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Introduction

The South Florida Water Management District (SFWMD) updates regional water supply plans to provide for current and future water needs while protecting south Florida's water resources. This update assesses existing and projected water needs and water sources to meet those needs over a 20-year planning horizon from 2010 to 2030 for the Lower East Coast (LEC) Planning Area (**Figure 1**). This update presents current and projected populations, water demand, water resource and water supply development projects, and related water supply planning information. The plan also describes proposed water supply projects and regional project implementation strategies for Fiscal Year (FY) 2010 through FY 2030. This current plan is a five-year update of the *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update; SFWMD 2006), which updated the *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan; SFWMD 2000).

Because the LEC Planning Area is dependent on water from Lake Okeechobee and the Everglades for a portion of its supply, the LEC plan and its updates are inexorably linked with restoration efforts and management decisions concerning these unique water resources. In addition, the region is home to an extensive agricultural industry, large urban communities (~70 percent of the SFWMD's total population), as well as other valued ecosystems that are generally connected to Lake Okeechobee or the Everglades.

CURRENT UPDATE

This update reflects the influence of significant fluctuations in the economy, residential and commercial development, agricultural commodity markets on water use, and sustainable use of natural resources on the projected water needs of the LEC Planning Area. **Chapter 2** of this update documents the population growth and water demand by each water use category. **Chapter 3** discusses changes to the water resources, their availability, and related issues facing the region. **Chapter 4** identifies water resource development projects. **Chapter 5** evaluates the planning area's various water source options. **Chapter 6** describes recommended water supply development projects. **Chapter 7** provides future guidance and direction with emphasis on actions recommended prior to the next update.

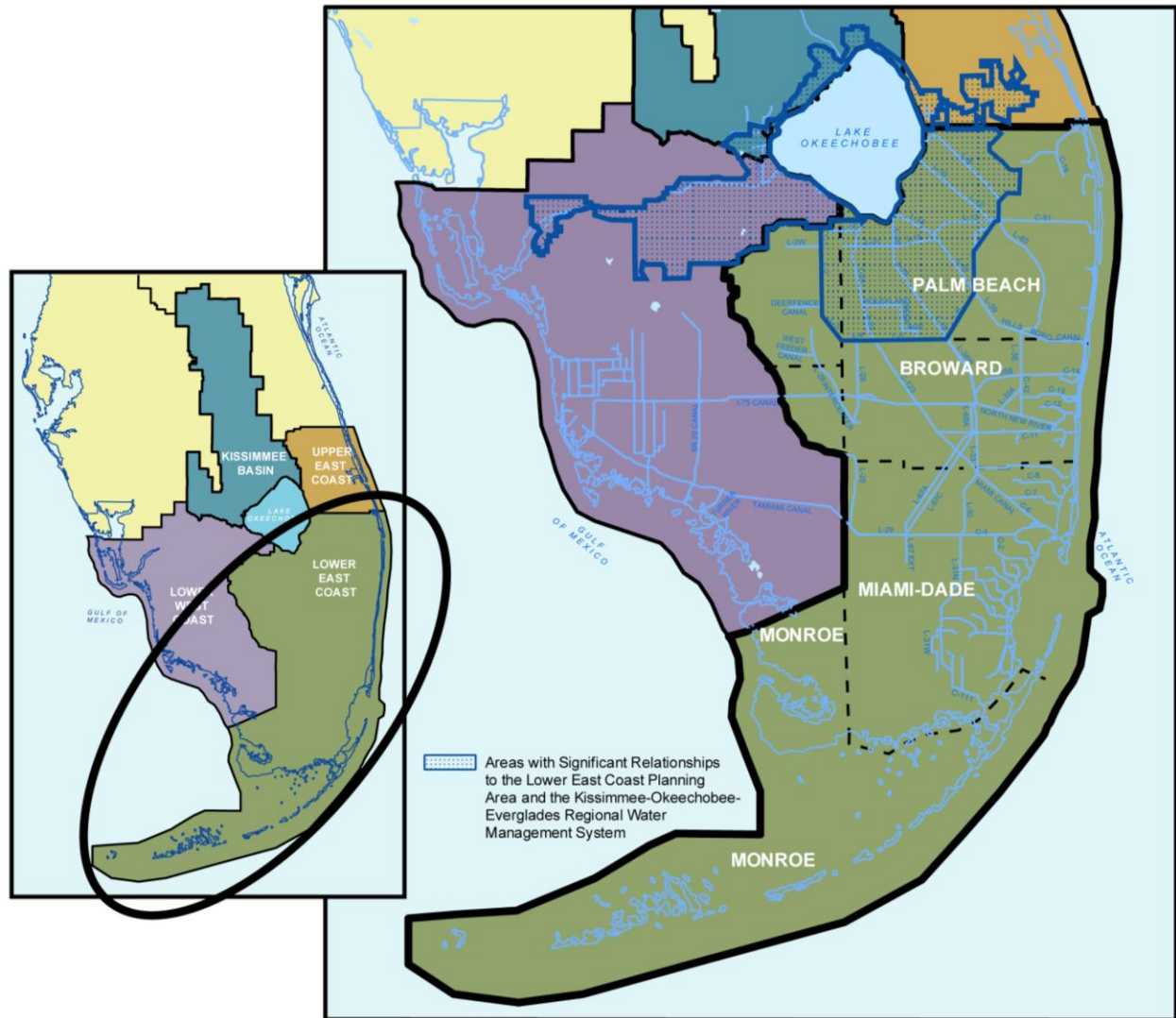


Figure 1. LEC Planning Area.

LEGAL AUTHORITY AND REQUIREMENTS

The legal authority and requirements for water supply planning are primarily found in Chapter 373, Florida Statutes (F.S.), with additional direction located in Chapters 403 and 187, F.S. In accordance with Florida's Water Protection and Sustainability Program, regional water supply plans and local government comprehensive plans must ensure adequate potable water facilities are constructed and are concurrently available with new development.

GOAL AND OBJECTIVES

The goal for this water supply plan update, derived from state statutes, is to identify sufficient water supply sources and future projects to meet existing and future reasonable-beneficial uses during a 1-in-10 year drought condition through 2030 while sustaining water resources and natural systems.


The objectives developed for the 2005–2006 LEC Plan Update were modified for this update. The following five objectives for this update provide an overall framework for the planning process:

- ◆ Water Supply – Identify sufficient water resource and water supply development options to meet projected 2030 water demand during a 1-in-10 year drought event.
- ◆ Water Conservation and Alternative Source Development – Increase levels of conservation, the efficiency of water use, and the development of alternative water sources to meet projected demand.
- ◆ Natural Systems – Protect and enhance the environment, including the Everglades and other federal, state, and locally identified natural resource areas.
- ◆ Linkage with Local Governments – Provide information to support local government comprehensive plans.
- ◆ Compatibility and Linkage with Other Efforts – Achieve compatibility and integration with the following:
 - Comprehensive Everglades Restoration Plan (CERP) and other environmental restoration projects
 - Modifications to operating schedules for the regional system including Lake Okeechobee
 - Consumptive Use Permitting process, Minimum Flows and Levels (MFLs), and Water Reservations
 - Other regional and local water resource planning efforts.

PLANNING PROCESS

The planning process for developing this update is described in **Table 1**.

Table 1. Planning process for developing this update.

PLANNING PROCESS 			
1 Planning and Assessment <p>The update process incorporated extensive public participation, including a series of public workshops, as well as coordination with local governments, the Florida Department of Environmental Protection (FDEP) and other appropriate state and federal agencies. A review of previous planning efforts in the region and documentation of activities since the approval of the 2005–2006 LEC Plan Update were key starting points of this process. The planning process integrated development of 2030 demand projections; assessment of existing and projected resource conditions; and formulation of strategies to meet urban, agricultural, and environmental water needs.</p>	2 Data Collection, Analyses, and Issue Identification <p>Using the 2005–2006 LEC Plan Update as a foundation, this water supply plan update involved collecting the latest information about population, water demand, rainfall (all described in Chapter 2), water resources, water conservation, and land use. Analyses, such as groundwater and surface water evaluations, review of regulatory information, mapping, wetland studies, and other related data confirmed the validity of previously identified issues and helped identify new issues.</p>	3 Evaluation of Water Resources and Water Source Options <p>The next phase of the planning process involved reviewing existing solutions or developing new solutions to address the identified issues (Chapter 3). In areas where projected demand exceeds available supplies, solutions included alternative water supplies and water conservation (Chapter 4). In some cases, the 2005–2006 LEC Plan Update identified more projects than needed to meet the projected demand for 2025. Source options were evaluated, and appropriate responsibilities were identified.</p>	4 Identify Water Resource and Water Supply Development Projects <p>Water supply projects intended to meet water needs for the next 20 years were identified, compiled, and evaluated by the SFWMD with input from stakeholders, the public, and other agencies. The projects were also screened for feasibility and ability to be permitted. With the new, lower projections for 2030, some proposed projects may be downsized, delayed, eliminated, or substituted with different projects. This information was used to create Chapter 5: Water Resource Development Projects and Chapter 6: Water Supply Development Status and Projects.</p>

Public Participation

The SFWMD established the Water Resources Advisory Commission (WRAC) to serve as an advisory body to the Governing Board. The WRAC is used as the primary forum for conducting workshops, presenting information, and receiving public input on water resource issues affecting south Florida. Commission members represent environmental, urban, and agricultural interests from all four of the SFWMD's water supply planning areas.

The SFWMD held WRAC issue workshops on the plan updates 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 — were invited to attend the workshops as well as the public. During the workshops, participants reviewed and provided comments regarding projected demand and other key plan elements compiled by SFWMD staff. In addition to WRAC issue workshops, water demand projections were also coordinated through individual meetings, outside of the WRAC, with local government planning departments, utilities, and agricultural industry representatives. Participants also reviewed and provided input on water supply issues, the condition of regional water resources, water source options, and other key aspects of the water supply plan update. Ultimately, the plan was presented to the SFWMD Governing Board for their consideration for approval at a publicly noticed meeting.

PLANNING AREA BACKGROUND

The LEC Planning Area includes essentially all of Palm Beach, Broward, and Miami-Dade counties, most of Monroe County, and the eastern portions of Hendry and Collier counties. While not included in the water demand totals for the LEC Planning Area, the Lake Okeechobee Service Area (LOSA), which includes portions of four additional counties — Martin, Okeechobee, Glades, and Lee — is considered in the analysis during the water supply planning process because of south Florida's reliance on Lake Okeechobee. Some utilities in the LEC Planning Area provide water to small portions of Martin County, which were included in the Palm Beach County population and demand figures.

The LEC Planning Area is described in detail in the *2011–2012 Water Supply Plan Support Document* (Support Document; SFWMD 2011). Additional background information is highlighted below:

- Palm Beach, Broward, and Miami-Dade counties are among the state's five most populated counties. In 2010, the LEC Planning Area represented 30 percent of Florida's total population.
- The 2005–2006 LEC Plan Update included a large set of alternative water supply projects due to the exceptionally high projections of growth in population and Public Water Supply (PWS) demand (1,286 million gallons per day [MGD] in 2025), as well as the anticipated effect of proposed SFWMD rules, which

resulted in limitations on new and increased withdrawals from the Surficial Aquifer System (SAS) in 2007.

- ◆ Neither the growth in population nor demand materialized and, in fact, PWS demand has decreased over the past five years. The reasons for this are likely mixed and due to conservation efforts by the utilities and the SFWMD, water shortage restrictions during droughts, year-round irrigation conservation measures, and the economic downturn. As a result, per capita water use rates have decreased over the past five years as well.
- ◆ The combination of reduced per capita use rates (PCUR) and slower than anticipated population growth has reduced PWS demand in 2010 (845 MGD) to less than the PWS demand in 2005 (912 MGD). The combined permitted water use allocation of 1,176 MGD enables most utilities to meet some or all of their future demand without additional projects.
- ◆ Many PWS utilities have already deferred construction of alternative water supply projects. Some alternative water supply projects recommended in the 2005–2006 LEC Plan Update may not be necessary until after this plan’s 2030 planning horizon.
- ◆ World-renowned ecosystems, such as the Everglades, Lake Okeechobee, Florida Bay, Biscayne Bay, and the Northwest Fork of the Loxahatchee River are in the LEC Planning Area, including two national parks (Everglades National Park and Biscayne National Park) and a federally-designated Wild and Scenic River (Northwest Fork of the Loxahatchee River).
- ◆ Within the LEC Planning Area, the Everglades Agricultural Area in Palm Beach County is ranked number one in the state and the United States in total sugarcane acres under cultivation. Palm Beach County accounted for 77 percent of the total sugarcane acreage in Florida (USDA-NASS 2007). Palm Beach County also ranked first in Florida in the value of vegetables, melons, potatoes, and sweet potatoes produced (\$409 million; USDA-NASS 2007). Palm Beach County was also ranked first in Florida in combined vegetable acreage harvested for sale (79,792 acres; USDA-NASS 2007).
- ◆ Miami-Dade County leads the state the production of nursery and ornamental/greenhouse products. In 2007, Miami-Dade County produced \$494 million in greenhouse and nursery sales and was ranked number two in the United States. Hendry County was ranked number one in 2007 in terms of oranges acreage and number one in the value of fruits, tree nuts, and berries produced (\$407.7 million; USDA-NASS 2007). Hendry County is also number two in terms of sugarcane acres under cultivation in Florida behind the Everglades Agricultural Area within Palm Beach County.

Population Projections and Water Demand

Projections developed for this update estimate the LEC Planning Area's population will increase by over 18 percent, from approximately 5.6 million residents in 2010 to slightly more than 6.6 million residents by 2030. In contrast, the 2005–2006 LEC Plan Update estimated the planning area's population to increase over 31 percent, with the total population reaching 7.3 million by 2025.

In this update, projected gross water demand for 2030 for the region's PWS is estimated at 1,006 MGD. This demand projection represents a 19 percent increase from 845 MGD actually used in 2010. While the projected increase is over 100 MGD, it is significantly less than the previous update, which anticipated new demand to be 320 MGD. The increase in PWS demand from 2010 to 2030 is expected to require implementation of fewer water supply development projects by utilities than projected in the previous plan.

Even at the lower demand projection, PWS is expected to remain the LEC Planning Area's single largest water use category in 2030, representing at least 50 percent of the planning area's total finished water demand by 2030. The Agricultural (AGR) Self-Supply use category is projected to remain the second largest water use category in 2030. Agricultural gross water demand is estimated to increase from 604 MGD in 2010 to 674.4 MGD in 2030, representing at least 35 percent of the LEC Planning Area's total gross demand. The remaining 15 percent consists of the rest of the urban demand and includes Domestic Self-Supply (DSS), Industrial/Commercial/Institutional (ICI) Self-Supply, Recreational/Landscape (REC) Self-Supply, and Power Generation (PWR) Self-Supply.

Overview of Water Resources

Water for urban and agricultural uses in the LEC Planning Area comes from groundwater and surface water. Water for environmental needs also comes from these same sources. Determining the condition and sustainability of water needed to meet projected urban and agricultural demands (**Chapter 2**), as well as environmental needs, requires consideration of the area's available water resources (**Chapter 3**). Extensive information related to the LEC Planning Area and its water resources is contained in the Support Document (SFWMD 2011).

Groundwater Resources

The LEC Planning Area groundwater resources are the SAS, which includes the Biscayne aquifer, and Upper Floridan aquifer, which is part of the Floridan Aquifer System (FAS) (**Figure 2**).

Surficial Aquifer System

The SAS, including the Biscayne aquifer, is shallow, unconfined, and generally extends from land surface to 200 feet in depth. It is recharged from rainfall and seepage from surface

water bodies such as canals and lakes. The SAS is connected to surface water systems, including canals, lakes, the Everglades, and other wetlands. The Biscayne aquifer is among the most productive in the world, and currently provides more than one billion gallons a day on average for potable and irrigation needs in the tri-county area.

The SAS, including the Biscayne aquifer, provides most of the fresh water for PWS and other urban uses within the LEC Planning Area. The Biscayne aquifer provides most of the fresh water for agriculture in Broward and Miami-Dade counties. Although the Biscayne aquifer is part of the SAS, it only exists in Broward and Miami-Dade counties. The Biscayne aquifer is designated as a “sole source aquifer” by the United States Environmental Protection Agency (USEPA) under the Safe Drinking Water Act because it is a principal source of drinking water and highly susceptible to contamination due to its high permeability and proximity to land surface.

Floridan Aquifer System

The FAS is a thick, multi-layered sequence of predominantly carbonate rocks that underlies all of Florida and parts of Alabama, Georgia, and South Carolina. While the FAS is the primary source of fresh water for much of northern and central Florida, it contains brackish water in the LEC, Lower West Coast, and Upper East Coast planning areas. Until recent years, the Floridan aquifer has not been widely developed as a water source in the LEC Planning Area due in part to the extensive availability of fresh groundwater from the SAS. To date, the brackish portions of the FAS have been more extensively developed in the Upper East Coast and Lower West Coast planning areas due to the lower productivity of the SAS in those planning areas.

Within the LEC Planning Area, more than 600 feet of low permeability sediments separate the FAS from the SAS. This is known as the Hawthorne Confining Unit. Under such conditions, the FAS is “confined” and water within the aquifer exists under artesian pressure. Although the potentiometric surface of the aquifer is above land surface, the low permeability sediments of the Hawthorne Confining Unit prevent significant upward migration of saline waters into the shallower freshwater aquifers. From Jupiter to southern Miami, water from the FAS is highly mineralized and requires specialized treatment, such as reverse osmosis (RO), to be converted into drinking water.

The FAS is generally subdivided into upper and lower sections separated by a continuous low permeability confining unit (see Middle Confining Unit in **Figure 2**). The top of the Upper FAS is approximately 900 feet below land surface in southeast Florida, and the base of the Upper Floridan aquifer extends as deep as 1,500 feet below land surface. At the base of the Lower Floridan aquifer, at a depth of approximately 2,500 feet, are cavernous zones with extremely high transmissivities, collectively known as the Boulder Zone, which provides a zone for disposal of treated wastewater, brine by-products of RO treatment, and other permitted discharges.

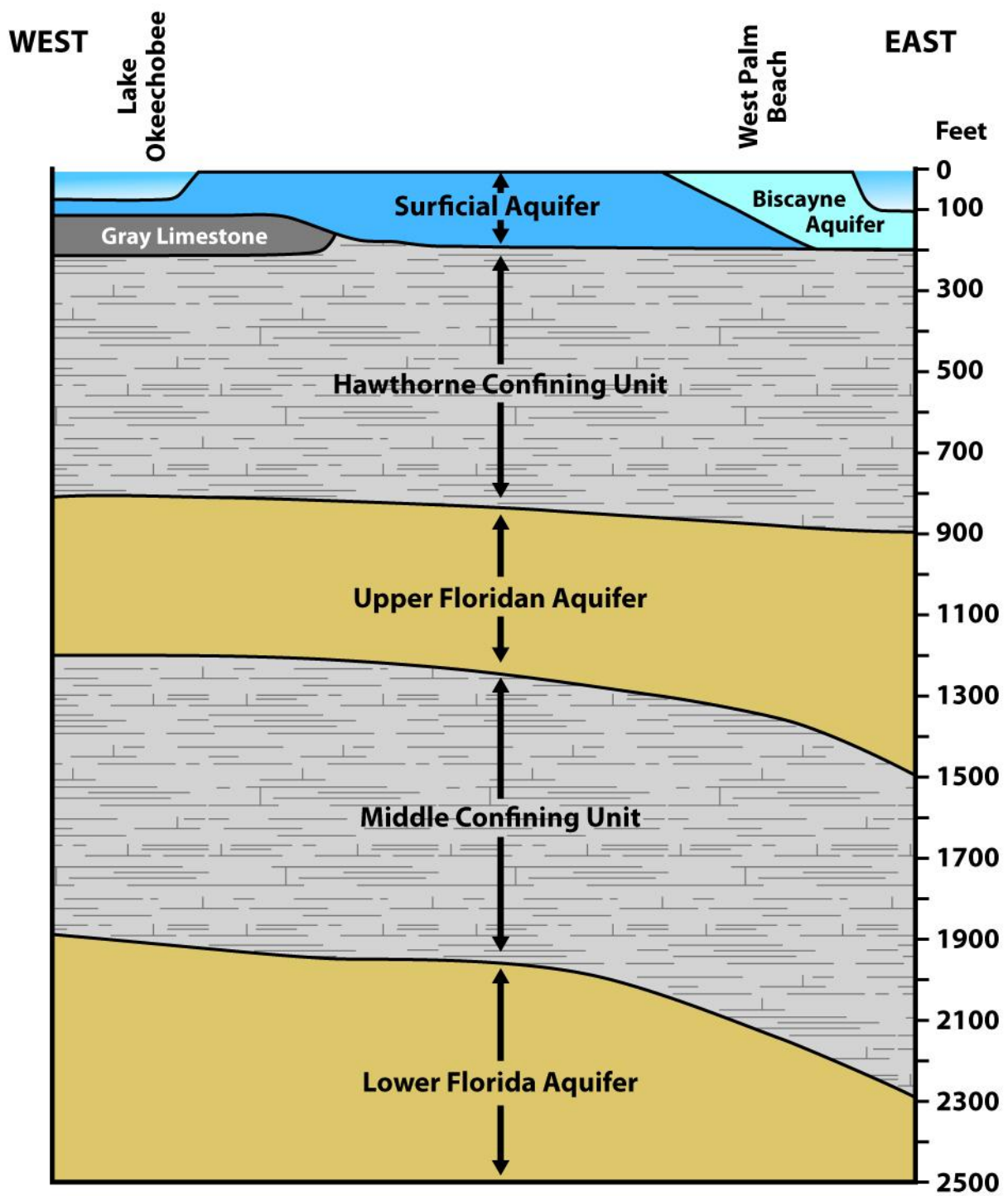


Figure 2. Generalized hydrogeologic cross-section of south Florida.

Surface Water Resources

The LEC Planning Area surface water resources are integrally interconnected as part of the Kissimmee–Okeechobee–Everglades ecosystem. Historically, water flowed from the Kissimmee Chain of Lakes into the Kissimmee River and then into Lake Okeechobee. Overflow from the lake would move as sheetflow across the Everglades and into Florida Bay.

The City of West Palm Beach and agriculture in Palm Beach and Hendry counties predominantly use surface water to meet PWS and irrigation demands, respectively. Lake Okeechobee, the Water Conservation Areas (WCAs), and an extensive network of canals are the principal sources of surface water in the LEC Planning Area.

Significant Freshwater Systems

The Central and Southern Florida Flood Control Project (C&SF Project) links Lake Okeechobee and the Everglades with the agricultural and urban areas, and other major ecosystems. The C&SF Project divided the remaining Everglades south of Lake Okeechobee and north of U.S. 41 in Palm Beach, Broward, and Miami-Dade counties into three hydrologic units known as the WCAs. Everglades National Park lies south of U.S. 41. Descriptions of the significant freshwater systems within the LEC Planning Area are as follows:

- ◆ **Lake Okeechobee** is a key component of the south Florida hydrologic system. The 2008 Lake Okeechobee Regulation Schedule (2008 LORS; USACE 2007) is designed to maintain Lake Okeechobee water levels approximately one foot lower than the previous schedule at levels between 12.5 and 15.5 feet National Geodetic Vertical Datum of 1929 (NGVD). **Chapter 3** of this document and **Chapter 4** of the Support Document (SFWMD 2011) provide additional information about the 2008 LORS. Lake Okeechobee has many functions, including flood protection, urban and agricultural water supply, navigation, and fisheries and wildlife habitat. The lake is critical for flood control during wet seasons and water supply during dry seasons. Agriculture in the LOSA, which includes the Everglades Agricultural Area (EAA), is the predominate user of lake water. In the LOSA, the Okeechobee Utility Authority (in the Kissimmee Basin Planning Area) is the only remaining PWS utility using water directly from Lake Okeechobee. Since the last plan update, Clewiston, South Bay, Belle Glade, and Pahokee have discontinued the use of Lake Okeechobee as their supply source and now use FAS water treated by RO for all of their PWS demand.
- ◆ **WCAs** are the remaining portions of the Northern and Central Everglades that were diked as part of the C&SF Project and are now operated and maintained for flood control, environmental habitat, and water supply to the LEC Planning Area. The WCAs serve as the first source of supplemental water to the coastal canals that recharge the Biscayne aquifer. WCA 1 is contained within the Arthur R. Marshall Loxahatchee National Wildlife Refuge.

- ◆ **Everglades National Park** is the nation's second largest national park. The park is home to a wide variety of endangered species and has several international preserve-style designations. Regulatory discharges from Lake Okeechobee and runoff from the EAA are treated by stormwater treatment areas (STAs) before being delivered to the WCAs. Water from the WCAs then enters Everglades National Park and flows through Shark River Slough to Whitewater and Florida bays and the Ten Thousand Islands area. Some water enters the panhandle of Everglades National Park and Taylor Slough, which is an important tributary to northeastern Florida Bay
- ◆ **C&SF Project canals** in the LEC Planning Area move water from Lake Okeechobee and the Everglades to coastal counties to recharge the SAS during dry times. The canals are also a crucial component of the flood control system for the region by discharging water to the bays and estuaries.
- ◆ **Wetlands** extend across 3.2 million acres of the LEC Planning Area (USFWS 2010). Approximately 2 million acres are freshwater wetlands and 1.2 million are generally classified as estuarine or marine. The remnant Everglades represent the majority of the region's wetlands. In addition to Everglades National Park and the WCAs, key wetlands in the LEC Planning Area include Holey Land Wildlife Management Area, Rotenberger Wildlife Management Area, Grassy Waters Preserve, and other wetlands in the Loxahatchee River watershed. The region also has extensive constructed wetlands within the Everglades STAs. Finally, isolated wetlands can be found throughout the LEC Planning Area.

Significant Coastal Ecosystems

Other important ecosystems in the region include the Northwest Fork of the Loxahatchee River, Lake Worth Lagoon, the North Fork of the New River, Biscayne Bay, and Florida Bay. A description of each of these is provided below:

- ◆ The **Northwest Fork of the Loxahatchee River** is a federally-designated Wild and Scenic River. It is hydrologically considered to be in the LEC Planning Area because of its geographic relationship to northern Palm Beach County. The river's watershed includes a broad area of northern Palm Beach County. The Northwest Fork of the Loxahatchee River flows north into Martin County, continues north and bends east through Jonathan Dickinson State Park. It then flows southeast back into Palm Beach County, where it enters the central embayment area of the Loxahatchee River Estuary.
- ◆ **Lake Worth Lagoon** is located in eastern Palm Beach County and extends for about 22 miles adjacent to heavily urbanized areas. It is connected to the Atlantic Ocean by the Lake Worth and South Lake Worth inlets.
- ◆ The **North Fork of the New River** is a remnant tributary that drained the eastern Everglades and now flows through the City of Fort Lauderdale, where it

eventually joins the river's main branch and empties into the Atlantic Ocean via the inlet at Port Everglades.

- ◆ **Biscayne Bay** covers approximately 428 square miles located on the southeastern coast near Miami-Dade County. The bay is an aquatic preserve and an Outstanding Florida Water. The southern half of the bay is within Biscayne National Park. This is the largest marine park in the National Park system and supports diverse flora and fauna, including many endangered species.
- ◆ **Florida Bay** lies between the Everglades and the Florida Keys. Florida Bay covers 850 square miles, of which approximately 80 percent is within Everglades National Park.

HISTORY OF PLANNING EFFORTS

A conclusion of the 2000 LEC Plan was that timely implementation of CERP projects would meet most of the water supply needs of the region by 2020. When the plan was updated five years later, delays to CERP projects had already significantly changed the basis of that conclusion. As a result of this and other factors, the 2005–2006 LEC Plan Update concluded that PWS utilities would need to depend heavily on conservation and the development of alternative water sources and treatment facilities.

As part of the 2005–2006 LEC Plan Update effort, local governments and water suppliers in the LEC Planning Area worked closely with the SFWMD to identify and develop potable water supply projects to meet projected water needs. Proposed projects were then included in local government comprehensive plans. Since then, the economic downturn, slower population growth, and improved conservation have significantly lowered demand projections. The SFWMD has also granted increased allocations of fresh groundwater where appropriate local hydrologic conditions were present and regulatory requirements were met. Additional allocation increases from this traditional water supply source may be possible if other sources such as reuse or stormwater can offset future demand.

As a result, many alternative water supply projects recommended in the last update have been deferred. For some utilities, the need for alternative water supply development may be delayed past the 2030 planning horizon of this update. For others, growth has created a need to implement some or all of the projects identified in the 2005–2006 LEC Plan Update.

The SFWMD has continued to work closely with staff from PWS utilities to modify population and demand projections and to identify water supply development projects for this update. **Chapter 6** of this update discusses existing and new water supply development projects for the LEC Planning Area and **Appendix G** provides additional details about these projects.

When funding is available, the alternative water supply projects listed in this update are eligible for cost-sharing consideration through a separate annual funding process.

established by the SFWMD's Governing Board that is consistent with the state's statutory requirements.

PROGRESS SINCE THE 2005–2006 LEC PLAN UPDATE

The 2000 LEC Plan and the 2005–2006 LEC Plan Update identified several main regional issues concerning water conservation, groundwater and surface water sources, regulatory criteria, and Everglades and ecosystem restoration. The Five-Year Water Resource Development Work Program, published in Volume II of the South Florida Environmental Reports (available online at <http://www.sfwmd.gov/sfer>) annually summarizes progress. At the time this update was developed, the most recent Five-Year Water Resource Development Work Program was published in the *2012 South Florida Environmental Report* (Martin 2012). Activities and programs implemented in the LEC Planning Area since the 2005–2006 LEC Plan Update are presented below.

Water Conservation

- ◆ In September 2008, the SFWMD adopted the Comprehensive Water Conservation Program (CWCP) to establish proactive, water savings throughout the SFWMD through demand management.
- ◆ The Districtwide Year-round Landscape Irrigation Conservation Measures Rule became effective in March 2010 (Chapter 40E-24, Florida Administrative Code [F.A.C.]), consistent with the CWCP. The rule limits landscape irrigation to three days a week in all areas of the SFWMD in support of the long-term sustainability of the region's water resources.
- ◆ The Water Savings Incentive Program (WaterSIP) provides up to 50-50 cost-sharing funds to utilities, municipalities, property owner associations, and large water users for noncapital cost projects, such as the purchase and installation of high efficiency indoor plumbing fixtures, outdoor irrigation retrofits, and automatic distribution system line flushing devices. From FY 2005 to FY 2011, the SFWMD allocated \$2.35 million for LEC Planning Area WaterSIP projects. This represents an estimated potential savings of 3.9 MGD. For more information on water conservation, see **Chapter 5**.

Modeling and Studies

- ◆ In 2005, the SFWMD and United States Geological Survey (USGS) began a cooperative study to measure evapotranspiration (ET) in south Florida using the eddy covariance method. Spatially extensive plant communities within Big Cypress National Preserve were studied individually, including dwarf cypress, cypress swamps, pine uplands, wet prairies, and marsh as mapped by Duever et al. (1986). This study provided the first quantitative measurements of ET for the

major natural plant communities in south Florida. The actual measured ET data from this study is being used to improve hydrologic models. As part of this same project, in 2007, the USGS installed five ET monitoring sites within differing vegetation communities in Big Cypress National Preserve and completed the construction of three towers. The fieldwork was completed in 2010 and the results from this study have been published in Shoemaker et al. (2011), available on the web at <http://pubs.usgs.gov/sir/2011/5212/>.

- ◆ The SFWMD held an independent peer review of the Lower East Coast Subregional Model (LECsR), which simulates groundwater flow in the SAS in the LEC Planning Area. The model was developed from five smaller groundwater models following the adoption of the 2000 LEC Plan (SFWMD 2000). It is currently being used to address site-specific issues pertaining to water use, permitting, and several CERP projects. Refinements to the model based on the peer review are expected to proceed in 2013.
- ◆ A study of the development and application of water quality modeling components that could be applied to the SFWMD Regional Simulation Model was completed in FY 2009. As a result of this study, a spatially distributed water quality model for phosphorus transport and cycling in wetlands was developed for application throughout the SFWMD (Jawitz et al. 2008).
- ◆ Three new FAS well sites in the planning area have been equipped with instrumentation and have been transmitting water level data at 15-minute intervals to the SFWMD. PBF-14 in Palm Beach County monitors the Upper Floridan aquifer. Wells BOYRO-EXP and PBF -15, located in Palm Beach County, are multizone wells monitoring the Upper and Middle Floridan (BOYRO-EXP), and the Upper, Middle, and Lower Floridan (PBF-15) aquifers.
- ◆ The SFWMD developed a density-dependent model of the FAS that encompasses the LEC Planning Area (HydroGeoLogic, Inc., 2006), referred to as the Phase I Model. The Phase II Model, which extended the Phase I Model to include the Upper East Coast Planning Area, was completed in October 2008 (Golder Associates 2008). The model is designed to evaluate future effects of proposed use of the FAS. An independent peer review of the model was conducted in June 2011. Implementation of peer review recommendations is underway and is scheduled to be completed in 2013.

Regulatory Protection and Operations

- ◆ In 2007, the SFWMD adopted a Restricted Allocation Area rule for the Everglades water bodies and the Loxahatchee River watershed. This rule is a component of recovery strategies for MFLs for the Everglades and the Northwest Fork of the Loxahatchee River.

- ◆ In 2008, the United States Army Corps of Engineers (USACE) implemented an interim regulation schedule for Lake Okeechobee that addressed concerns about the integrity of the Herbert Hoover Dike. The dike provides key flood control for developed areas around the lake. The 2008 LORS is designed to regulate lake levels at a lower elevation than previous regulation schedules. Additional information regarding 2008 LORS can be found in the *Central and Southern Florida Project Water Control Plan for Lake Okeechobee and Everglades Agricultural Area* (USACE 2008).
- ◆ Shortly after implementation of the 2008 LORS, the SFWMD updated its Water Shortage Management Plan by rule (Chapter 40E-21, F.A.C.), to assure equitable distribution of available water resources among all water users during times of shortage.
- ◆ Because adoption of the 2008 LORS lowered the Lake Okeechobee schedule, the SFWMD changed the Lake Okeechobee MFL status from prevention to recovery. In October 2008, the SFWMD adopted a second Restricted Allocation Area rule for the LOSA. This rule was developed as part of a recovery strategy for the Lake Okeechobee MFL. Adaptive protocols for Lake Okeechobee operations (SFWMD 2010) were updated in 2010. These provide guidance to staff and the SFWMD Governing Board when making recommendations to the USACE about Lake Okeechobee water releases. Adaptive protocols are designed to identify potential “win-win” situations in which one or more environmental resources may benefit from a lake release and where minimal or no adverse effect on meeting permitted agricultural and urban water supply needs or impacts on Seminole Tribe water rights are anticipated (SFWMD et al. 2003).

Water Storage

- ◆ The CERP North Palm Beach County – Part I Project (now known as the Loxahatchee River Watershed Restoration Project) consists of six separable elements. The L-8 Basin Reservoir – Phase 1 component of this project is in the pilot testing phase. A temporary pump has been installed that provides limited water deliveries to the Grassy Waters Preserve and the Northwest Fork of the Loxahatchee River during the dry season pursuant to specific operational conditions. Design and procurement for a larger, permanent pump are under way.
- ◆ In 2010, construction commenced on the CERP Fran Reich Preserve (Site 1 Impoundment) – Phase I Project. This project consists of a 1,660-acre above-ground impoundment located in the southwestern portion of urban Palm Beach County. When completed, water from the Hillsboro Canal will be pumped into the reservoir during the wet season for release during the dry season.
- ◆ The CERP Hillsboro Aquifer Storage and Recovery (ASR) Pilot Project, located at the westernmost corner of Site 1, has been constructed and is in the third and

final test phase, which is scheduled to be completed by the end of 2012. Preliminary results indicate that ASR technology at this site can provide supplemental storage in support of the reservoir project although the volume of such storage has not been determined.

Restoration

- ◆ The CERP Acme Basin B Discharge Project (officially renamed Environmental Preserve at the Marjory Stoneman Douglas Everglades Habitat) was completed in 2010. The project improves Everglades water quality by diverting the direct discharge of urban runoff into a STA before the water enters the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA 1).
- ◆ The Deering Estate Flowway Project, a component of the CERP Biscayne Bay Coastal Wetlands Project, was completed in 2011. The flowway is designed to direct freshwater runoff away from existing canal discharges and redistributes it as sheetflow prior to discharge into Biscayne Bay. Operations are scheduled to begin in 2012.
- ◆ The CERP C-111 Spreader Canal Western Project commenced construction in 2010. A constructed hydrologic ridge along the eastern border of Taylor Slough is designed to retain more water within the slough and increase the flow of water to Florida Bay. Construction is anticipated to be completed in 2012.

Water Supply Development Projects

Water supply development in the LEC Planning Area included both traditional (fresh and surface water and groundwater) and alternative sources. Through the Alternative Water Supply Funding Program, the SFWMD assisted water users in the development of alternative water projects, including reclaimed water, water reclamation facilities, brackish water wellfields, RO treatment facilities, and ASR well systems (see also **Chapters 5 and 6**). For the 2007–2012 period, the SFWMD, in cooperation with the State of Florida, provided more than \$123 million in alternative water supply funding for 212 projects, with 90 projects occurring in the LEC Planning Area.

Between FY 2007 and FY 2011, water supply development projects funded by the Alternative Water Supply Funding Program in the LEC Planning Area have created a total of 73 MGD of new water capacity. The new sources of this water include 28.5 MGD of brackish water, 20.9 MGD of reclaimed water, and 23.4 MGD of surface water/stormwater.

Outlook on Sea Level Rise

Although sea level rise is occurring across the globe, the impact to individual regions varies, and the degree and rate of change remains uncertain. Long-term data show changes in sea

level. Despite the uncertainties, sea level rise and its effects on hydrogeologic conditions must be included as a consideration in water supply planning.

Saltwater intrusion was identified as an issue in the 2000 LEC Plan when utilities at risk were identified (SFWMD 2000). The SFWMD has worked with coastal utilities to develop inland freshwater sources and to diversify water sources to modify the risk of saltwater intrusion. The anticipated sea level rise may increase the intrusion of salt water into groundwater. The SFWMD is jointly working with the Southeast Florida Regional Climate Change Compact to evaluate sea level rise. The compact is a joint commitment of Palm Beach County, Broward, Miami-Dade, and Monroe counties to partner in mitigating the causes and adapting to the consequences of climate change, including development of standard methods for analysis and mapping, as well as development of an action plan.

WATER SUPPLY PLANNING FOR THE NEXT 20 YEARS

The stronger statutory link between local governments' comprehensive plans and the SFWMD's regional water supply plans, data sharing, and collaborative planning are all credited with improving the water supply planning process. Moreover, the SFWMD's Water Supply Planning staff closely coordinates with the Consumptive Use Permitting staff during the water supply planning process. This coordination will only improve by fulfilling the guidance provided by the Florida Department of Environmental Protection (FDEP) to the water management districts in early 2012. In the future, water supply development projects included in water supply plans will undergo initial screening for feasibility including whether they can be permitted. Updates to local governments' water supply facilities work plans and the next SFWMD's five-year update will continue to refine 20-year demand estimates and projections.

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