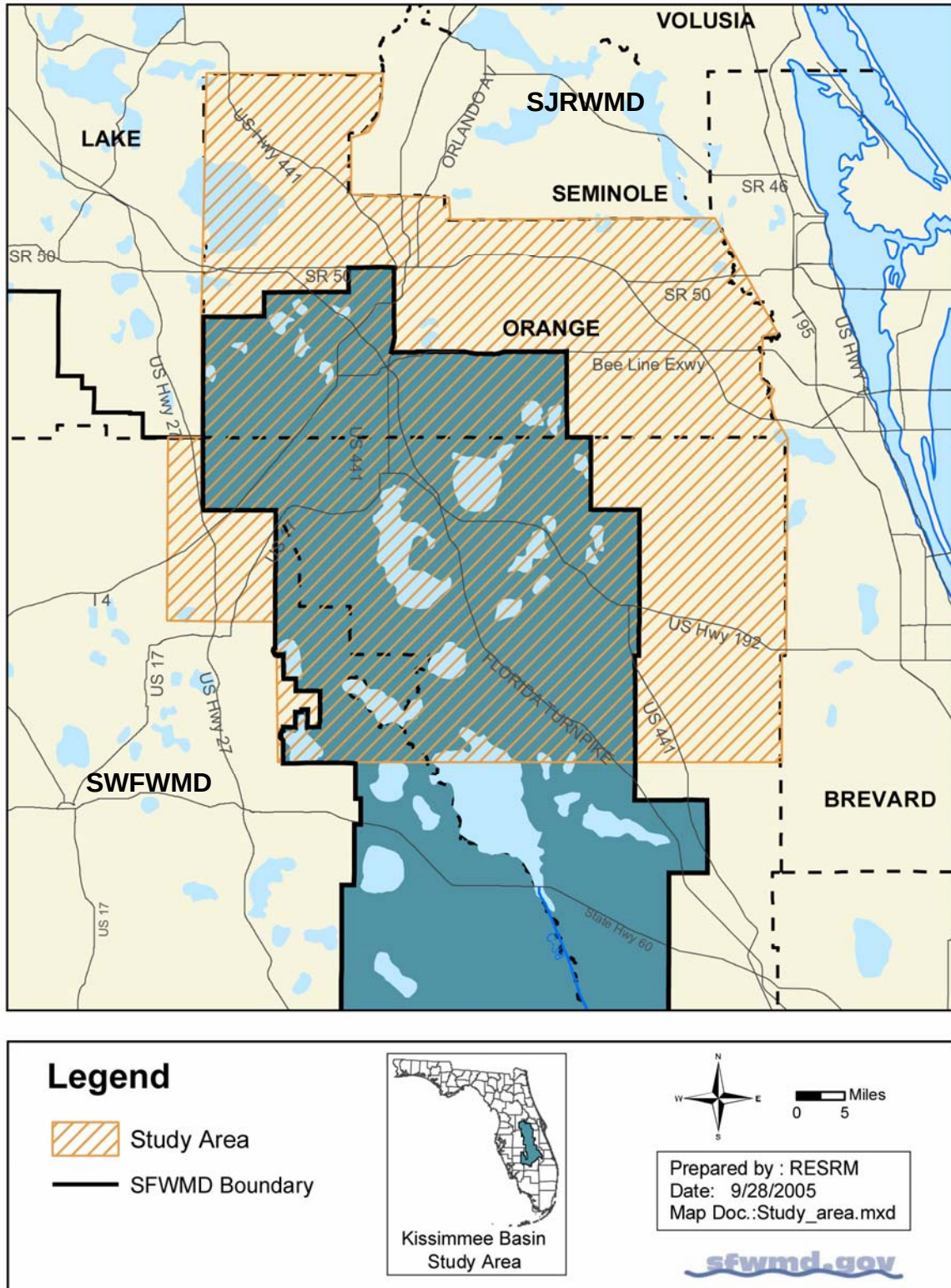


Figure 6. Central Florida Regional Reuse Study Area.

Historic use of reclaimed water use for residential irrigation has been relatively inefficient, and is likely due in part to the misperception that this water is more expendable than potable sources. Section 3.4 of the *Central Florida Reuse Evaluation* discusses estimates of potable water offset using reclaimed water. While estimated demand for reclaimed water is expected to be greater than the anticipated supply, it is possible to extend the use of reclaimed water by improving its use with conservation, supplemental sources of water and improvement of water storage. Work completed as part of the *Central Florida Reuse Evaluation* suggests that improved efficiency of reclaimed water use in residential irrigation could potentially increase the availability of the reclaimed water supply by as much as 45 MGD. Several projects have been identified as supplemental sources to augment reclaimed water supplies and to improve overall use. Storage tanks and in-ground reservoirs also provide the means to improve the percentage of overall reclaimed water use within the planning area as identified by this plan update.

Reclaimed interconnects provide an additional means of supplementing normal reclaimed supplies by increasing both the efficiency and reliability of reclaimed systems. When two or more reclaimed water systems are interconnected, additional system flexibility and reliability are often achieved.



Golf Course and Rapid Infiltration Basins

In areas where aquifer recharge rates from the Surficial Aquifer to the Floridan Aquifer are moderate to high, aquifer recharge is a viable use of reclaimed water. In parts of central Florida, including the western portions of Orange and Osceola counties and the eastern portions of Polk and Lake counties, favorable geologic conditions exist for Floridan Aquifer recharge. Orange County Utilities, the Toho Water Authority and the Reedy Creek Improvement District operate rapid infiltration basins (RIBs) within these regions as a means of reclaimed water disposal and for aquifer recharge.

Aquifer recharge from these RIBs is thought to help mitigate some of the environmental impact from water withdrawals in the region, although the extent is uncertain at this time.

In the KB Planning Area, outside of the study area, reuse has been applied in only a limited number of instances to date. Currently, no existing or proposed water reuse is occurring within the areas of Glades and Highlands counties. Recently, the City of Okeechobee identified its intent to expand its use of reclaimed water in some upcoming residential development projects.

CONSERVATION

Water conservation is regarded as an important component in integrated water resource management and vitally important for the fast-growing KB Planning Area. Measures to use water more efficiently can be less expensive than projects that increase supply. Other important advantages of conservation include reducing stress on natural systems. Water conservation projects are often easier to implement than supply projects due to less complex permitting, lower costs and acceptance by the public.

Increased use of reclaimed water and increased water conservation and research were recommended in the 2000 KB Plan to meet the region's projected water demands and to reduce the potential for harm to wetlands and water resources. Water conservation of reclaimed water is also an important concern due to the growing demand for such supplies.

A Statewide Effort

In response to growing water demands, water supply problems and one of the worst droughts in Florida's history, the FDEP led a statewide Water Conservation Initiative to find ways to improve efficiency in all categories of water use. Hundreds of stakeholders participated in the initiative, which addressed all water use classes and subsequently offered alternatives to save water. Fifty-one cost-efficient alternatives were published in the *Florida Water Conservation Initiative* (FDEP 2002). These alternatives can be found in the *Consolidated Water Supply Plan Support Document* (SFWMD 2005–2006). The conservation methods best suited to the scope of the 2005–2006 KB Plan Update are presented in **Appendix L**.

In addition to policy and regulatory measures, the following sections highlight conservation measures that were the highest ranked of the Water Conservation Initiative alternatives.

Agricultural Conservation

Agricultural irrigation accounts for one of the largest water uses in the KB Planning Area. Improvements in the recovery and recycling of irrigation water and greater use of reclaimed water for irrigation have already resulted in significant water savings throughout the region.

By 2004, over 58 percent of the citrus acreage in the planning area began using low-volume technology or microirrigation, while the remaining acreage is irrigated by flood irrigation. Much of the acreage currently irrigated by flood irrigation is located in Chapter 298 Districts (Chapter 298, F.S.) where several growers use a method of rain harvesting, which recycles water after each use and moves it from one citrus grove to another. Conversion of citrus acreage from flood irrigation to

microirrigation will continue to increase water savings. The U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS) has promoted water conservation through conversion of flood irrigation systems to low-volume technology with its cost-sharing Environmental Quality Improvement Program (EQIP).

Urban Water Conservation

Landscape Irrigation

Landscape irrigation for watering lawns, ornamental plants and golf courses can be significantly reduced through more efficient irrigation system design, installation and operation, and by reducing the amount of landscape requiring intensive irrigation. Rain sensors can save an average of 27,000 gallons per year per home irrigation system. If 75 percent of homes in the KB Planning Area were to install rain sensors, the region could save an estimated 5 MGD.

Indoor Water Use

Indoor water use accounts for a major portion of demands on public water supply. The greatest potential for conserving water in this sector is through increasing the number of Florida homes and businesses using water efficient toilets, clothes washers, showerheads, faucets and dishwashers. Plumbing retrofit programs were one of the Water Conservation Initiative’s highest ranked alternatives and were recommended in the 2000 KB Plan.

If 75 percent of homes built before 1984 were to retrofit at least one toilet and one showerhead, the KB Planning Area could potentially achieve a total annual savings of almost 6 MGD. Whenever indoor water use is reduced, there is also a reduction in wastewater. Achieving this savings is highly dependent on cooperating utilities, and several utilities have conducted small-scale retrofit projects.

The SFWMD will continue to devise programs for retrofits, provide Water Savings Incentive Program (WaterSIP) funding, technical assistance and outreach. The District’s WaterSIP is tailored to assist the community to partially fund projects, such as large-scale retrofits, as recommended by this 2005–2006 KB Plan Update. Each year the District sets parameters for WaterSIP proposals that stress water conservation options recommended in the regional water supply plans. Water pricing rate structures (including drought rates) and informative utility billing are effective techniques to encourage water users to conserve water.

Industrial, Commercial and Institutional

Industrial, commercial and institutional users can improve water use efficiency through certification programs for businesses implementing industry-specific best

management practices and through water use audits, improved equipment design and installation, and greater use of reclaimed water.

Immediate and low-cost water conservation opportunities exist within the region's world-class hospitality industry. Estimated annual water savings of almost 5 MGD could be achieved if 50 percent of restaurants were retrofitted with low-volume rinse valves and 50 percent of hotels and motels installed low-volume shower faucets and toilet retrofits in Orange and Osceola counties.

General Policy Considerations

Reuse of reclaimed water can be more efficient through pricing and metering. Metering of reclaimed water use and implementation of volume-based rates for reclaimed water is a major strategy contained in the *Water Reuse for Florida – Strategies for Effective Use of Reclaimed Water Report* (Reuse Coordinating Committee 2003) to promote efficient use of reclaimed water.

The role of education and outreach programs and the effect of cooperative funding programs, such as the Mobile Irrigation Lab (MIL) and other agricultural irrigation programs, were also reviewed to assess the potential for water conservation in the KB Planning Area. Cooperative funding, cost-sharing, WaterSIP and other incentives to support cost-effective projects within all sectors of water use promoting increased efficiency of water use have been effective.

The MIL Program began in south Florida in 1989 with an agricultural lab in the SFWMD's Lower West Coast (LWC) Planning Area. The mission of the program is to educate and demonstrate to agricultural and urban water users how to irrigate efficiently. Currently, there are 15 operational labs in the SFWMD. Ten are District-funded and five are funded by other sources. Districtwide, 12 counties are served by the labs, including the Toho Water Service Area. Funding is provided by a multiagency partnership between federal, state, regional and local levels of government.

More information about conservation efforts and plan recommendations for the KB Planning Area can be found in **Appendix L**.

Conserve Florida Program

During finalization of this plan update, legislation was passed incorporating and codifying the development of the statewide Water Conservation Program for public water supply (Section 373.227, F.S.). The law provides goals that must be addressed as part of the program, called “Conserve Florida,” which encourages conservation by utilities and stresses accountability.

As provided in Section 373.227(4), F.S., a water management district must approve a goal-based water conservation plan as part of a consumptive use permit if a utility provides reasonable assurance that the plan will achieve effective water conservation, at least as well as the water conservation requirements adopted by the appropriate water management district, and is otherwise consistent with the statute.

Also required by Florida House Bill 293, and included in the Conserve Florida Program, are guidelines that address Xeriscape™ landscaping and the development of a statewide model ordinance to increase landscape irrigation efficiency. In addition, the 2004 legislation allows water management districts to require the use of reclaimed water, if feasible, and to encourage metering of newly implemented reuse projects, enabling utilities to charge for the actual volume of water used. See Chapters 367, 373, 403, 570 of the Florida Statutes for specific legislative authority on the statewide Water Conservation Program.

SUMMARY

Traditional groundwater sources in the Upper Kissimmee Basin are limited. Thus, it is appropriate to develop alternative water supply sources. Alternative water supply opportunities for the KB Planning Area include brackish groundwater, fresh surface water from the Kissimmee River and Chain of Lakes and its tributaries, runoff collection and storage, and reclaimed water. Reclaimed water and conservation seem the best (and most immediate) options available to meet and defer future demands. Conservation within the reclaimed water system, surface water from the Taylor Creek/St. Johns River Project, and water from the Kissimmee Chain of Lakes and River system seem to be the Northern KB Planning Area’s most suitable surface water sources for alternative water supplies. Programs promoting reuse and development of surface water alternatives are recommended for implementation. Additionally, a reservoir to be located north of Lake Okeechobee (scheduled for completion in 2015), may be an essential component of the Lower Kissimmee Basin’s water supply system to counteract the impacts of seasonal variability of supply availabilities.

Water Resource Development Projects

Florida water law identifies two types of projects to meet water needs: Water Resource Development projects and Water Supply Development projects. Water Resource Development projects are generally the responsibility of a water management district, and are intended to assure the availability of an adequate supply of water for all competing uses deemed reasonable and beneficial and to maintain the functions of natural systems. Water Supply Development projects are generally the responsibility of local users, such as utilities, and involve the water source development options described in **Chapter 5** to provide water to users.

This chapter addresses the role of the South Florida Water Management District (SFWMD or District) and other parties in Water Resource Development projects, and provides a summary of the Water Resource Development projects in the Kissimmee Basin (KB) Planning Area, including estimated schedules and costs for Fiscal Years 2006–2010. Water Supply Development projects are addressed in **Chapter 7**.

LAW / CODE

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 Development projects support and enhance Water Supply Development projects, but often by themselves do not yield specific quantities of water. For example, hydrologic investigations and groundwater monitoring and modeling provide important information about aquifer characteristics, such as hydraulic properties and water quality. All of these efforts are useful in developing an appropriate facility design, identifying the safe yield and evaluating the economic viability of Water Supply Development projects. The Water Resource Development projects described in this chapter—drilling and testing, groundwater and wetland monitoring, groundwater and evapotranspiration assessments, Districtwide feasibility studies, minimum flows and levels, and water

reservations—do not produce water, but serve an important role in supporting the Water Supply Development projects described in the next chapter. The Water Conservation Program, which makes water available, is discussed in this chapter, and encourages measures to use water more efficiently so the water saved can be used to meet new needs. In effect, conservation expands current water supplies.

DISTRICTWIDE WATER RESOURCE DEVELOPMENT PROJECTS

The following Water Resource Development projects encompass more than one region and are therefore considered Districtwide. These efforts are organized according to the current budget categories the District uses for funding both new and ongoing Water Resource Development projects. Aspects of these Districtwide projects specifically pertaining to the KB Planning Area are identified. The status of these projects and identification of implementing entities are included in the project discussions. **Table 4** summarizes the estimated costs and time frames for completion of these Districtwide projects.

Drilling and Testing Program

A Districtwide Drilling and Testing Program is providing an improved understanding of the geology and hydrology of the aquifers in central and south Florida as new exploratory/test wells are constructed during the next five years. Efforts will continue to evaluate conditions in the Floridan Aquifer System (FAS) as a brackish water supply source for the KB Planning Area, and well construction activities at each site are yielding additional information about the aquifers and confining units above the FAS. These efforts will develop a more complete understanding of the hydrology and potential yields of the aquifer system, as well as support consumptive use permitting (CUP) and water supply development efforts.

Groundwater and Wetlands Monitoring

Well construction and monitoring efforts provide information about geology, aquifer characteristics and water level conditions to aid the SFWMD in the development of groundwater models, assessing groundwater conditions and management of this resource. Aquifer monitoring is an ongoing effort.

Surficial Aquifer Well Pairing Network

Within the Upper Kissimmee Basin, the linkage between the Floridan Aquifer and the shallow Surficial Aquifer is of critical importance due to the potential impacts that Floridan Aquifer use may have on wetland systems in this region. Improving

the network of these wells will lead to a better understanding of the basin. The network of existing Floridan Aquifer wells offers the opportunity to install adjacent shallow wells. Sites are then equipped with electronic recording devices to monitor water levels in both aquifers. Within the KB Planning Area, an average of about three sites per year has been equipped with monitoring devices. The anticipated schedule for future site installations for remaining wells in the region assumes the same rate of installation.

Wetlands Monitoring Network

Wetlands serve a vital role in providing habitat for many species of plants and animals. Within the SFWMD, consumptive uses, drainage or other diversions of water may impact the hydrologic system supporting these wetlands. To better understand these systems, the District has expanded its network of wetland monitoring sites Districtwide. Within the KB Planning Area, at least one to two sites have had monitoring devices installed during each of the past three years. The SFWMD intends to continue this effort and plans to develop a database to link information from these sites to data collected from consumptive use permit holders.

Groundwater and Evapotranspiration Assessments

A number of specialized hydrogeologic studies were completed by the U.S. Geological Survey (USGS) in cooperation with the District. The information learned from these studies is needed to enhance the understanding of aquifers and evapotranspiration (ET) rates across the District. Typically, each project requires several years of focused effort by USGS professionals, giving a continuity and focus unique to the USGS. Some projects have the cooperation of other water management districts or other governmental agencies. The USGS reports, maps and data are peer reviewed and highly respected in the industry, making them invaluable references for the District's groundwater models, assessments and policy-making.

Current USGS projects include development of a water quality module for a new District model and a project to measure ET in five specific vegetation communities occurring throughout the District.

Comprehensive Water Conservation Program

The SFWMD's overall water conservation goal is to prevent and reduce wasteful, uneconomical, impractical or unreasonable uses of water resources. In addition to improving efficiency of water use, the statewide Water Conservation Program, known as "Conserve Florida," strives to improve management of traditional supplies and encourage development of alternative or diverse water supply sources. To better promote the conservation goal, the SFWMD funds outreach and educational programs to encourage water users to make efficient use of water resources through conservation and reuse.

Through the Water Savings Incentive Program (WaterSIP), the SFWMD provides matching funds up to \$50,000 to water providers, such as utilities and homeowners associations, for water-saving technologies. These technologies include low-flow plumbing fixtures, rain sensors, fire hydrant flushing devices and other hardware. During Fiscal Years 2002–2006, 41 projects were funded Districtwide and cumulatively made almost 3 MGD of water available. For Fiscal Year 2007, 14 projects are proposed for funding and are anticipated to make almost 1 MGD of water available. Based on the actual and proposed water savings for Fiscal Years 2002–2007, it is anticipated that a cumulative total of over 3 MGD of water will be made available Districtwide. Since the program's inception in 2002, it is estimated that over 4 MGD of water will be made available by WaterSIP through 2011.



Mobile Irrigation Lab Program

The Mobile Irrigation Laboratory (MIL) Program consists of specialized labs on wheels designed to conduct irrigation audits of agricultural and urban irrigation systems. The MILs are operated by the soil and water conservation districts and provide recommendations to water users who implement the water savings recommendations. It is anticipated the MIL Program will make a cumulative total of 10 MGD available Districtwide between Fiscal Years 2007–2011. Since the program's inception in 1989 through 2006, it is estimated that 106 MGD of water has been made available by this program.

Districtwide, there are 15 MILs serving 12 counties. Ten MILs are District-funded and five are funded by other sources.

Rulemaking efforts are under way at the SFWMD to consider goal-based conservation as a permit condition. Workshops are being held concerning revisions to Chapter 40E-2, Florida Administrative Code (F.A.C.), and the *Basis of Review for*

Water Use Permit Applications (SFWMD 2003) that would require individual water utilities to develop goal-based conservation programs. Goal-based conservation allows utilities to achieve a water management district agreed-upon conservation goal, such as a reduction in per capita or overall reduction in pumpage, using any method from a suite of methods the utility chooses, to satisfy CUP conservation requirements.

Feasibility Studies

The SFWMD is performing feasibility studies to determine the viability of water resource development options in order to increase water supply through water resource alternatives. This effort involves collecting and analyzing data and modeling.

Water User and Supply Cost Relationships Feasibility Study

The objective of the Water User and Supply Cost Relationships Project is to develop engineering cost estimation relationships for evaluating water supply alternatives for the SFWMD's four planning regions. This effort will include options that use groundwater, surface water, seawater, aquifer storage and recovery (ASR), and reclaimed water for reuse.

Modeling

The SFWMD funds modeling efforts supporting the establishment of minimum flows and levels (MFLs), water reservations and projects in the District's four regional planning areas.

Subregional modeling for the regional water supply plans is primarily in the form of model update and maintenance. The District is in the process of converting the water level monitoring data and topography from National Geodetic Vertical Datum of 1929 (NGVD) to North American Vertical Datum of 1988 (NAVD). This will likely require a partial recalibration of all groundwater models used in each region. A major modeling effort project within the next two years is the groundwater modeling of central Florida.

In 2002, the SFWMD began an effort to improve previous groundwater models for the central Florida area. These plans include updating the groundwater model for the Lower Kissimmee Basin and creating a transient groundwater model with improved grid resolution for the upper portion of the basin. The improvements are designed to allow a more accurate portrayal of the existing withdrawals from groundwater and to better predict possible groundwater resource solutions. The effort is being coordinated with the St. Johns River Water Management District (SJRWMD) and the Southwest Florida Water Management District (SWFWMD).

The SFWMD has hired contractors to perform the internal work to make the needed improvements. Subsequent to the model upgrades, the District will use the model for water supply plan updates.

Minimum Flows and Levels Activities

As part of the process of establishing and maintaining MFLs, the SFWMD is developing and implementing an electronic tracking system to determine whether MFL criteria are being met. Other efforts include producing documents and conducting scientific and peer reviews.

Reservations Activities

The process of establishing water reservations for resource protection involves preparing documents, conducting scientific peer reviews, holding public workshops and providing administrative support. In some cases, the District assembles a team of experts to assist with analysis, interpretation, and presentation of technical issues and information needed to develop and implement a standardized methodology/approach for water reservations. The District anticipates proposing a Kissimmee River reservation prior to the five-year update of this plan.

Floridan Aquifer System Groundwater Model and Database Development

The use of the Floridan Aquifer System (FAS) as a water source along the east coast of Florida is anticipated to expand as a result of treatment and storage improvements, and as regulatory constraints continue to limit development of traditional sources. Therefore, the District is using density-dependent models to quantitatively assess the FAS in this region. This effort involves two phases. Phase 1 in the Lower East Coast (LEC) Planning Area includes the refinement of the existing FAS groundwater flow model using data collected for the construction of ASR projects associated with the Comprehensive Everglades Restoration Plan (CERP) and individual utilities with deep well injection facilities. Phase 1 modeling was completed in Fiscal Year 2006.

As new Floridan Aquifer exploratory wells are drilled and water supply wells constructed and tested, assessment of aquifer capacity will evolve by updating the database and models. Additionally, existing monitor well networks are being processed, analyzed and brought into the model. Water quality sampling will continue in conjunction with the new exploratory wells installed within the LEC Planning Area. Phase 2, which will be expanded to include the Upper East Coast (UEC) Planning Area, aims to improve the model calibration in the LEC Planning Area.

Table 4. Implementation Schedule and Costs for Districtwide Water Resource Development Projects Fiscal Years 2006–2010.

Project	Plan Implementation Schedule and Costs (\$1,000s)					
	FY06 \$	FY07 \$	FY08 \$	FY09 \$	FY10 \$	Total \$
Drilling and Testing Est. start date: 1990 Est. finish date: ongoing	1,736	109	115	121	127	2,208
Groundwater and Wetland Monitoring Est. start date: 2002 Est. finish date: ongoing	810	581	610	641	673	3,315
Groundwater and ET Assessments Est. start date: 1954 and 2002, respectively Est. finish date: ongoing	385	405	425	446	468	2,129
Water Conservation Program Est. start date: 1977/2000 Est. finish date: ongoing	1,650	1,381	1,381	1,181	1,181	6,724
Districtwide Feasibility Studies Est. start date: 2001 Est. finish date: ongoing	950	450	1,450	600	600	4,050
Modeling Est. start date: 1998 Est. finish date: ongoing	100	592	493	421	452	2,058
MFLs Activities Est. start date: 1995 Est. finish date: ongoing	105	183	183	123	123	717
Reservations Activities Est. start date: 2004 Est. finish date: ongoing	425	TBD	TBD	TBD	TBD	TBD
Floridan Aquifer Groundwater Model and Database Development Est. start date: 2006 and 2000, respectively Est. finish date: 2007 and ongoing respectively	135	375	236	248	260	1,254
Total	\$6,296	\$4,076	\$4,843	\$3,781	\$3,884	\$22,455

KISSIMMEE BASIN-SPECIFIC PROJECTS

In addition to the Districtwide Water Resource Development projects, there are several region-specific Water Resource Development projects planned for the KB Planning Area. These projects are proposed to resolve outstanding issues of water availability and the use of surface water within the planning area. **Table 5** summarizes the estimated costs and time frames required for the completion of these projects.

Central Florida Aquifer Recharge Feasibility Study

Part of the effort in studying the Kissimmee Chain of Lakes water supply availability includes a feasibility assessment of how best to use the available water in the system. Availability of water supply from the Kissimmee Chain of Lakes, and Shingle, Boggy and Reedy creeks is projected to be highly variable. As such, surface water from these systems may, in part, be a product of opportunity rather than a consistent, daily alternative source. While this makes direct use more difficult, it offers opportunities to use surface water for aquifer recharge to offset some of the projected groundwater withdrawal impacts during periods of high availability. Because portions of central Florida have moderate and high recharge areas to the Floridan Aquifer, rapid infiltration basins may be a feasible means of using surface water from these sources for implementing aquifer recharge. Similar studies have been completed in Orange County for the use of reclaimed water for aquifer recharge. A project is proposed to expand this study into parts of Osceola, Polk and Lake counties to identify aquifer recharge opportunities for using surface water from the Kissimmee Chain of Lakes and available reclaimed water.

Modeling for Kissimmee Chain of Lakes Management Plan

A resolution included in the *2000 Kissimmee Basin Water Supply Plan* (2000 KB Plan) directed the SFWMD to work with other agencies to develop a plan for improving the health and stability of the Kissimmee Chain of Lakes. The development of the Kissimmee Chain of Lakes Long-Term Management Plan requires an extensive modeling effort to estimate performance of the many competing uses for the Kissimmee Chain of Lakes and the Kissimmee River.

The Kissimmee Basin Hydrologic, Modeling and Operations Study (KBMOS) is an initiative to construct an advanced hydrologic/hydraulic model to be used to simulate alternative structure operation criteria to meet identified objectives. A MIKE SHE/MIKE 11 Model was selected as the alternative formulation and evaluation for the study. The tool is an integrated surface and groundwater model

used to evaluate water control operations for the entire Kissimmee Chain of Lakes and Kissimmee River north of the S-65E Structure. The study is constrained to evaluating modifications of the existing control infrastructure limitations in attempting to improve operations. The purpose of the study is to find a means of operating the Kissimmee Basin system to achieve a more acceptable balance among flood control, water supply, aquatic plant management, navigation, water quality and natural resource management, while continuing to address impacts to downstream systems, including Lake Okeechobee, and the Caloosahatchee and St. Lucie estuary discharges. Another aspect of this effort involves evaluating the lakes and their tributaries to understand the best way to use the available water in the system. This project was initiated in 2005 and will extend through 2008.

Central Florida Coordination Area Action Plan

As discussed in earlier chapters, the SFWMD, the Southwest Florida Water Management District (SWFWMD) and the St. Johns River Water Management District (SJRWMD) have undertaken a new effort to address water supply issues in the central Florida region. The districts have developed an action plan to assure a coordinated and consistent approach in the Central Florida Coordination Area (CFCA), including the City of Cocoa's public water supply service area in Brevard County; all of Polk, Orange, Osceola and Seminole counties; and, southern Lake County. Consensus action plans were developed in three key functional areas: regulatory, planning, and computer modeling and tools. The CFCA Action Plan was presented to the governing boards of the three Districts during their respective October 2006 meetings.

Information from the other studies and activities described in this chapter will be used as appropriate in the CFCA effort.

In general, the districts have jointly concluded that the availability of sustainable quantities of groundwater in central Florida is insufficient to meet future demands, and there is an immediate need to develop and implement alternative water supply projects in addition to continued aggressive conservation and reuse of reclaimed water. The time needed to implement alternative water supply projects will necessitate allocation of groundwater consistent with 2013 projected demands. Beyond the 2013 level of demand, alternative water supply sources must be developed to meet future demands. In some instances, specific conditions may require that allocations from traditional groundwater be less than 2013 demand or require specific actions to be taken to avoid or mitigate harm that would occur from the 2013 demand at a specific location. In other areas, specific conditions may allow slightly increased allocations. But, the conclusion is clear: within the next five to six years public water supply utilities in central Florida must be prepared to move to alternative water supplies to meet future demands.

The three districts are committed to refining the tools needed to improve the best estimate of the limits on sustainable groundwater and re-evaluate these conclusions as these tools and data become available. The districts are also committed to a continuing assessment of all potential alternative water supply sources, including but not limited to, the St. Johns River and Kissimmee River systems in order to help meet future demands. As a general proposition, permits issued in the interim will be conditioned to reflect the 2013 limit on traditional groundwater resources and the uncertainty in projecting potential harm to the water resources.

Table 5. Implementation Schedule and Costs for Kissimmee Basin Planning Area Region-Specific Water Resource Development Projects Fiscal Years 2006-2010.

Project	Plan Implementation Schedule and Costs (\$1,000s)					
	FY06	FY07	FY08	FY09	FY10	Total
	\$	\$	\$	\$	\$	\$
Central Florida Recharge Feasibility Study						
Est. start date: 2006	0	100	100	0	0	200
Est. finish date: 2008						
Kissimmee Chain of Lakes Management Plan						
Est. start date: 2004	0	1,300	300	0	0	1,600
Est. finish date: 2008						
Central Florida Coordination Area Action Plan Initiative						
Est. start date: 2006	Staff time	Staff time	Staff time	Staff time	Staff time	Staff time
Est. finish date: 2008						
Total	\$0	\$1,400	\$400	\$0	\$0	\$1,800

SUMMARY

Water Resource Development projects are generally the responsibility of a water management district, and are intended to assure the availability of an adequate supply of water. The SFWMD expanded groundwater and wetland monitoring and testing efforts, completed hydrogeologic studies, and implemented outreach and educational programs to encourage efficient use of water resources through conservation and reuse. Additionally, the District is performing feasibility studies, such as the Water User and Supply Cost Relationships Project and the Central Florida Aquifer Recharge Feasibility Study, to determine the viability of water resource development options in order to increase water supply through water resource alternatives.

Water Supply Development Projects

Average water demand in the Kissimmee Basin (KB) Planning Area is projected to increase by 55 percent to 401 million gallons of water per day (MGD) by Year 2025. In 20 years, approximately 70 percent (284 MGD) of the area's total average water demand will be associated with urban use. Agriculture, the second largest water user, is expected to increase by about 1 percent to an estimated 118 MGD under average conditions.

The metro-Orlando area will experience the region's greatest growth in population. An increase of 120 MGD in Public Water Supply use is projected in Orange, Osceola and Polk counties. Increased agricultural water use is anticipated in Okeechobee, Highlands, Polk and Glades counties. However, in Orange and Osceola counties, agricultural water demand is projected to decrease as agricultural lands convert to urban land use.

This chapter provides a summary of the Water Supply Development projects anticipated to meet the needs of the KB Planning Area for the next 20 years. Information is provided for each water use category, with a particular emphasis on the fast-growing Public Water Supply sector. Additional details about individual users, projects, quantities developed and project costs can be found in **Appendices A, B, and D**.

LAW / CODE

Water supply development is defined in Section 373.019 (24), Florida Statutes (F.S.), as 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.

Local governments, government-owned and privately owned utilities, regional water supply authorities, multijurisdictional water supply entities, self-suppliers, and other water users are primarily responsible for Water Supply Development projects. **Appendix A** provides a listing of the projects submitted by local utilities and agricultural operations for consideration in the plan update.

Over the next 20 years, water supply development projects are anticipated to shift from reliance on traditional sources, such as the Floridan Aquifer System in central Florida, to alternative/nontraditional sources. This is the result of growing concern

over the long-term sustainability of the Floridan Aquifer to provide increased supplies without harming the water resources of the region.

Water Supply Development projects selected for inclusion in this *2005–2006 Kissimmee Basin Plan Update* (2005–2006 KB Plan Update) primarily include alternative water supplies. As part of the planning process in preparing this plan update, the South Florida Water Management District (SFWMD or District) circulated a questionnaire to solicit information from municipal, agricultural and other water suppliers regarding the traditional and alternative water supply projects planned to meet water needs for the next 20 years. This process allowed local governments, water suppliers and water users to provide input on the proposed water supply projects included in the plan update.

Several factors were evaluated to determine a project’s inclusion in the plan update, such as resource constraints, and whether the project actually contributes new supply. Not all projects submitted in response to the District’s questionnaires are included in this plan update. Many projects submitted reflect such practices as maintenance of existing facilities and improvements in the distribution system. While these projects represent good utility practice, they do not represent alternative water supply projects.

Several utilities located outside of the KB Planning Area identified projects within the KB Planning Area to meet their future water needs. These projects, listed in Table 2 of **Appendix A**, are presented to reflect the associated utility’s entire plan to meet future water demands.

Identified projects may not be eligible for state funding assistance and may not be permittable. Projects listed in this plan update are not necessarily recommended, or deemed permittable by the District. Furthermore, a project identified for inclusion in this plan update may not necessarily be selected for development by the utility. In accordance with Section 373.0361(6), Florida Statutes (F.S.), nothing contained in the water supply component of a regional water supply plan should be construed to require local governments, public or privately owned utilities, special districts, self-suppliers, multijurisdictional entities and other water suppliers to select that identified project. If the projects identified in this plan update are not selected by a utility, the utility will need to identify another method to meet its needs, advise the District of the alternate project(s), and a local government will need to include such information in its 10-Year Water Supply Facilities Work Plan. The projects listed have not been evaluated for concurrence with District consumptive use permit rules.

Alternative water supply projects listed in this 2005–2006 KB Plan Update include alternative water supply projects submitted by local suppliers specifically for consideration in this plan update; projects submitted and approved for cost-sharing funds from the District in Fiscal Year 2006 and Fiscal Year 2007 under the alternative water supply portion of the new Water Protection and Sustainability

Program; and, projects recommended by the SFWMD for utilities that showed an unmet future need. In Fiscal Year 2006 and Fiscal Year 2007, 16 projects located within the KB Planning Area were recommended for a total of approximately \$6 million in funding. These funds are for construction of alternative water supply projects, and applicants must pay at least 60 percent of a project's construction costs.

Alternative sources include reclaimed domestic wastewater; surface water (from local stormwater management systems or from the Central and Southern Florida Flood Control Project that has been determined not necessary for restoration of protection of natural resources); aquifer recharge projects using storm water or treated wastewater; and, desalinated brackish or saline water.

If an alternative water supply project is included in this KB Plan Update, it is eligible for funding consideration, but District funding of that project is not guaranteed. Inclusion in the plan update does not serve by itself as an application for funding. The alternative water supply funding program requires completion and submittal (by the project owner) of a separate application for each project for which funding is requested on an annual basis. The application for alternative water supply funding, as well as submittal time frames and requirements are available from the District's Water Supply Web site: <http://www.sfwmd.gov/watersupply>.

Demand and supply conditions for the six major water use categories are evaluated in this chapter. Because the majority of growth in demand during the next 20 years will occur in the urban sector, and more specifically within the public water systems, particular emphasis is placed on evaluating future needs and recommending water supply projects within the Public Water Supply category.

Historically, fresh groundwater from the Floridan Aquifer System (FAS) and groundwater from the Surficial Aquifer System (SAS) have served the entire KB Planning Area as traditional water sources. Additionally, in the Lower Kissimmee Basin, groundwater from the Surficial Aquifer and surface waters from Lake Istokpoga and Lake Okeechobee have also been classified as traditional sources. However, at this time, the availability of water for increased development from several of these traditional sources is under investigation. As a result, users seeking to expand the use of these sources are encouraged to participate in the upcoming water availability evaluations and may need, depending on the outcome of the studies, to consider alternative sources in the event such sources are not available for increased allocation. Due to this pending water supply review for the KB Planning Area, yields from the majority of proposed new traditional water supply projects have not been counted or incorporated into this plan update.

The decision not to include most new traditional supply development projects in this plan update should not be interpreted as precluding development of these sources as long as that development is done in compliance with the District rules. In

fact, some traditional freshwater projects have been included in this plan update. These projects reflect expansion of small systems currently relying on fresh groundwater to meet their water needs. Inclusion of these freshwater projects in the plan update does not confer any special permitting status or relieve the permit applicant for such systems from meeting all District rule criteria in order to qualify for a permit.

PUBLIC WATER SUPPLY

Public Water Supply includes all potable uses served by municipal and private utilities. Public Water Supply demand is projected to increase to 235 MGD in Year 2025. Public water demand is currently met through a combination of traditional fresh surface water and groundwater supplies. In addition, several utilities are using reclaimed water to provide irrigation water to developments as a way of reducing demands on Floridan Aquifer water. While the use of reclaimed water for irrigation is encouraged, the resource benefit to utilities varies depending on the location of the utility wellfield in relation to the location of irrigation demands met by reclaimed water.

Regionwide, **Table 6** shows a surplus supply condition in Year 2025 of nearly 26 MGD. This surplus represents the difference between the estimated Year 2025 demands and the volume of proposed water supply projects. It should be noted that some of the projects don't directly provide for drinking water supply on a one-to-one basis. For example, a desalinization project, which produces 10 MGD of potable water will provide for 10 MGD of demand. However, 10 MGD of reclaimed water used for irrigation does not provide for 10 MGD of potable demand. As a result, a surplus in **Table 6** does not mean the future demands are permittable based on the proposed projects. The rural portions of counties predominately served by Domestic Self-Supply are not included in the table. Additionally, Polk County and Poinciana Utilities have not identified sufficient sources of water to meet their projected needs within the SFWMD. In both cases, projected demand is expected to be met by reclaimed water programs, which are currently being developed (or expanded) by each entity.

The projected supplies in **Table 6** are based on existing permitted supplies; alternative water supply potable water projects submitted and approved for the District's Fiscal Year 2006 and Fiscal Year 2007 alternative water supply funding; eligible potable water projects submitted by local water suppliers specifically for the 2005–2006 KB Plan Update; and, District-recommended projects for entities that did not supply project information and indicated an unmet future need.

Table 6. Public Water Supply Demand and Alternative Water Supply Projects through 2025.

Utility	2006-2010			2011-2015			2016-2020			2021-2025		
	Identified Demand (MGD)	Identified Projects (MGD)	Surplus/ Deficit (MGD)	Identified Demand (MGD)	Identified Projects (MGD)	Surplus/ Deficit (MGD)	Identified Demand (MGD)	Identified Projects (MGD)	Surplus/ Deficit (MGD)	Identified Demand (MGD)	Identified Projects (MGD)	Surplus/ Deficit (MGD)
Okeechobee Utility Authority	2.9	3.2	0.3	3.2	3.2	0.0	3.5	3.7	0.2	3.8	3.8	0.0
Orange County Utilities	29.1	37.2	8.1	34.6	37.4	2.4	40.0	42.2	2.2	45.5	49.7	4.2
Orlando Utilities Commission	47.0	56.4	9.4	36.6	61.5	24.9	56.6	61.5	4.9	56.6	61.6	5.0
Polk County (Oak Hill Estates)	1.0	1.7	0.7	1.3	1.7	0.4	1.6	1.7	0.1	1.9	1.7	-0.2
City of St. Cloud	7.8	5.8	-2.0	10.6	15.8	5.2	12.3	22.8	10.5	15.5	22.8	7.3
Reedy Creek Improvement District	21.2	23.4	2.2	21.9	23.4	1.5	22.7	23.4	0.7	23.4	23.4	0.0
Toho Water Authority	45.8	47.8	2.0	56.6	63.9	7.3	67.4	83.9	16.5	78.2	91.4	13.2
Poinciana Utilities	5.8	5.8	0.0	7.0	5.8	-1.2	8.2	5.8	-2.4	9.4	5.8	-3.6
KB Total	160.6	181.3	20.7	171.8	212.7	40.5	212.3	245.0	32.7	234.3	260.2	25.9

Note: Reclaimed water values are not included in the identified project total summary. However, reclaimed water use is recognized as having a major role in helping to meet future water supply needs and will likely offset the smaller identified supply deficits.

Eighty-eight water supply projects were submitted by local utilities for this 2005–2006 KB Plan Update. Seventy of these projects are for the development of alternative water supply sources and are listed in Table 1 of **Appendix A**. The proposed alternative water source projects include:

RECLAIMED WATER 44 projects with a combined capacity of 183 MGD by 2025.

SURFACE WATER 23 projects with a combined capacity of 91 MGD by 2025. (Several of these smaller proposed projects are stormwater collection systems for agricultural irrigation.)

BRACKISH WATER 3 brackish groundwater projects with a combined capacity of 60 MGD by 2025.

In addition to the 70 alternative water supply projects, Poinciana Utilities submitted 10 new groundwater projects to meet its future needs. Groundwater represents a traditional resource throughout the KB Planning Area. These projects do not represent alternative water supplies by definition, but are listed solely for the purpose of identifying utility plans for potential future use. These projects are also listed in Table 1 of **Appendix A**, but are not identified as eligible for AWS funding.

Of the eight remaining projects, several utilities located outside of the KB Planning Area identified projects within the KB Planning Area to meet their future water needs. The majority of these projects are traditional groundwater projects. However, one is a 35-MGD surface water project involving the Kissimmee River. These projects, listed in Table 2 of **Appendix A**, are for informational purposes only, as the location of these projects may affect local utility efforts to develop additional supplies.

Water conservation is a critical part of the District’s efforts to protect and preserve the region’s water resources. Although individual water conservation projects are not included in this chapter, the District’s Water Conservation Program and local components are discussed in **Chapter 5**. The SFWMD’s programs include an annual funding initiative for water conservation efforts.

Other types of water supply projects submitted for consideration in this KB Plan Update include monitoring systems and distribution system improvements, such as potable water interconnections between local governments, finished water storage tanks, pipelines, booster stations, pump upgrades and backup power supplies. While these types of projects are appropriate for utility management and maintenance, they do not generate new water supply and were not included in this plan update.

Individual utility summaries are provided herein that identify demand and supply projections for major utilities in the KB Planning Area. Yield from existing supplies

and new alternative water supply projects is compared with projected water demand for each service area in Years 2015 and 2025. Reclaimed and other nonpotable alternative water supply projects are shown, but not counted toward meeting future potable demand.

Supplying reclaimed water to self-supplied operations, such as golf courses or other large users, can reduce competition for limited freshwater resources, but may or may not result in a reduction in demand on the potable water system. The replacement of a self-supplied withdrawal with reuse water supply will not necessarily result in an additional freshwater allocation for the utility.

Other reuse projects, such as wetland or canal recharge, can be designed to support additional allocations by offsetting resource impacts that might preclude permitting of additional wells.

The SFWMD strongly supports reuse projects, and recognizes that reuse applications have multiple benefits for the implementing utility. At the planning level, however, it is difficult to predetermine the potential offset without defining and analyzing the distribution of the reuse. Such offsets will be quantified on a case-by-case basis in the consumptive use permitting process based on the reclaimed water plans developed by the provider.

In the KB Planning Area, seven utilities had adequate supplies to meet future demand considering the combination of projects submitted and existing water supplies. Projected demands for two utilities (Polk County and Poinciana Utilities) exceeded their identified projected water supply alternatives. For both Polk County and Poinciana Utilities, the identified projected supply deficits do not occur until after 2010 and are expected to be met using additional reclaimed water. In the case of unmet needs, the District has recommended projects for the local utilities to be included in the 2005–2006 KB Plan Update.

UTILITY SUMMARY

OKEECHOBEE COUNTY

Supply Entity: Okeechobee Utility Authority

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

The current supplies for the Okeechobee Utility Authority are composed of 100 percent fresh water from Lake Okeechobee. Based on current projects, Okeechobee County can expect its 2025 supplies to be composed of about 94 percent traditional fresh surface water from Lake Okeechobee and 6 percent from alternative water supplies. The U.S. Army Corps of Engineers' (USACE) revised lake regulation schedule increases the likelihood of extreme low lake stage events, which could affect the water supply to this utility. Diversification of sources will be needed to assure consistent supply.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	12,205	17,555	21,123
Per Capita (gallons per day finished water)*	190	190	190
(Note: All potable volumes are finished water unless noted)		MGD	
Potable Water Demand (average annual)	2.3	3.2	3.8
Volume from Traditional Sources	2.3	3.2	3.8
Volume from Alternative Sources	0.0	0.0	0.0
Volume of Reclaimed Water Made Available**	0.0	0.2	0.3
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	3.2	3.8	N/A
Alternative			\$6.2
Captured Storm Water / Surface Water	0.0	0.0	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	0.2	0.3	
Other	0.0	0.0	
Total	3.4	4.1	\$6.2

UTILITY SUMMARY

ORANGE COUNTY

Supply Entity: Orange County Utilities

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

Orange County Utilities (OCU) serves a portion of the City of Orlando and rural adjoining areas of Orange County. The current supplies for meeting OCU's potable needs are 100 percent traditional fresh groundwater. Based on current projects, the Orange County service area customers can expect their overall 2025 supplies to be 77 percent traditional fresh groundwater and 23 percent from alternative water supplies. Alternative Water Supply projects include 30 MGD from surface water projects, such as the St. Johns River/Taylor Creek Reservoir Project and projects on the St. Johns River. Reclaimed water is expected to play a major role in meeting nonpotable demands.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	47,993	137,088	196,485
Per Capita (gallons per day finished water)*	315	315	315
(Note: All potable volumes are finished water unless noted)		MGD	
Potable Water Demand (average annual)	18.1	34.6	45.5
Volume from Traditional Sources	15.1	20.0	20.0
Volume from Alternative Sources	0.0	17.4	29.8
Volume of Reclaimed Water Made Available**	3.0	24.2	52.0
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	20.0	20.0	N/A
Alternative			\$227.2
Captured Storm Water / Surface Water	17.4	29.9	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	24.2	52.0	
Other	0.0	0.0	
Total	61.6	101.9	\$227.2

UTILITY SUMMARY

ORANGE COUNTY

Supply Entity: Orlando Utilities Commission

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

Orlando Utilities Commission (OUC) serves the City of Orlando and adjoining areas. The current supplies for the OUC are composed of about 97 percent traditional fresh groundwater and 3 percent reclaimed water. Based on current projects, the City of Orlando can expect its 2025 supplies to be about 77 percent traditional fresh groundwater and 23 percent alternative water supplies. The OUC proposes to deliver 5 MGD of potable use through construction of the St. Johns River/Taylor Creek Project and over 11 MGD of reclaimed water through Project RENEW.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	146,471	217,035	264,061
Per Capita (gallons per day finished water)*	272	272	272
(Note: All potable volumes are finished water unless noted)		MGD	
Potable Water Demand (average annual)	41.9	56.5	56.5
Volume from Traditional Sources	40.7	56.5	56.6
Volume from Alternative Sources	1.2	5.0	5.0
Volume of Reclaimed Water Made Available**	1.2	10.4	11.7
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	56.6	56.6	N/A
Alternative			\$120.9
Captured Storm Water / Surface Water	5.0	5.0	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	10.4	11.7	
Other	0.0	0.0	
Total	72.0	73.3	\$120.9

UTILITY SUMMARY

ORANGE COUNTY

Supply Entity: Reedy Creek Improvement District

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

Reedy Creek Improvement District (RCID) serves Walt Disney World, its supporting services and adjoining commercial businesses. The current supplies for the RCID are composed of about 76 percent traditional fresh groundwater and 24 percent reclaimed water. Water use during this base year was unusually high due to drought conditions for the area. Based on current projects, the RCID can expect its 2025 supplies to be about 76 percent traditional fresh groundwater and 24 percent alternative water supplies from reclaimed water and reclaimed water augmentation with surface water from Lake Norbow Impoundment, Reedy Lake Impoundment or local stormwater ponds.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	N/A	N/A	N/A
Per Capita (gallons per day finished water)*	N/A	N/A	N/A
(Note: All potable volumes are finished water unless noted)			
	MGD		
Potable Water Demand (average annual)	19.7	21.9	23.4
Volume from Traditional Sources	19.7	23.4	23.4
Volume from Alternative Sources	5.9	0.0	0.0
Volume of Reclaimed Water Made Available**	5.9	8.1	11.7
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	21.9	23.4	N/A
Alternative			\$0.8
Captured Storm Water / Surface Water	1.2	1.2	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	8.1	11.7	
Other	0.0	0.0	
Total	31.2	36.3	\$0.8

UTILITY SUMMARY

OSCEOLA COUNTY

Supply Entity: City of St. Cloud

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

The current supplies for the City of St. Cloud are composed of about 66 percent traditional fresh groundwater and 34 percent reclaimed water. Based on current projects, the City of St. Cloud can expect its 2025 supplies to be about 35 percent traditional fresh groundwater and 65 percent reclaimed and surface water supplies. Surface water supplies are projected to come from withdrawals from East Lake Tohopekaliga.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	31,373	70,878	97,214
Per Capita (gallons per day finished water)*	160	160	160
(Note: All potable volumes are finished water unless noted)			
	MGD		
Potable Water Demand (average annual)	3.3	10.6	15.5
Volume from Traditional Sources	3.3	5.8	5.8
Volume from Alternative Sources	0.0	6.0	13.0
Volume of Reclaimed Water Made Available**	1.7	3.2	6.6
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	5.8	5.8	N/A
Alternative			\$31.6
Captured Storm Water / Surface Water	10.0	17.0	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	3.2	6.6	
Other	0.0	0.0	
Total	19.0	29.4	\$31.6

UTILITY SUMMARY

OSCEOLA COUNTY

Supply Entity: Toho Water Authority

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

The current supplies for the Toho Water Authority are composed of about 87 percent traditional fresh groundwater and 13 percent reclaimed water. Based on current projects, Osceola County can expect its 2025 supplies to be about 54 percent traditional fresh groundwater and 46 percent alternative water supplies. A brackish groundwater wellfield and both potable and nonpotable use of surface water from Lake Tohopekaliga have been proposed by the utility to meet future demands.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	103,249	210,330	344,405
Per Capita (gallons per day finished water)*	Composite 97 - 272		
(Note: All potable volumes are finished water unless noted)		MGD	
Potable Water Demand (average annual)	27.8	56.3	78.2
Volume from Traditional Sources	24.2	35.8	35.8
Volume from Alternative Sources	0.0	28.1	55.6
Volume of Reclaimed Water Made Available**	3.6	13.5	32.5
Additional Potable Water Needed	0.0	0.0	0.0

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	35.8	35.8	N/A
Alternative			\$252.4
Captured Storm Water / Surface Water	13.1	25.6	
Brackish Water	15.0	30.0	
Seawater	0.0	0.0	
Reclaimed Water	21.0	32.5	
Other	0.0	0.0	
Total	84.9	123.9	\$252.4

UTILITY SUMMARY

OSCEOLA AND POLK COUNTY

Supply Entity: Poinciana Utilities

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

The current supplies for Poinciana Utilities are composed of 100 percent traditional fresh groundwater. Based on current projects, the utility can expect its 2025 supplies to be 50 percent traditional fresh groundwater and 50 percent alternative water supplies. Poinciana Utilities did not propose adequate projects to meet its 2025 needs, but indicated that several reuse efforts are under way and will identify these projects in the near future. The SFWMD has identified an interconnect with Toho Water Authority to supply potable water as the means to meet future water deficits.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	14,366	69,375	106,048
Per Capita (gallons per day finished water)*	123	123	123
(Note: All potable volumes are finished water unless noted)			
	MGD		
Potable Water Demand (average annual)	3.3	7.0	9.4
Volume from Traditional Sources	3.3	5.8	5.8
Volume from Alternative Sources	0.0	0.0	0.0
Volume of Reclaimed Water Made Available**	0.0	2.4	3.4
Additional Potable Water Needed	0.0	1.2	3.6

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD)		Est. Capital Cost (\$ M)
	2015	2025	
Traditional	5.8	5.8	N/A
Alternative			*\$0.0
Captured Storm Water / Surface Water	0.0	0.0	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	2.4	3.4	
Other	0.0	0.2	
Total	8.2	9.4	*\$0.0

* No cost has been provided at this time.

UTILITY SUMMARY

POLK COUNTY

Supply Entity: Polk County Utilities - Oak Hill Estates

Population and Supply Summary:

Proposed supply projects by 2015: Adequate

Proposed supply projects by 2025: Adequate

The current supplies for Polk County within the SFWMD are composed of 100 percent traditional fresh groundwater. Based on current projects, Polk County can expect its 2025 supplies to be about 80 percent traditional fresh groundwater and 20 percent from an as yet unidentified alternative water supply. While Polk County has identified surface water from the Kissimmee River as an alternative, this project is not currently proposed to serve the Oak Hill area and has not been demonstrated to be available. The SFWMD has identified the need for Polk County to deliver reclaimed water to offset future demands in this area by 2020.

Item	2000 (Estimated)	2015 (Projected)	2025 (Projected)
Population	0.5	1.4	2.1
Per Capita (gallons per day finished water)*	N/A	N/A	N/A
(Note: All potable volumes are finished water unless noted)			
	MGD		
Potable Water Demand (average annual)	0.5	1.4	2.0
Volume from Traditional Sources	0.5	1.7	1.7
Volume from Alternative Sources	0.0	0.0	0.0
Volume of Reclaimed Water Made Available**	0.0	0.0	0.0
Additional Potable Water Needed	0.0	0.3	0.3

* Per capita use was estimated based on total water use for the base year divided by population for the year. This value differs from per capita use estimates derived for the Consumptive Use Permitting that must be adhered to for permit issuance.

** Reclaimed water made available is based upon projected wastewater flows as estimated in the Central Florida Regional Reuse Evaluation provided in Appendix H. The value represents total wastewater flow and does not reflect potable replacement inefficiencies or other system uses.

Project Summary:

Project Type	Capacity (MGD) 2015	2025	Est. Capital Cost (\$ M)
Traditional	1.7	1.7	N/A
Alternative			*\$0.0
Captured Storm Water / Surface Water	0.0	0.0	
Brackish Water	0.0	0.0	
Seawater	0.0	0.0	
Reclaimed Water	0.0	0.3	
Other	0.0	0.0	
Total	1.7	2.0	*\$0.0

* No cost has been provided at this time.

AGRICULTURAL WATER USE

Agricultural water use includes supplies for crop irrigation in the region, and aquaculture and livestock watering. Traditional water sources used for irrigation include fresh surface water and/or fresh groundwater. In the Kissimmee Basin (KB) Planning Area, overall agricultural water use is expected to increase by less than 1 MGD to almost 118 MGD by Year 2025.



Agricultural Pump Station

Although total agricultural water use in the KB Planning Area is projected to change little during the next 20 years, increased water usage is forecasted in the Indian Prairie Basin area, which has historically had limitations on surface water use due to past shortages. The impending development of a set of operational changes to Lake Istokpoga and Lake Okeechobee is not expected to significantly improve water supply availability for Highlands and Glades counties. In addition, changes to the regulation schedule of Lake Okeechobee may increase the risk of water supply shortages during drought events. As explained in **Chapter 5**, water is

available from Lake Istokpoga under the 1-in-10 year drought condition, but during brief periods when drought is more severe, the use of water from Lake Okeechobee is also needed to support the irrigation demands of agricultural operations in the southern Indian Prairie Basin. Furthermore, the District is responsible for providing water supply to the Seminole Tribe and the District meets this responsibility using water from both Lake Istokpoga and Lake Okeechobee. Because water supply reliability remains uncertain, the District is no longer proposing to lift the existing restrictions on new surface water withdrawals from Lake Istokpoga and the associated canals. Therefore, increased agricultural demands in the Indian Prairie Basin will need to be met by other sources.

This does not preclude agricultural or any other water use type from applying for, and potentially acquiring, consumptive use permits from traditional sources, so long as the conditions of permit issuance are satisfied. Such opportunities should be addressed on a case-by-case basis due to the site-specific variations that occur in aquifer confining units and other factors.

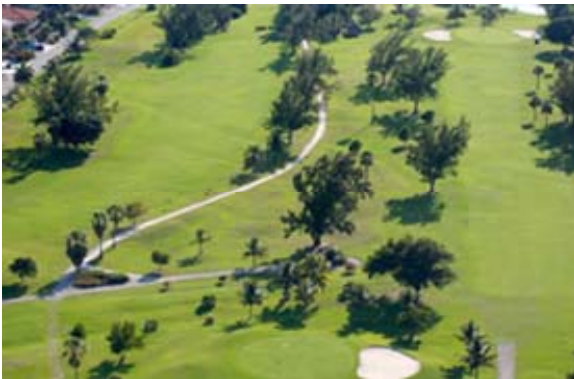
Alternative water supply opportunities for agriculture include storage for surface water supplies that may be seasonally available, the application of reclaimed water, storm water, blending (brackish and fresh water), and the recapture and reuse of

water normally lost to a farm's water management system (tailwater recovery). The type of irrigation system used for various agricultural operations has a significant effect on the amount of water needed to be withdrawn to meet crop demands. Although individual growers select the irrigation system to use, their choice is influenced by the conservation and efficiency requirements in the District's consumptive use permitting (CUP) process as it applies to new installations and permit renewals. New permits for agricultural use generally require installation of low-volume irrigation systems, such as drip or under-tree spray irrigation. The District plans periodic updates to this water supply plan within the five-year state-required update period, at which point new projects may be incorporated.

THERMOELECTRIC POWER GENERATION SELF-SUPPLY

Thermoelectric Power Generation water use in the KB Planning Area is expected to experience minimal growth. The planning area's major power generators have not identified plans for the construction of new facilities during the next 20 years. Kissimmee Utility Authority has indicated its water use is projected to increase, but the increase in water demand will be met through reclaimed water supplied by the Toho Water Authority (which is addressed in its demand projections). Florida Power & Light (FPL) has announced plans to develop new power facilities in Glades County, but the plant will be located within the SFWMD's Lower West Coast (LWC) Planning Area.

RECREATIONAL SELF-SUPPLY



Recreational Use

The Recreational Self-Supply category includes irrigation for large landscaped areas, such as parks, golf courses 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 recent years, to meet CUP requirements, irrigation for new golf courses often uses reclaimed water with groundwater used as a backup source. Within the KB Planning Area, Recreational Self-Supply water demand is projected to increase 165 percent from the current 6 MGD to 15

MGD by Year 2025. Not all golf course acreage in central Florida is included in this self-supplied category because certain courses are irrigated with reclaimed water and

demand projections for these courses are included in the Public Water Supply projections.

Considering the projected modest increase for growth in this category, most future water supplies will come from alternative water supplies using reclaimed water and surface water. Those demands not being supplied by the local utilities will most likely come from surface water supplies and, to a minor extent, fresh groundwater. The Reuse Evaluation completed as part of this planning effort (see **Appendix H**) indicates sufficient reclaimed water generated in central Florida to address all the water use in this category.

COMMERCIAL AND INDUSTRIAL SELF-SUPPLY

Commercial and Industrial Self-Supply demand is estimated to grow approximately 71 percent to almost 19 MGD by Year 2025. Many commercial and industrial water uses are met through Public Water Supply utilities and are counted elsewhere. The estimates included in this water use category are the larger self-supplied users, most of which have historically relied on fresh groundwater and, to a limited extent, fresh surface water. Nearly all of this water use category's projected need is in the metro-Orlando area, where new groundwater may be limited for consumption.

The lack of specific locations or projects submitted for future Commercial and Industrial Self-Supply make identification of projects difficult. Most likely, some users will be able to find groundwater in small quantities to meet their water needs. Others will need to turn to the local utility for potable or reclaimed water supplies where usable. Commercial and industrial uses are also good candidates for implementation of water conservation and recycling measures to reduce overall water use.

DOMESTIC SELF-SUPPLY

Domestic Self-Supply demands in the KB Planning Area are projected to increase from 11 MGD to almost 14 MGD in Year 2025. Domestic Self-Supply includes potable water from a private supply, typically a domestic well, serving a private residence. Typically, property owners relying on such systems own, operate and maintain their domestic wells. Domestic Self-Supply needs are met almost exclusively using fresh groundwater. Domestic irrigation needs are also occasionally met using fresh surface water.

Considering the limited options for Domestic Self-Supply, all future needs in this use category are expected to be met using fresh groundwater supplies. Areas of high development density, including the metro-Orlando area, using Domestic Self-Supply

should be considered for municipal supply, especially if such areas rely on septic tanks for wastewater disposal. No alternative water supply projects were submitted to meet future Domestic Self-Supply needs. Typically, the costs and scale of operations limit alternative water supply opportunities in this category.

CONCLUSION

Meeting the projected increase of over 140 MGD in water demand in the KB Planning Area over the next 20 years will require continued emphasis on alternative water supply development, including development of brackish groundwater resources, reclaimed water and available surface water. Development of additional storage, such as ASR or reservoirs, will also be critical to improving access to seasonal supplies to help meet future needs. The District should focus resources on surface water projects and brackish water supplies for this planning area.

Traditional water supplies are not expected to be adequate to meet all projected demands through the Year 2025 for the KB Planning Area. Although development may be practicable in some areas, permitting new traditional supplies will depend largely on local resource conditions.

The largest change in water demand during the next 20 years will be seen in the Public Water Supply sector, which will increase to 235 MGD. Approximately 70 new public water supply projects identified to serve water demands in the KB Planning Area were evaluated as part of this plan update. The projects submitted have a capacity of almost 334 MGD if reuse projects are included in the total. Projects specific to each



Residential Use

major public water supplier are included; however, not all of the identified projects are necessarily permissible or eligible for matching funding from the state.

Regionwide, traditional resources are expected to be sufficient to meet the projected 1 MGD increase in agricultural water demand over the next 20 years. However, the generation of additional supplies from Lake Istokpoga is not recommended at this time due to the risk of drought conditions for existing users within the Indian Prairie Basin combined with the District's need to continue to assure supply to the Seminole Brighton Reservation. Agricultural users should also investigate and implement alternative water supplies in basins where water availability is limited.

Domestic Self-Supply use is projected to increase by 3 MGD in the next 20 years. Typically, property owners relying on such systems own, operate and maintain their domestic wells. Domestic Self-Supply needs are met almost exclusively using fresh groundwater. Domestic irrigation needs are also occasionally met using fresh surface water. This use is expected to grow in a random fashion, with new uses being spread near the fringes of the metro-Orlando areas and in the Southern KB Planning Area. The relatively small use and diverse spread of withdrawals are not expected to contribute significantly to limitations of groundwater caused primarily due to increases in public water supply.

Thermoelectric Power Generation water supply needs are projected to remain flat as increases in demand will be met through public utility contracts and by power suppliers located outside of the planning area. Other use categories, such as Recreational and Commercial and Industrial Self-Supply, are projected to grow by about 9 MGD and 8 MGD each, respectively, in the next 20 years. These future needs are expected to be met largely through use and development of alternative water supplies, such as reclaimed water.

The inclusion of specific Water Supply Development projects to address projected needs for the next 20 years is a new requirement of state law. The District recognizes there are public water supply utilities conducting detailed studies to estimate population and demand increases to identify the most appropriate water supply project options to meet those future needs. For these reasons, the District will consider amending the regional water supply plans on an annual basis for the next three years (as needed) to allow for the inclusion of additional, specific alternative water supply projects. Such amendments, if needed, are proposed to be done during January or February for the next three years. Only local governments that are affected by the additional alternative water supply projects would be required to amend their comprehensive plans, consistent with the requirements of Section 163.3177(6)(c), F.S. It is anticipated at the end of the three-year period, this annual plan amendment process will be re-evaluated.

This 2005–2006 KB Plan Update contains water supply-related information useful to local governments in the preparation and amendment of their comprehensive plans. Within 18 months following the approval of this water supply plan update, local governments within the KB Planning Area are required to revise their comprehensive plans and adopt revisions to their 10-Year Water Supply Facilities Work Plans to include specific water supply projects.

Overall, the District has concluded that surface water supplies in the Lake Istokpoga/Indian Prairie Basin and groundwater in the Upper Kissimmee Basin are limited and alternative water supplies will need to be developed to meet future demands. There appears to be adequate Floridan Aquifer groundwater to meet the 2025 projected needs for agriculture in the Lower Kissimmee Basin. In addition, opportunities to collect and store seasonally available surface water may help to meet future demands. Within the Upper Kissimmee Basin, where the population of

Orange County is expected to more than double and Osceola County's population will triple over the next two decades, the population growth is expected to outstrip any reasonable projected availability of groundwater.

By the Year 2025, average water demand is projected to increase by over 140 MGD (55 percent) from the Year 2000 estimate of 258 MGD to 401 MGD by 2025. This plan update supports the 2000 KB Plan findings, which call for development of alternative water sources to meet most of the region's new water supply needs. Approximately 334 MGD of water to be made available through alternative water supply projects, costing over \$1 billion, are proposed by local governments to meet projected new water demands. Meeting the Kissimmee Basin Planning Area's rapidly growing water supply needs, while safeguarding its natural systems will require the timely implementation of alternative water supply projects through the collective and cohesive efforts of the state, water management districts and local governments.



Kissimmee River

This plan update underscores the importance of partnerships and close cooperation required to meet the needs of Florida's communities and natural systems. The SFWMD is relying on the dedication and commitment of each stakeholder, local government and water utility to work together to protect and preserve Florida's water resources. Together, we are the stewards of south Florida's water supply.

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, has a 90 percent probability of being exceeded over a 12-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.

1-in-10 Year 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 also sustaining water resources and related natural systems during a 1-in-10 year drought event.

Acceler8 Part of the Comprehensive Everglades Restoration Plan (CERP), Acceler8 accelerates eight restoration projects through SFWMD's issuance of "Certificates of Participation" bond revenue for construction finance. Acceler8 projects include: C-44 (St. Lucie Canal) Reservoir/Stormwater Treatment Area (STA); C-43 (Caloosahatchee River) West Reservoir; Everglades Agricultural Area (EAA) Reservoir - Phase 1 with Bolles & Cross Canals Improvements; Everglades Agricultural Area (EAA) Stormwater Treatment Areas (STAs) Expansion; Water Preserve Areas - Includes Site 1, C-9, C-11, Acme Basin B, WCA-3A/3B; Picayune Strand (Southern Golden Gate Estates) Restoration; Biscayne Bay Coastal Wetlands - Phase 1; C-111 Spreader Canal; and Lake Okeechobee Fast Track (LOFT) projects.

Acre-foot The volume of water that covers 1 acre to a depth of 1 foot; 43,560 cubic feet; 1,233.5 cubic meters; 325,872 gallons.

Alternative Water Supply Salt water; brackish surface and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface 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; stormwater; 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, F.S.).

Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) A simple water budget model for estimating irrigation demands that estimates demand based on basin specific data.

Agricultural Self-Supplied Water Demand The water used to irrigate crops, to water cattle and for aquaculture (e.g., fish production) that is not supplied by a public water supply utility.

Annual Average Daily Flow The total volume of wastewater flowing into a wastewater facility during any consecutive 365 days, divided by 365 and expressed in units of MGD.

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 later recover the water for use in the future during dry periods.

Aquifer System A heterogeneous body of intercalated permeable and less permeable material that acts as a water-yielding hydraulic unit of regional extent.

Available Supply The maximum amount of reliable water supply, including surface water, groundwater and purchases under secure contracts.

Average Daily Demand A water system's average daily use based on total annual water production (total annual gallons or cubic feet divided by 365).

Average Rainfall Year A year having rainfall with a 50 percent probability of being exceeded over a 12-month period.

Backpumping The practice of actively pumping water leaving an area back into a surface water body.

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.

Basis of Review (BOR) From the District's publication, *Basis of Review for Water Use Permit Applications within the South Florida Water Management District*. Read in conjunction with Chapters 40E-2 and 40E-20, Florida Administrative Code (F.A.C.), the Basis of Review further specifies the general procedures and information used by District staff for review of water use permit applications with the primary goal of meeting District water resource objectives.

Best Management Practices (BMPs) Agricultural management activities designed to achieve an important goal, such as reducing farm runoff or optimizing water use.

Blaney-Criddle A formula to calculate evapotranspiration (ET) based on mean temperature and number of daylight hours. The Water Supply Department allocates water using a version of the Blaney-Criddle that employs months as time increments. The “Modified Blaney-Criddle” is a variation of Blaney-Criddle, which multiplies the ET from Blaney-Criddle by a coefficient that relates mean air temperature to the growth stage of a crop. Additionally, effective rainfall is calculated using the mean temperature and hours of daylight, the Blaney-Criddle ET, average monthly rainfall and a soil factor. Further calculations consider average rainfall to drought rainfall (1-in-10 year drought). The difference between monthly drought effective rainfall and monthly ET becomes the basis for water allocations.

Brackish Water, Saline Water or Seawater Water containing significant amounts or concentrations of dissolved salts or total dissolved solids (TDS). The concentration is the amount (by weight) of salt in water, expressed in “parts per million” (ppm) or milligrams per liter (mg/L). The terms fresh, brackish, saline and brine are used to describe the quality of the water. (~1 mg/L TDS = 0.5 mg/L of Chlorides.)

Capacity Capacity represents the ability to treat, move or reuse water. Typically, capacity is expressed in million gallons per day (MGD).

Captured Storm Water/Surface Water Water captured predominantly during wet weather flow and stored aboveground or underground for future beneficial use.

Central and Southern Florida Project Comprehensive Review Study (C&SF Restudy) A five-year study effort that looked at modifying the current C&SF Project to restore the greater Everglades and south Florida ecosystem, while providing for the other water-related needs of the region. The study concluded with the Comprehensive Plan being presented to the Congress on July 1, 1999. The recommendations made within the Restudy, that is, structural and operational modifications to the C&SF Project, are being further refined and will be implemented in the Comprehensive Everglades Restoration Plan (CERP).

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

Commercial and Industrial Self-Supplied Water Demand Water used by commercial and industrial operations withdrawing a minimum water quantity of 100,000 gallons per day from individual, on-site wells.

Comprehensive Everglades Restoration Plan (CERP) The framework and guide for the restoration, protection and preservation of the south Florida ecosystem. The 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, which 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.

Conservation (See *Water Conservation*.)

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

Consumptive Use Permitting (CUP) The issuance of permits by the SFWMD, under authority of Chapter 40E-2, F.A.C., allowing withdrawal of water for consumptive use.

Control Structure A man-made structure designed to regulate the level/flow of water in a canal or water body (e.g., weirs, dams).

Demand The quantity of water needed to be withdrawn to fulfill a requirement.

Demand Management 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 saline water to remove or reduce chlorides and dissolved solids, resulting in the production of fresh water.

Discharge The rate of water movement past a reference point, measured as volume per unit time (usually expressed as cubic feet or cubic meters per second).

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 (UV) radiation and ozonation.

Disposal Effluent disposal involves the wasteful practice of releasing treated effluent back to the environment using ocean outfalls, surface water discharges and deep injection wells.

Domestic Self-Supplied (DSS) Water Demand 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.

Domestic Use Use of water for household purposes of drinking, bathing, cooking or sanitation.

Domestic Wastewater Wastewater derived principally from dwellings, business buildings, institutions and the like; sanitary wastewater; sewage.

Drawdown The vertical distance between the static water level and the surface of the cone of depression.

Drought A long period of abnormally low rainfall, especially one that adversely affects growing or living conditions.

Ecosystem Biological communities together with their environment, functioning as a unit.

Effluent Water that is not reused after flowing out of any plant or other works used for the purpose of treating, stabilizing or holding wastes. Effluent is “disposed” of.

Electrodialysis Dialysis that is conducted with the aid of an electromotive force applied to electrodes adjacent to both sides of the membrane.

Elevation The height in feet above mean sea level according to North American Vertical Datum (NAVD). May also be expressed in feet above mean sea level (MSL) as reference datum.

Environmental Resource Permit (ERP) A permit issued by the SFWMD under authority of Chapter 40E-4, F.A.C., to ensure that land development projects do not cause adverse environmental, water quality or water quantity impacts.

Estuary The part of the wide lower course of a river where its current is met by ocean tides or an arm of the sea at the lower end of a river where fresh and salt water meet.

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

Existing Legal Use of Water A water use that is authorized under a District water use permit or is existing and exempt from permit requirements.

Fallow Land left unseeded during a growing season. The act of plowing land and leaving it unseeded. The condition or period of being unseeded.

Fiscal Year (FY) The South Florida Water Management District’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 Department of Agricultural and Consumer Services (FDACS) FDACS communicates the needs of the agricultural industry to the Florida Legislature, the FDEP and the water management districts, and ensures participation of agriculture in the development and implementation of water policy decisions. FDACS also oversees Florida's soil and water conservation districts, which coordinate closely with the federal Natural Resources Conservation Service (NRCS).

Florida Department of Community Affairs (FDCA) FDCA's mission is to assist Florida communities in meeting the challenges of growth, reducing the effects of disasters and investing in community revitalization.

Florida Department of Environmental Protection (FDEP) The SFWMD operates under the general supervisory authority of the FDEP, which includes budgetary oversight.

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.

Florida Water Plan State-level water resource plan developed by the FDEP under Section 373.036, F.S.

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, and the Upper Floridan Aquifer is used for drinking water supply in parts of Martin and St. Lucie counties. From Jupiter to south Miami, water from the Floridan Aquifer System is mineralized (total dissolved solids are greater than 1,000 mg/L) along coastal areas and in southern Florida.

Flow The actual amount of water flowing by a particular point over some specified time. In the context of water supply, flow represents the amount of water being treated, moved or reused. Flow is frequently expressed in millions of gallons per day (MGD).

Fresh Water Water with less than 1,000 mg/L of TDS, but drinking water, by EPA standards, must have less than 500 mg/L of TDS. (~1 mg/L TDS = 0.5 mg/L of Chlorides.)

Geographic Information Systems (GIS) The abstract representation of natural (or cultural) features of a landscape into a digital database, geographic information system.

Governing Board Governing Board of the South Florida Water Management District.

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 Rule 40E-8, F.A.C., the temporary loss of water resource functions that results from a change in surface or groundwater hydrology and takes a period of one to two years of average rainfall conditions to recover.

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.

Infiltration The movement of water through the soil surface into the soil under the forces of gravity and capillarity.

Intrusion (See *Saline Water or Saltwater Intrusion*.)

Irrigation The application of water to crops and other plants by artificial means.

Irrigation Efficiency The average percent of total water pumped or delivered for use that is delivered to the root zone of a plant.

Lake Okeechobee Largest freshwater lake in Florida. Located in central Florida, the lake measures 730 square miles and is the second largest freshwater lake wholly within the United States.

Lake Okeechobee & Estuary Recovery (LOER) LOER is an action plan developed to improve water quality, expand water storage, facilitate land acquisition and enhance the ecological health of Lake Okeechobee and the St. Lucie and Caloosahatchee estuaries. Key state agencies charged with carrying out this plan include the South Florida Water Management District (SFWMD), the Department of Environmental Protection (FDEP), the Department of Agriculture and Consumer Services (FDACS) and the Department of Community Affairs (FDCA).

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 recreation areas, cemeteries, public, commercial and industrial establishments, and public medians and rights of way.

Levee An embankment to prevent flooding or a continuous dike or ridge for confining the irrigation areas of land to be flooded.

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 also sustaining water resources and related natural systems during a 1-in-10 year drought event.

Load Concentration times flow.

Maximum Daily Allocation The maximum quantity permitted to be withdrawn in any single 24-hour period.

Maximum Monthly Allocation The maximum quantity of water assigned to the permit to be withdrawn during the month in the growing season when the largest supplemental crop requirement is needed by the specific crop for which the allocation is permitted.

Microfiltration A membrane separation process in which particles greater than about 20 nanometers in diameter are screened out of a liquid in which they are suspended.

Microirrigation The application of small quantities of water on or below the soil surface as drops or tiny streams of spray through emitters or applicators placed along a water delivery line. Microirrigation includes a number of methods or concepts, such as bubbler, drip, trickle, mist or microspray, and subsurface irrigation.

MIKE SHE An integrated surface water/groundwater model, which includes a module for estimating supplemental irrigation requirements based upon land use, soil type, crop type, rainfall and evapotranspiration.

Minimum Flow and Level (MFL) The point at which further withdrawals would cause significant harm to the water resources.

Mobile Irrigation Laboratory (MIL) 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.

MODFLOW A fine-scale model code created by the U.S. Geological Survey. The District uses it for subregional and groundwater modeling.

Monthly Average Daily Flow The total volume of wastewater flowing into a wastewater facility during a calendar month, divided by the number of days in that month and expressed in units of MGD.

National Geodetic Vertical Datum (NGVD) 1929 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 Resources Conservation Service (NRCS) An agency of the U.S. Department of Agriculture (USDA) that provides technical assistance for soil and water conservation, natural resource surveys, and community resource protection. Formerly the U.S. Soil Conservation Service (SCS).

Net Water Demand The water demands of the end user, after accounting for treatment and process losses and inefficiencies (e.g., irrigation inefficiency). When discussing public water supply, the term “finished water demand” is commonly used.

North American Vertical Datum (NAVD) 1988 The official civilian vertical control datum (reference for elevation data) for surveying and mapping activities in the United States.

Outflow The act or process of flowing out of.

Per Capita Use Total use divided by the total population served.

Performance Measure 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.

Phosphorus (P) An element that is essential for life. In freshwater aquatic environments, phosphorus is often in short supply; increased levels can promote the growth of algae and other plants.

Potable Water Water that is safe for human consumption.

Potentiometric Head The level to which water will rise when a well is pierced in a confined aquifer.

Public Water Supply (PWS) Water that is withdrawn, treated, transmitted and distributed as potable or reclaimed water.

Public Water Supply (PWS) Demand All potable (drinking quality) water supplied by water treatment facilities with projected average pumpages greater than 100,000 gallons per day to all types of customers, not just residential.

Rapid Infiltration Basin (RIB) 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.

Ratoon A shoot sprouting from a plant base, as in the banana, pineapple or sugarcane. A Ratoon Crop A crop cultivated from the shoots of a perennial plant.

Raw Water Demand The amount of water that must be withdrawn from the groundwater or surface water system to meet a particular need. Withdrawal demands are nearly always higher than User/Customer Demands because of inherent treatment and process losses, and inefficiencies associated with delivering water from the source to the end user.

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.

Reclaimed Water Water that has received at least secondary treatment and basic disinfection and is reused after flowing out of a domestic wastewater treatment facility (Chapter 62-610, F.A.C.).

RECOVER A comprehensive monitoring and adaptive assessment program formed to perform the following for the Comprehensive Everglades Restoration Program: restoration, coordination and verification.

Recreational Self-Supplied Water Demand The water used for landscape and golf course irrigation. The landscape subcategory includes water used for parks, cemeteries and other irrigation applications greater than 100,000 gallons per day. The golf course subcategory includes those operations not supplied by a public water supply or regional reuse facility.

Regional Water Supply Plan Detailed water supply plan developed by the District under Section 373.0361, F.S., 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.

Reservations of Water (See *Water Reservations*.)

Reservoir A man-made or natural water body used for water storage.

Restricted Allocation Area Areas designated within the 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.

Restudy Shortened name for C&SF Restudy.

Retrofit The replacement of existing equipment with equipment of higher efficiency.

Retrofitting The replacement of existing water fixtures, appliances and devices with more efficient fixtures, appliances and devices for the purpose of conservation.

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, F.A.C. The term “reuse” is synonymous with “water reuse.”

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

Runoff That component of rainfall, which is not absorbed by soil, intercepted and stored by surface water bodies, evaporated to the atmosphere, transpired and stored by plants, or infiltrated to groundwater, but which flows to a watercourse as surface water flow.

Saline Water Any water that contains more than 1,000 mg/L of TDS. This may be brackish water (1,000 to 15,000 mg/L of TDS), seawater (15,000 to 40,000 mg/L of TDS), or brine (more than 40,000 mg/L of TDS). It is common in the literature to define coastal water that is very brackish simply as saline water. ($\sim 1 \text{ mg/L TDS} = 0.5 \text{ mg/L of Chlorides}$.)

Saline Water or Saltwater Interface The hypothetical surface of chloride concentration between fresh water and seawater where the chloride concentration is 250 mg/L at each point on the surface.

Saline Water or 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.

Salinity Of or relating to chemical salts (usually measured in parts per thousand, or ppt).

Seawater, Saline Water or Brackish Water Water containing significant amounts or concentrations of dissolved salts or total dissolved solids (TDS). The concentration is the amount (by weight) of salts in water, expressed in “parts per million” (ppm) or milligrams per liter (mg/L). The terms fresh, brackish, saline, and brine are used to describe the quality of the water. ($\sim 1 \text{ mg/L TDS} = 0.5 \text{ mg/L of Chlorides}$.)

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, F.A.C., the long-term loss of water resource functions resulting from a change in surface 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, F.A.C., the temporary loss of water resource functions, which result from a change in surface or groundwater hydrology, that takes more than two years to recover, but which is considered less severe than serious harm. The specific water resource functions addressed by a MFL and the duration of the recovery period associated with significant harm are defined for each priority water body based on the MFL technical support document.

South Florida Water Management Model (SFWMM) An integrated surface water-groundwater model that simulates the hydrology and associated water management schemes in the majority of south Florida using climatic data from January 1, 1965, through December 31, 1995. The model simulates the major components of the hydrologic cycle and the current and numerous proposed water management control structures and associated operating rules. It also simulates current and proposed water shortage policies for the different subregions in the system.

Stage The height of a water surface above an established reference point (datum or elevation).

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.

Subregional Groundwater Model A computer model that is used to simulate impacts on a smaller scale than the SFWMM, such as effects within public water supply service areas and impacts of individual wellfields.

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.

Thermoelectric Self-Supplied Water Demand 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.

Three-month Average Daily Flow The total volume of wastewater flowing into a wastewater facility during a period of three consecutive months, divided by the number of days in this three-month period and expressed in units of MGD. The three-month average daily flow also can be calculated by adding the three monthly average daily flows observed during this three-month period and dividing by three. The three-month average daily flow is a rolling average that is to be assessed for each month of the year.

Total Maximum Daily Load (TMDL) The maximum allowed level of pollutant loading for a water body, while still protecting its uses and maintaining compliance with water quality standards, as defined in the *Clean Water Act*.

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

Tributary A stream that flows into a larger stream or other body of water.

User/Customer Demand (See *Net Demand*.)

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

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 Conservation Reducing the demand for water through activities that alter water use practices, e.g., improving efficiency in water use, and reducing losses of water, waste of water and water use.

Water Reservations State law on water reservations, in Section 373.223(4), F.S., defines water reservations as follows: “The governing board or the department, by regulation, may reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety. Such reservations shall be subject to periodic review and revision in the light of changed conditions. However, all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest.”

Water Resource Development 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 the 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. (Section 373.019, F.S.)

Water Reuse (See *Reuse*.)

Watershed A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water.

Water Resources Advisory Commission (WRAC) The SFWMD Water Resources Advisory Commission (WRAC) 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 Shortage Declaration If there is a possibility that insufficient water will be available within a source class to meet the estimated present and anticipated user demands from that source, or to protect the water resource from serious harm, the governing board may declare a water shortage for the affected source class. (Rule 40E- 21.231, F.A.C.) Estimates of the percent reduction in demand required to match available supply is required and identifies which phase of drought restriction is implemented. A gradual progression in severity of restriction is implemented through increasing phases. Once declared, the District is required to notify permitted users by mail of the restrictions and to publish restrictions in area newspapers.

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(24), F.S.)

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

Water Well Any excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed when the intended use of such excavation is for the location, acquisition, development, or artificial recharge of groundwater. This term does not include any well for the purpose of obtaining or prospecting for oil, natural gas, minerals, or products of mining or quarrying; for inserting media to dispose of oil brines or to repressure oil-bearing or natural gas-bearing formation; for storing petroleum, natural gas, or other products; or for temporary dewatering of subsurface formations for mining, quarrying or construction purposes. (Section 373.303(7), F.S.)

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).

Wetland Drawdown Study Research effort by the South Florida Water Management District to provide a scientific basis for developing wetland protection criteria for water use permitting.

Withdrawal Demand (See *Raw Water Demand*.)

Xeriscape™ Landscaping that involves seven principles: proper planning and design; soil analysis and improvement; practical turf areas; appropriate plant selection; efficient irrigation; mulching; and appropriate maintenance.

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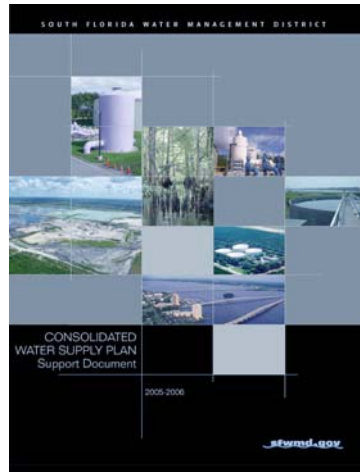
Guide to the Water Supply Plan Package



Planning Document
Printed with CDs on
inside of back cover



Appendices
on CD from inside cover
of Planning Document



Support Document
on CD from inside cover
of Planning Document



CD 1 – Contains the Kissimmee Basin Water Supply Plan Update including the Planning Document, Appendices and the Comprehensive Water Supply Plan Support Document

CD 2 – Contains the 2000 Kissimmee Basin Water Supply Plan

SFWMD



MEETING SOUTH FLORIDA'S RAPIDLY
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