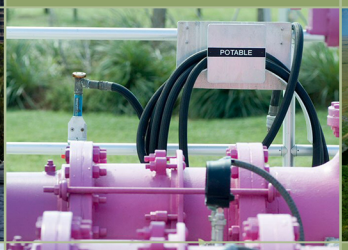
SOUTH FLORIDA WATER MANAGEMENT DISTRICT



LOWER EAST COAST
Water Supply Plan

2005-2006 UPDATE

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Acknowledgements

The South Florida Water Management District (SFWMD or District) would like to recognize and thank the Water Resources Advisory Commission (WRAC) Regional Water Supply Workshop participants for their contributions, comments, advice, information and assistance throughout the development of this *2005–2006 Lower East Coast Water Supply Plan Update.*

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 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.

This *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) supports the District's findings and recommendations in its *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan), which suggest that most future water needs will be met through development of alternative water sources. Alternative water sources in the Lower East Coast (LEC) Planning Area include brackish water, reclaimed water, and the storage of storm water captured during wet-weather flows for later beneficial use.

Historically, traditional water sources for urban and agricultural use in the LEC Planning Area have included the Surficial and Biscayne aquifers, fresh surface water, primarily from the Everglades and Lake Okeechobee, and, to a limited extent, other fresh surface water systems. However, since the 2000 LEC Plan, a number of factors have emerged that have created considerable uncertainty concerning water availability from the regional system to meet additional demands in the LEC Planning Area. Most notably, the 2000 LEC Plan concluded that supplies would be adequate through 2020 if the Comprehensive Everglades Restoration Plan (CERP) was implemented on schedule. However, the overall implementation of the CERP has been slower than anticipated due to federal procedural and funding issues, which have affected the timing and availability of water in the LEC Planning Area.

While many of the emerging factors focus on environmental concerns, other factors relate to regulatory and policy changes both within and outside the District. These include ongoing efforts to institute changes in the Lake Okeechobee regulation schedule, as well as the Lake Okeechobee Water Shortage Management Plan. In addition, the District Governing Board adopted the Regional Water Availability Rule as part of the District's Consumptive Use Permit Program in February 2007. Therefore, given the Governing Board direction to reduce reliance on the regional system for future water supply needs, the focus of this 2005–2006 LEC Plan Update is on alternative water sources and projects.

Encompassing approximately 6,100 square miles, the LEC Planning Area includes all of Miami-Dade, Broward and Palm Beach counties, most of Monroe County, and the eastern portions of Hendry and Collier counties. Additionally, the entire Lake Okeechobee Service Area, which includes portions of four additional counties—Martin, Okeechobee, Glades and Lee—was considered in the water supply planning process because of the region's reliance on Lake Okeechobee for water supply.

Population growth in the LEC Planning Area is expected to significantly impact Public Water Supply demand in the region. The LEC Planning Area's population is expected to grow from 5.6 million in 2005 to over 7.3 million by 2025 (U.S. Bureau of the Census 2001). This 31 percent increase in population correlates to the projected additional 305 million gallons per day (MGD) of water needed to meet Public Water Supply demand in the next 20 years. Because most of the growth in demand during the next 20 years will occur in the urban sector, and more specifically within the public water supply systems, this plan update emphasizes the evaluation and recommendation of water supply projects in the Public Water Supply use category.

To fulfill the growing population's demand for additional power supplies, water demand associated with new power generation facilities proposed for the planning area will increase from 4.5 MGD in 2005 to 103 MGD by 2025. Although irrigated agricultural acreage will decrease by 10 percent and net water use is expected to decrease by approximately 37 MGD during the planning period, agricultural water use will remain the second-largest use category in the LEC Planning Area.

In addition to demand projections, this 2005–2006 LEC Plan Update reflects changes in Florida water law since the 2000 LEC Plan. In 2005, legislation was enacted, strengthening the link between land use and water supply planning. At that time, the Water Protection and Sustainability Program was established, which provides annual state revenues matched with District funds to support alternative water supply development. Alternative water supply funding is available through the District's Alternative Water Supply Funding Program for projects ready for construction. To be eligible for funds, the specific alternative water supply projects must be recommended in the appropriate water supply plan. The application for alternative water supply funding, as well as submittal time frames and requirements are posted each year on the District's Web site.

Therefore, to expedite the Water Protection and Sustainability Program and development of the 2005–2006 LEC Plan Update, the District solicited projects from water users and suppliers. The 129 projects in this plan update were submitted specifically for consideration in this plan update, or were projects submitted and approved for alternative water supply cost-sharing funds in Fiscal Years 2006 and 2007. This number also includes District-recommended projects for utilities that showed an unmet future need and did not submit projects with sufficient volumes to meet the future need. Of these 129 projects, 115 alternative water supply projects were submitted by public water suppliers in the following categories:

FLORIDAN 45 projects using brackish water from the Floridan Aquifer as the water source.

OTHER 23 projects involving efforts in these subcategories: aquifer storage and recovery (ASR), captured storm water otherwise lost to tide, water conservation, or sale/purchase agreements.

RECLAIMED 47 projects involving the reuse of advanced or highly treated wastewater flows from domestic facilities.

While inclusion in this 2005–2006 LEC Plan Update enables projects planned for the LEC 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 neither serves as an application for funding, nor a guarantee of funding. 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 apply for alternative water supply funding or for more information, see the SFWMD's Web site at: http://www.sfwmd.gov/org/wsd/aws.

In addition to recommended alternative water supply projects, this plan update provides regional project implementation strategies to planners, policy makers and utility directors. All local governments within the LEC 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 February 2007. The District continues to work closely with local water suppliers during the implementation phase of this water supply plan update.

The 2005–2006 LEC Plan Update is organized into seven chapters and eight appendices. The following briefly summarizes the focus of each chapter:

Chapter 1 – Introduction explains the purpose of the water supply plan update document, provides an overview of the planning process, and summarizes the SFWMD's accomplishments since publication of the 2000 LEC 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 LEC Planning Area through 2025. Water use definitions, new calculation methods and estimation models are also discussed.

Chapter 3 – Resource Analysis identifies the region's water sources, summarizes the changes in regional water availability since the 2000 LEC Plan, and discusses the tools in place that are used to protect water resources under state law.

Chapter 4 – Issues identifies resource issues in the LEC Planning Area, including issues concerning revisions to Lake Okeechobee's regulation schedule and water shortage plan; limitations on water availability from the Everglades and related areas; and, regulatory issues regarding the use of the Upper Floridan Aquifer and

reclaimed water as alternative water sources. Additionally, the state of Florida's changes to 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.

Chapter 6 – Water Resource Development Projects discusses the SFWMD's projects that support the Water Supply Development projects (in **Chapter 7**) for the LEC 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 LEC 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 needed to help meet future demands.

The continued high rate of population growth in the LEC Planning Area through 2025 will require the region's increased commitment to water conservation and alternative water supply development. Comparison of population projections with the projects listed in this plan update indicates that existing and proposed new supplies are adequate to meet the projected future needs. The SFWMD will maintain efforts to assess water resources, coordinate critical resource protection strategies and projects, and restore vital environmental systems throughout the LEC Planning Area and south Florida.

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Acronyms and Abbreviations

ac-ft	acre-feet
AFSIRS	Agricultural Field Scale Irrigation Requirements Simulation
AKA	also known as
ASR	aquifer storage and recovery
ATU	aerobic treatment unit
AWT	advanced wastewater treatment
BCWWS	Broward County Water and Wastewater Services
BEBR	Bureau of Economic and Business Research
BMP	best management practice
C&SF Project	Central and Southern Florida Flood Control Project
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
CSID	Coral Springs Improvement District
CSOP	Combined Structural and Operational Plan
CUP	consumptive use permitting
CUP/CERP	Consumptive Use Permitting/Comprehensive Everglades Restoration Plan Guiding Principles
CWMP	Caloosahatchee Water Management Plan
District	South Florida Water Management District
EAA	Everglades Agricultural Area
EAR	Evaluation and Appraisal Report
ED	electrodialysis
EDR	electrodialysis reversal
ENCON	Loxahatchee River Environmental Control District
ENP	Everglades National Park
EQIP	Environmental Quality Improvement Program
ET	evapotranspiration
F.A.C.	Florida Administrative Code
FAS	Floridan Aquifer System

FAWN	Florida Automated Weather Network
FBFKFS	Florida Bay and Florida Keys Feasibility Study
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FKAA	Florida Keys Aqueduct Authority
FPL	Florida Power & Light
F.S.	Florida Statutes
FWC	Florida Fish and Wildlife Conservation Commission
FY	fiscal year
GIS	geographic information system
GPCD or gpcd	gallons per capita per day
GPD or gpd	gallons per day
IAS	Intermediate Aquifer System
IFAS	Institute of Food and Agricultural Sciences
KB	Kissimmee Basin
LEC	Lower East Coast
LEC Plan	Lower East Coast Water Supply Plan
LECsR	Lower East Coast Subregional Model
LOER	Lake Okeechobee and Estuary Recovery
LOFT	Lake Okeechobee Fast Track
LOPP	Lake Okeechobee Protection Program
LOSA	Lake Okeechobee Service Area
LOWP	Lake Okeechobee Watershed Project
LWC	Lower West Coast
MFL	minimum flow and level
MGD or mgd	million gallons per day
mg/L	milligrams per liter
Miami-Dade WASD	Miami-Dade Water and Sewer Department
MIL	mobile irrigation laboratory
MODWaters	Modified Water Deliveries to Everglades National Park
MSIP	Master Implementation Sequencing Plan
N/A	not applicable
NGVD	National Geodetic Vertical Datum of 1929

Northern Plan	North Beach Palm County Comprehensive Water Management Plan
NRCS	Natural Resources Conservation Service
NSID	North Springs Improvement District
OPWCD	Old Plantation Water Control District
OSTDS	On-site Sewage Treatment and Disposal Systems
OWTS	On-Site Wastewater Treatment Systems
PBA	Palm Beach Aggregate, Inc.
PBC	Palm Beach County
PIR	Project Implementation Report
ppt	parts per thousand
psu	practical salinity unit
PWS	public water supply
RAC	regional activity center
RECOVER	Restoration Coordination Verification
Restudy	Central and Southern Florida Project Comprehensive Review Study
RIB	rapid infiltration basin
RO	reverse osmosis
RSM	Regional Simulation Model
SAS	Surficial Aquifer System
SAV	Submerged Aquatic Vegetation
SCRWTBD	South Central Regional Wastewater and Disposal Board
SFWMD	South Florida Water Management District
SFWMM	South Florida Water Management Model
SFWRMS	South Florida Water Resource Management System
STA	stormwater treatment area
SWFFS	Southwest Florida Feasibility Study
SWIM	Surface Water Improvement and Management
TAZ	traffic analysis zone
TBD	to be determined
TMDL	total maximum daily load
UEC	Upper East Coast
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture

USDA-NRCS	United States Department of Agriculture - Natural Resources Conservation Service
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WASD	Water and Sewer Department
WaterSIP	Water Savings Incentive Program
WCA	water conservation area
WPA	water preserve area
WQBEL	water quality based effluent limitations
WRAC	Water Resources Advisory Commission
WSE	Water Supply and Environmental
WTP	water treatment plant
WWTP	wastewater treatment plant
WWTF	wastewater treatment facility

1
Introduction

This document is an update of the *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan), which was approved by the Governing Board in May 2000 (SFWMD 2000b). The 2000 LEC Plan was developed based on the South Florida Water Management District's (SFWMD or District) finding that sources of water may not be adequate for the planning period to supply water for all existing and projected reasonable-beneficial uses and to sustain the water resources and related natural systems. The 2000 LEC Plan concluded that supplies would be adequate through 2020 if the Comprehensive Everglades Restoration Plan (CERP) was implemented on schedule. This *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) identifies changes since 2000 in available supplies and projected demands, as well as additional water resource and supply components for meeting such demands for the 2025 planning period.

This 2005–2006 LEC Plan Update projects a 31 percent increase in population in the Lower East Coast (LEC) Planning Area between 2005 and 2025, growing from 5.6 million to 7.3 million. Within the LEC Planning Area, traditional fresh groundwater and surface water are becoming increasingly limited to satisfy the region's water demands, resulting in the need to develop alternative water sources.

Regional Water Supply Plans

The SFWMD prepares water supply plans for each of its four planning areas to effectively support planning initiatives and address local issues. The regional water supply plans encompass a 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 LEC Plan Update includes a discussion

NAVIGATE

The 2005–2006 LEC 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* and the previous 2000 LEC Plan. This material is also available from the District's Water Supply Plan Web site: http://www.sfwmd.gov/watersupply.

of minimum flows and levels (MFLs) established within the planning area; MFL recovery and prevention strategies where appropriate; MFLs and water reservations under development; technical data; and, support information.

Florida Water Law

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 *2005–2006 Consolidated Water Supply Plan Support Document* (SFWMD 2007) further describes the Water Protection and Sustainability Program.

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.

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

The new statutory provision strengthens the link 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 adequate potable water facilities are constructed and concurrently available with new development. All local governments within the Lower East Coast (LEC) 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 and/or reverse osmosis (RO), reclaimed water, and new storage facilities. This combination of state and District funds is specifically for cost-sharing alternative water supply project construction costs. The program also adds permitting incentives for water providers selecting projects recommended by the water supply plan updates.

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.

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. The goal of this 2005–2006 LEC Plan Update is to identify sufficient sources of water to meet the needs of all reasonable-beneficial uses within the LEC Planning Area (**Figure 1**) for 2025 during a 1-in-10 year drought event, while sustaining the region's water resources and related natural systems.

2005-2006 Lower East Coast Plan Update Objectives

The SFWMD established the Water Resources Advisory Commission (WRAC) in 2001 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 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 this water supply planning process. Stakeholders representing a cross-section of interests in the region—agricultural, industrial, environmental, 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, District staff and stakeholders developed the following five objectives for this plan update, which provide an overall framework for the planning process. The objectives were modified from those developed for the 2000 LEC Plan.

WATER SUPPLY Identify sufficient water resource and water supply development options to meet projected 2025 water demands during a 1-in-10 year drought event.

CONSERVATION AND ALTERNATIVE SOURCE DEVELOPMENT Increase levels of conservation, increase the efficiency of water use and increase the use of alternative water sources.

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 linkage between the LEC Plan and local government comprehensive plans.

COMPATIBILITY AND LINKAGE WITH OTHER PLANNING EFFORTS Achieve compatibility and integration with the CERP; modifications to operating schedules for the regional system, including Lake Okeechobee; the consumptive use permitting (CUP) process and reservations of water; and, other local and regional water resource planning efforts.

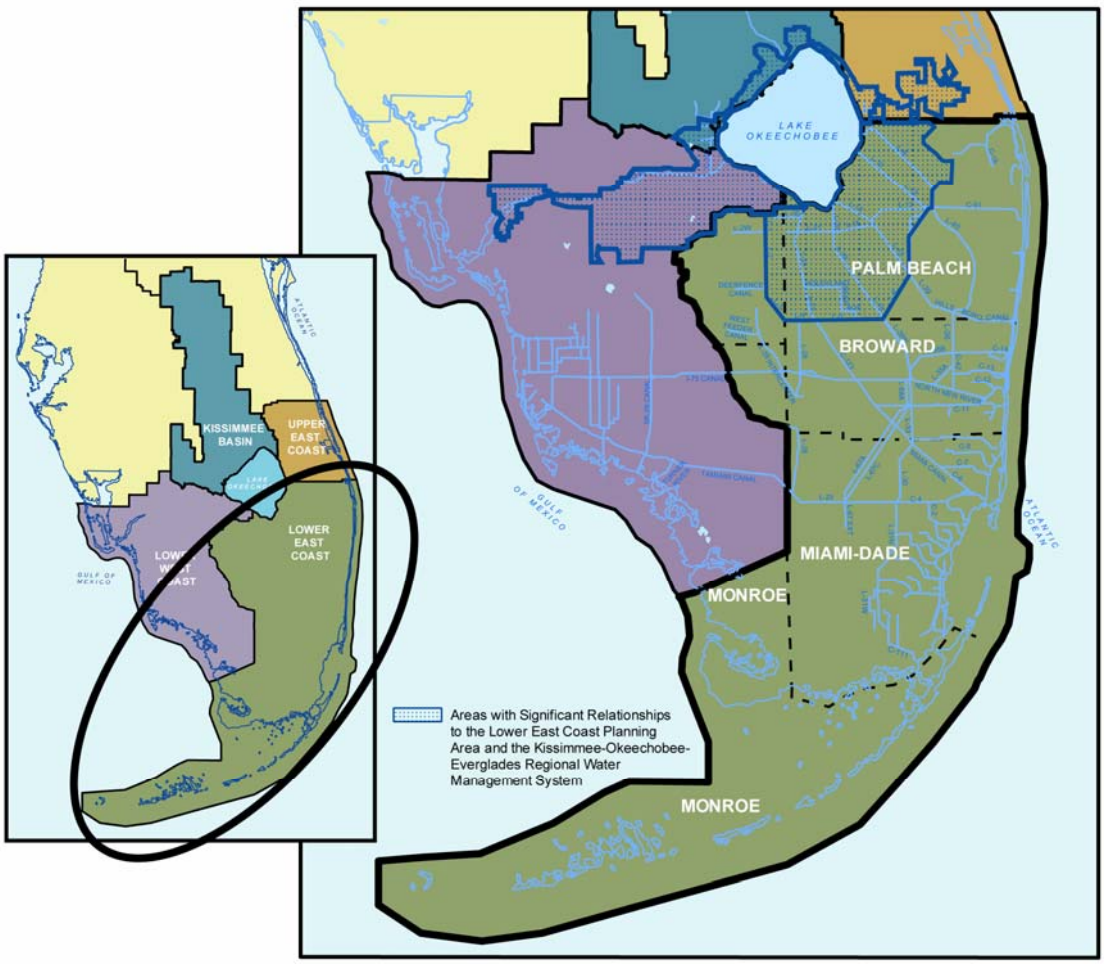


Figure 1. Lower East Coast Water Supply Planning Area.

CHARACTERISTICS OF THE LOWER EAST COAST PLANNING AREA

The LEC Planning Area covers approximately 6,100 square miles and includes essentially all of Miami-Dade, Broward and Palm Beach counties, most of Monroe County, and the eastern portions of Hendry and Collier counties. Additionally, the entire Lake Okeechobee Service Area, which includes portions of four additional counties—Martin, Okeechobee, Glades and Lee—was considered in the water supply planning process because of its reliance on Lake Okeechobee for water supply. Some utilities in the LEC Planning Area provide water to a small population in Martin County, which was included in the Palm Beach County population figures. The following further highlights the LEC Planning Area:

- Population is expected to grow from 5.6 million in 2005 to 7.3 million by 2025. Miami-Dade, Broward and Palm Beach counties are among the state's five most populated counties.
- Increased population will result in a net increase of 393 million gallons per day (MGD) in water demand for all use categories during the next 20 years, all or most to come from alternative sources.
- Agricultural land totals more than one-half million acres, making Agriculture the second-largest use category in the LEC Planning Area.
- World-renowned ecosystems, such as the Everglades, Lake Okeechobee, Florida Bay and Biscayne Bay, are in the LEC Planning Area.
- Traditional water sources include fresh groundwater from the Surficial Aquifer System (SAS) and the Biscayne Aquifer, and surface water, primarily from the Everglades and Lake Okeechobee.
- Alternative water sources include brackish water from the Floridan Aquifer, reclaimed water and excess storm water during the rainy season.

POPULATION IS EXPECTED TO GROW FROM 5.6 MILLION IN 2005 TO 7.3 MILLION BY 2025. MIAMI-DADE, BROWARD AND PALM BEACH COUNTIES ARE AMONG THE STATE'S FIVE MOST POPULATED COUNTIES.

INCREASED POPULATION WILL RESULT IN A NET INCREASE OF 393 MGD IN WATER DEMAND FOR ALL USE CATEGORIES DURING THE NEXT 20 YEARS, ALL OR MOST TO COME FROM ALTERNATIVE SOURCES.

Typical Southeast Florida Urban View

PLANNING PROCESS

1

Planning and Assessment

The process for development of the 2005–2006 LEC Plan Update incorporated extensive public participation, including public workshops, as well as coordination with local governments, adjoining water management districts, and other state and federal agencies. A review of previous planning efforts in the region and documentation of activities since the approval of the 2000 LEC Plan were a key starting point of this process. Planning efforts integrated development of 2025 demand projections, assessment of existing and projected resource conditions, and formulation of strategies to meet urban, agricultural and environmental water needs.

2

Data Collection, Analysis and Issue Identification

Using the 2000 LEC Plan as a foundation, this water supply plan update involved collecting the latest information about water resources, rainfall, natural resources, water demands, water conservation and land use. Analyses, such as groundwater and surface water evaluations, regulatory information, mapping, wetland studies and other related data, confirmed the validity to previously identified issues and helped identify new issues that may have emerged.

3

Evaluation of Water Source Options

The next phase of the planning process consisted of modifying existing solutions or developing new solutions to address the identified issues. In areas where projected demands exceeded available supplies, solutions included the use of alternative water supplies and water conservation. Each water source option was evaluated, and local and regional responsibilities were identified.

4

Water Supply Development

To expedite the Water Protection and Sustainability Program as directed by legislation in 2005, the District requested water users and suppliers to complete project questionnaires identifying water supply projects intended to meet water needs for the next 20 years. This project information was compiled and evaluated by the District, with input from stakeholders, and was used to create a comprehensive set of water supply projects that exceeds 2025 demands (see **Chapter 7**).

ACCOMPLISHMENTS

In preparing the 2000 LEC Plan, the planning process analyses identified key regional issues. Numerous recommendations were developed, and the scope and nature of these recommendations were organized into the following categories in the 2000 LEC Plan:

- Ongoing projects from the *1998 Interim Plan for Lower East Coast Regional Water Supply* (1998 Interim LEC Plan) (SFWMD 1998).
- Other federal, state and District projects.
- Comprehensive Everglades Restoration Plan (CERP) projects.
- Recommendations to the CERP resulting from analysis performed during the Lower East Coast regional water supply planning and development process.
- Recommendations to the CERP from the *Caloosahatchee Water Management Plan* (CWMP) (SFWMD 2000a).
- Operational recommendations resulting from the LEC Planning Area's water supply planning process and analysis.
- Consumptive use permitting (CUP) and resource protection projects.
- Other Water Resource Development and Water Supply projects.

The development of projects in each of these categories had regional, as well as local responsibilities, which the 2000 LEC Plan discussed. The Five-Year Water Resource Development Work Program, contained in the SFWMD's annual *South Florida Environmental Report, Volume II*, Chapter 5, annually summarizes the progress of these recommendations. **Appendix C** of this plan update tracks the progress or completion of the recommendations as originally outlined in the 2000 LEC Plan.

Ongoing Projects from the 1998 Interim Plan

The 2000 LEC Plan continued to address ongoing projects from the 1998 Interim LEC Plan, such as saltwater intrusion monitoring and Floridan Aquifer System (FAS) modeling. Saltwater monitoring will continue to be important to communities with eastern wellfields in the Biscayne Aquifer. The District uses a network of

Installation of Saltwater Monitoring Wells

wells and data loggers in its continuing effort to monitor saltwater intrusion in Palm Beach, Broward and Miami-Dade counties. This information has been valuable in consumptive use permitting (CUP) and during droughts. As alternative sources of water supply are developed to meet increasing demands, the Floridan Aquifer Groundwater Monitoring Program will play an increasingly important role. This effort will reduce data gaps and support modeling efforts that are expected to continue beyond this plan update.

Other ongoing project recommendations for Palm Beach, Broward and Miami-Dade counties included the following:

Recommendations for Palm Beach County included development of a comprehensive water management plan for Northern Palm Beach County, an Aquifer Storage and Recovery (ASR) Feasibility Study and other water storage options. The District accepted the *Northern Palm Beach County Comprehensive Water Management Plan* in May 2002 (SFWMD 2002). The plan recommendations have been incorporated into the CERP. When completed, system improvements will increase water supplies, provide hydrologic improvements to the Loxahatchee Slough, and improve flows to the Northwest Fork of the Loxahatchee River, Loxahatchee Estuary and Lake Worth Lagoon.

Recommendations for Broward County included a Secondary Canals Recharge Network and Urban Environmental Enhancement projects. The Northern Broward County Secondary Canals Recharge Network has resulted in the interconnection of surface water infrastructure to allow increased flexibility in local water management. Through the Urban Environmental Enhancement Program, which received cost-sharing funds from the District, a number of projects to rehydrate remnant wetlands have been completed, including Hillsboro Pinelands, Tradewinds South, Fern Forest Basin I and II, and Tall Cypress.

Recommendations for Miami-Dade County included ASR development, in which wells using untreated water from the Biscayne Aquifer return the water directly to Miami-Dade Water and Sewer Department (WASD) treatment plants. In the 2000 LEC Plan, the WASD proposed to have 35 MGD of ASR capacity available in 2005. The ASRs have been constructed, but additional disinfection has been required by the Florida Department of Environmental Protection (FDEP) before full-scale operation can begin.

Other Federal, State and South Florida Water Management District Projects

This category in the 2000 LEC Plan included recommendations for projects sponsored by the federal government, state government or District. Among them were Critical Restoration projects, which included the West Canal Structure (C-4), Western C-11 Water Quality Treatment and Lake Okeechobee Water

Retention/Phosphorus Removal projects. The West Canal Structure, Western C-11 Water Quality Treatment Project, and Critical Project Pilot stormwater treatment areas (STAs) at Nubbin Slough and Taylor Creek have been completed. A Nubbin Slough element is one of the five fast-track construction projects in the Lake Okeechobee & Estuary Recovery (LOER) Plan. This 1,600-acre constructed wetland, to be completed by December 2007, is expected to prevent more than 20 metric tons of phosphorus per year from entering Lake Okeechobee. The Lake Okeechobee Fast Track (LOFT) projects are being constructed as part of the District's Acceler8 initiative.

Lake Okeechobee

Within the SFWMD, agricultural irrigation and landscape irrigation are major water use categories. Therefore, the 2000 LEC Plan encouraged the continued use and expansion of the District's Mobile Irrigation Laboratory (MIL) Program as a cost-efficient means to promote water conservation. These efforts are now part of the Comprehensive Water Conservation Program. In the LEC Planning Area, there are four urban labs and three agricultural labs. Four of these seven MILs are District funded. In Fiscal Years 2004 and 2005, evaluations by agricultural and urban MILs in the LEC Planning Area generated a potential water savings of 0.59 MGD.

Comprehensive Everglades Restoration Plan Projects and Recommendations

The 2000 LEC Plan assumed that the CERP projects influencing water supply and restoring the natural systems in the region would be constructed according to the original 1999 schedule. These schedules have been revised, and the District has undertaken Acceler8 projects to ensure that a series of key projects will be built without additional delay. Issues related to the CERP schedules, as well as Lake Okeechobee, have created significant uncertainty about the availability of water from the regional system for additional urban water supply.

Operational Recommendations Resulting from the Planning Process and Analysis

As a result of the planning process and analysis for the 2000 LEC Plan, recommendations were made to improve systemwide operational protocols. As a result, the District adopted *Adaptive Protocols for Lake Okeechobee Operations* (SFWMD *et al.* 2003) for the management of Lake Okeechobee, which allows for the delivery of fresh water to the Caloosahatchee and St. Lucie estuaries during dry conditions when the Lake Okeechobee regulation schedule would otherwise not provide such releases. The District has also moved forward to update the drought management plan for Lake Okeechobee, formerly known as the Supply-Side Management Plan. That effort is still under way and is now known as the Lake Okeechobee Water Shortage Management Plan.

Consumptive Use Permitting and Resource Protection Projects

In this category, the 2000 LEC Plan recommended several projects regarding CUP and Resource Protection projects, and the resulting action includes several milestones. These included establishment of MFLs for critical water bodies, as well as rulemaking for CUP criteria, including the so-called B-List rules, which have had a major impact on the LEC Planning Area. One key rule change designated the regional water management system as a source of limited availability (SFWMD 2003).

Other Water Resource and Water Supply Development Projects

This category included recommendations for other Water Resource Development projects, such as feasibility studies for seawater reverse osmosis (RO); a reclaimed water regional conveyance system master plan for northern Palm Beach and southern Martin counties; a Water Savings Incentive Program (WaterSIP); and, District water conservation funding programs to create additional water. These ongoing efforts are discussed in greater detail in **Appendix C**.

WATER SUPPLY PLANNING FOR THE NEXT 20 YEARS

To determine the water supply needs of the LEC 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.

Urban Development in the LEC Planning Area

This 2005–2006 LEC Plan Update projects a 31 percent increase in population in the Lower East Coast (LEC) Planning Area between 2005 and 2025, growing from 5.6 million to 7.3 million. Within the LEC Planning Area, traditional fresh groundwater and surface water are becoming increasingly limited to satisfy the region's water demands, resulting in the need to develop alternative water sources.

2

Demand Estimates and Projections

The water demands presented in this chapter include both the demands of the water users or customers and the withdrawal demands. The user/customer demands directly meet the water needs of the users. The water withdrawal demands reflect the amount of water that must be withdrawn from all sources to meet the user/customer demands. The withdrawal demands reflect the proposed selection of sources, treatment processes, storage options and reuse of reclaimed water that result from the projects identified in **Chapter 7**. Additional information about demand estimates can be found in **Appendix D**.

The planning period for this *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) is 2005 to 2025. Extensive baseline information was collected for 2000, including population, land use, cropping and irrigation systems, historical water use, climatic conditions, etc. This information was used to develop water use factors, such as per capita finished water demands by utility, which were then used along with projected variables, such as population, to develop the future water demands. Some data, such as population by county, were updated through 2005 since these estimates have recently become available.

DISTRICT

User/Customer Demand or **Net 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.

Withdrawal Demand or **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.

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**.

This chapter provides an overall perspective of the user/customer and water withdrawal demands and associated growth from 2005 to 2025. The water demand projections summarized in this chapter are presented in terms of average weather conditions. **Appendix D** provides demand projections for 1-in-10 year drought conditions. It also provides additional information about water demand within each use category. In the case of agriculture, acreage and demands by crop type are included, and in the case of public water supplies, population and demands by utility are provided. Although not quantified in this chapter, environmental demands are addressed during the water supply planning process using resource protection criteria.

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.

DEMANDS BY WATER USE CATEGORY

Water demand estimates for 2000 and projections through 2025 in five-year increments were made for each of the six water supply categories (defined to the right). Key results in terms of water withdrawals (see **Figure 3**) specific to the Lower East Coast (LEC) Planning Area for the planning period of 2005 to 2025 include:

- Regionwide, Public Water Supply withdrawal demands (raw water) are expected to increase by 375 million gallons per day (MGD) or 41 percent by 2025 to 1,286 MGD, at which time this water supply category will represent approximately 57 percent of the region's total water demands.
- Agricultural water withdrawal demands (gross demands) are projected to modestly decline from 762 MGD in 2005 to 689 MGD, or about 10 percent, by 2025. Nevertheless, Agriculture will remain the second-largest use category in the LEC Planning Area.
- Thermoelectric Power Generation Self-Supply is a rapidly growing water use category. Future customer demand projections reflect the 103 MGD required to serve new power generation facilities planned by Florida Power & Light (FPL). During the 20-year planning period, water withdrawal demands will increase from 4.5 MGD to 103 MGD.
- The remaining water use categories—Domestic Self-Supply, Commercial and Industrial, Recreational and Landscape—will also experience increased water withdrawal demands, reaching a total of 195 MGD by 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.

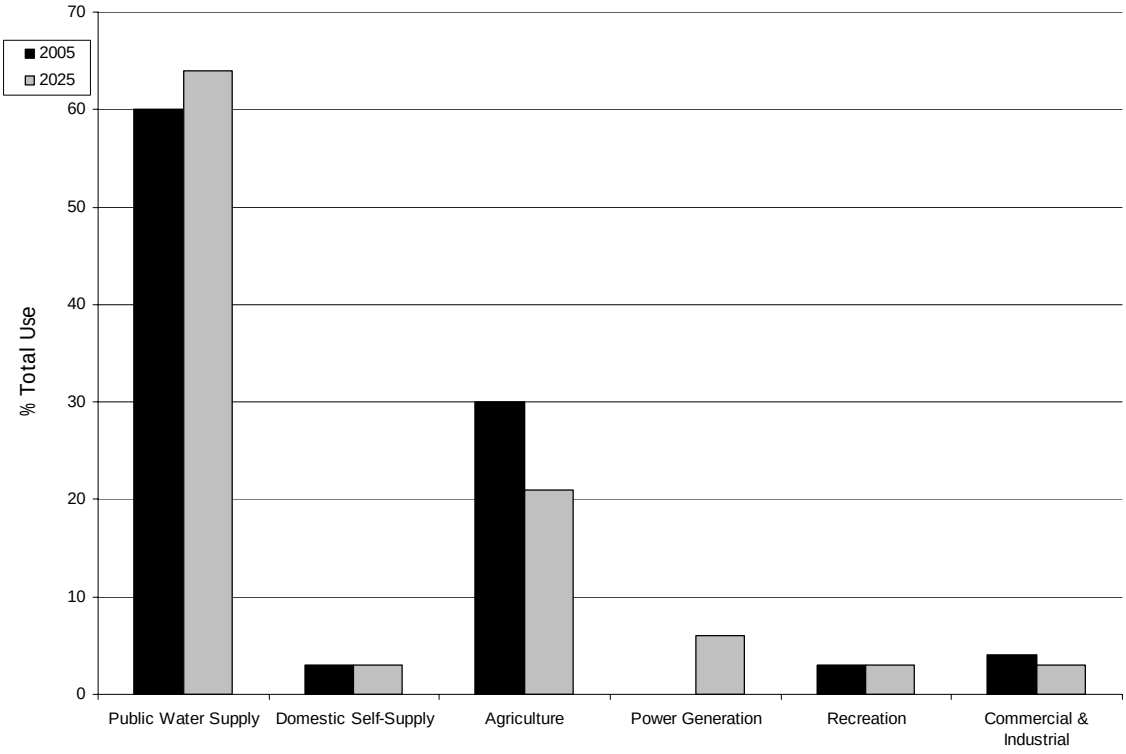
Commercial and Industrial water uses are business operations using a minimum water quantity of 100,000 GPD.

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.

REGIONWIDE, PUBLIC WATER SUPPLY WITHDRAWAL DEMANDS ARE EXPECTED TO INCREASE BY 375 MGD… TO 1,286 MGD BY 2025, …REPRESENTING ABOUT 57 PERCENT OF THE REGION'S TOTAL WATER DEMANDS.

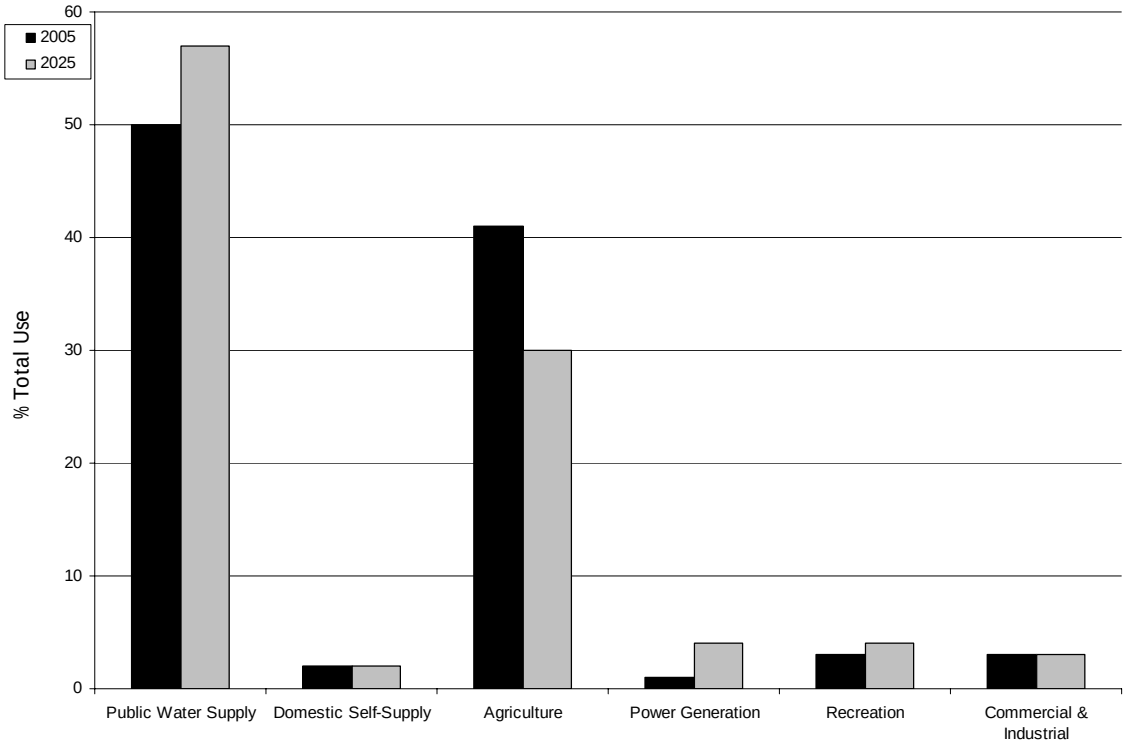
Providing for these increased demands requires a commitment to a coordinated water planning effort. **Figure 2** shows the user/customer water or net demands by use category.



	Public Water Supply	Domestic Self-Supply	Agriculture	Power Generation	Recreation	Commercial & Industrial	Total
Estimated 2005 MGD	869.0	36.6	429.7	4.5	48.6	61.3	1,449.7
Projected 2025 MGD	1,173.6	48.9	393.0	102.6	63.6	61.3	1,843.0
% Total Use 2005	60%	3%	30%	0%	3%	4%	100%
% Total Use 2025	64%	3%	21%	6%	3%	3%	100%
% Change MGD	35%	34%	-9%	2,180%	31%	0%	27%

Figure 2. User/Customer (Finished Water) Demands – Water Categories as a Percentage of Total Demand in Bar Chart and Average Year Demands and Percentage of Growth in Tabular Chart.

Figure 3 shows the associated withdrawal demands as developed in **Appendix D**. The withdrawal demands are comparable to the demand estimates presented in previous LEC Planning Area water supply plans. The water withdrawal demands differ from the user/customer demands for Public Water Supply, Recreational Self-Supply and Agricultural uses. The differences are caused by inefficiencies in delivery or treatments that prevent all the water being withdrawn from being available to meet the user/customer demands.



	Public Water Supply[a]	Domestic Self-Supply	Agriculture	Power Generation	Recreation	Commercial & Industrial	Total
Estimated 2005 MGD	911.8	36.6	761.7	4.5	64.7	61.3	1,840.6
Projected 2025 MGD	1,286.5	48.9	689.1	102.6	84.8	61.3	2,273.2
% Total Use 2005	50%	2%	41%	1%	3%	3%	100%
% Total Use 2025	57%	2%	30%	4%	4%	3%	100%
% Change MGD	41%	34%	-10%	2,180%	31%	0%	24%

Figure 3. Water Withdrawal (Raw or Gross) Demands – 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

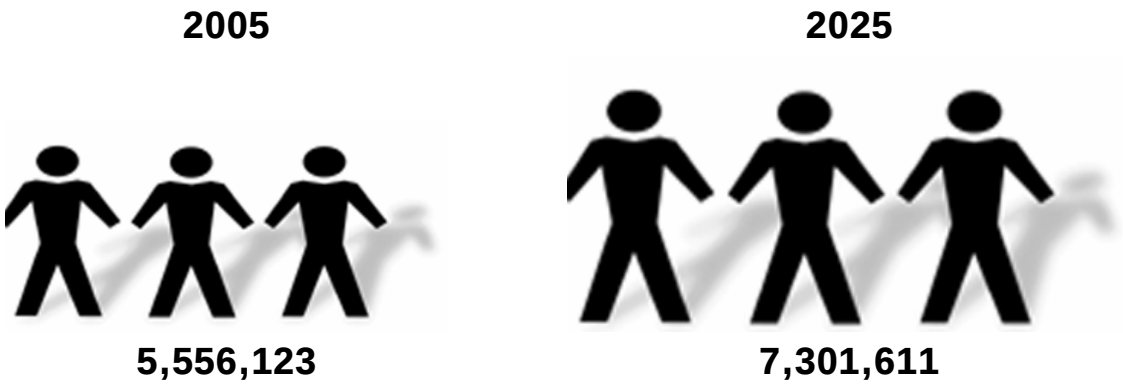
The region's population is expected to increase by 31 percent from 2005 to 2025, with Palm Beach, Broward and Miami-Dade counties experiencing the greatest growth. **Table 1** provides a summary of the population estimates for the counties or portions of counties located in the LEC Planning Area. In Palm Beach County, utilities in the cities of Jupiter and Tequesta also serve a small population in Martin County, which is included in Palm Beach County's total population. The distribution of population estimates to individual utilities is based on historical data and

projected distributions of population to traffic analysis zones (TAZ) and then to utility service areas. **Figure 2** provides a summary of the projected water demands under average year conditions for 2005 and 2025 for all water use categories.

Table 1. Population in the LEC Planning Area, 2005–2025.

	2005			2025		
County Area	Public Water Supply	Domestic Self-Supply	Total[a] Population	Public Water Supply	Domestic Self-Supply	Total Projected Population
Broward	1,763,613	4,281	1,767,894	2,334,643	6,151	2,340,794
Hendry (LEC portion)	0	1,279	1,279	0	1,279	1,279
Miami-Dade	2,392,533	31,966	2,424,499	3,015,089	51,661	3,066,750
Monroe (LEC portion)	82,413	0	82,413	88,600	0	88,600
Palm Beach[b]	1,148,974	131,064	1,280,038	1,631,571	172,617	1,804,188
Total	5,387,533	168,590	5,556,123	7,069,903	231,708	7,301,611

a. Source: U.S. Bureau of the Census, 2001, University of Florida Bureau of Economic and Business Research, 2006.
b. Includes population in Martin County served by Jupiter and Tequesta utilities.



THE REGION'S POPULATION IS EXPECTED TO INCREASE BY 31 PERCENT FROM 2005 TO 2025, WITH PALM BEACH, BROWARD AND MIAMI-DADE COUNTIES EXPERIENCING THE GREATEST GROWTH.

Public Water Supply and Domestic Self-Supply

The LEC Planning Area includes all of Miami-Dade, Broward and Palm Beach counties, most of urban Monroe County, and the eastern portion of Hendry County. Miami-Dade, Broward and Palm Beach counties are among the state's five most populated counties. Public Water Supply customer demands grow significantly through the projection period, primarily due to the expected increase in population served by public water supply utilities, which is expected to grow from 5.4 million in 2005 to 7.1 million in 2025. Domestic Self-Supply population, which is much smaller, is also expected to grow during the next 20 years, resulting in increased demand in this use category. Together, Public Water Supply and Domestic Self-Supply represent two-thirds of the LEC Planning Area's total user/customer (finished water) demands and 59 percent of the total water withdrawal (raw water) demands by 2025.

LEC Urban Development

The permanent resident populations used in this plan update are consistent with the 2000 Census of population and closely track the medium county population estimates and projections from the University of Florida, Bureau of Economic and Business Research (BEBR 2006). The distribution of the population to utilities within each county is subject to considerable uncertainty. There are, for instance, many recent development proposals throughout the LEC Planning Area that could significantly change growth patterns within the area.

Water conservation measures were not factored into the demand projections used in this chapter. Rather, water conservation is considered a water source option and discussed in **Chapter 5**.

TOGETHER, PUBLIC WATER SUPPLY AND DOMESTIC SELF-SUPPLY REPRESENT TWO-THIRDS OF THE LEC PLANNING AREA'S TOTAL USER/CUSTOMER (FINISHED WATER) DEMANDS BY 2025.

Agricultural Water Use

Agricultural / Urban Land Use

Agricultural acreage in the LEC Planning Area is expected to decline by almost 10 percent between 2005 and 2025. Declines in irrigated agricultural acreage will primarily be due to increased demand for land for urban development and environmental restoration.

Agricultural water demand reflects projected irrigated acreage, crop and soil types, growing seasons, irrigation system types, and irrigation strategies. The Agricultural land use projections reflect the land use projections incorporated into the South Florida Water Management District's (SFWMD or District) planning and hydrologic modeling efforts, especially the South Florida Water Management Model (SFWMM).

Agricultural Self-Supply demand calculations for this 2005–2006 LEC Plan Update were made using the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model. This is a change from the *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan), which used a modified Blaney-Criddle Model to estimate supplemental requirements for irrigation. Use of the Blaney-Criddle Model generally results in a higher per acre irrigation estimate than the AFSIRS Model. This chapter presents the net irrigation demands for Agriculture because the net demands estimate the amount of water farmers need to place into the root zone of crops. Gross irrigation requirements reflect the efficiency of delivery of that water and may be affected by the alternative projects if proposed in the future. Both net and gross irrigation demands by crop type are presented in **Appendix D**.

Thermoelectric Power Generation Self-Supply

The need for additional power supplies is expected to grow as the population in the LEC Planning Area and other portions of south Florida grows. In addition, the major power supplier, Florida Power & Light (FPL), expects that much of the additional generating capacity to be installed will use fresh or brackish water sources and cooling tower technology as a heat rejection method. To date, most of the generating capacity has used flow-through cooling, and much of this has been ocean water, the use of which is not covered by the water supply plans.

Florida Power & Light's West County Energy Center proposal to add two new, natural gas-fired combined cycle electric generating units of approximately 1,200 megawatts each exemplifies the kind of facilities expected to be constructed during

the planning period. The power plant, to be located on a 220-acre site in western Palm Beach County, is undergoing site certification.

As shown in **Figure 2** and **Figure 3**, power generation water use and withdrawal demand are both expected to increase to 103 MGD by 2025. These estimates represent the water needed to support power generating capacity proposed to be located in the LEC Planning Area.

Recreational Self-Supply

Recreational Self-Supply demand is projected to exceed 63 MGD by 2025, a 31 percent increase over the 2005 estimated use of 49 MGD. Recreational Self-Supply water use projections primarily include water demands for golf course irrigation. Acreage for this use category was identified as part of the overall land use analysis supporting the District's hydrologic modeling and planning efforts. Landscape irrigation demand projections are included in this Recreational category.

Pompano Golf Reuse – Greener Greens

Commercial and Industrial Self-Supply

Demands for Commercial and Industrial Self-Supply are based on 2000 demands developed and reported by the U.S. Geological Survey (USGS). The estimates do not include users that have an overwhelming percentage of localized return flow to the same source, such as construction and mining dewatering. Because this demand category is small and historical data fail to support any trends in use, the levels are held constant through the projection period.

DEMAND PROJECTIONS IN PERSPECTIVE

The demand projections presented in this *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) are based on the best information available at this time. However, these projections reflect trends, circumstances and industry intentions that change over time. For example, this plan update expects much greater Thermoelectric Self-Supply demands than the 2000 LEC Plan anticipated. In addition, this plan update expects higher growth in Broward and Palm Beach counties and lower growth in Miami-Dade County than the 2000 LEC Plan anticipated. The growth is large enough that accommodating this population will require infill and redevelopment of existing urban areas, as well as expansion of the urbanized area. Where this new development will occur and how it will affect neighboring communities are important, but as yet unsettled issues for growth management and water concurrency.

In summary, the major driving force behind the significant growth in water demands reflected in this 2005–2006 LEC Plan Update is the region's anticipated population growth of about 1.7 million residents for the 20-year period from 2005 to 2025.

THE MAJOR DRIVING FORCE BEHIND THE SIGNIFICANT GROWTH IN WATER DEMANDS REFLECTED IN THIS 2005–2006 LEC PLAN UPDATE IS THE REGION'S ANTICIPATED POPULATION GROWTH OF ABOUT 1.7 MILLION RESIDENTS FOR THE 20-YEAR PERIOD FROM 2005 TO 2025.

3

Water Resource Analysis

The regional water supply plans provide strategies designed to identify adequate water availability to meet the future urban, agricultural and natural systems demands for at least a 20-year planning horizon. This water supply for the future must be sufficient to meet these needs during a 1-in-10 year drought event.

This chapter describes the water resources available in the Lower East Coast (LEC) Planning Area and the relationships of the ecosystems to these resources. The related programs and activities intended to sustain and restore the natural systems and to meet the consumptive use demands are integral to this relationship.

Many of the programs and activities described in this chapter occurred or were modified following the approval of the existing *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan). Such changes and information gained since 2000 have affected key assumptions concerning water availability for consumptive use in this *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update).

OVERVIEW OF WATER RESOURCES

Water for urban and agricultural uses in the LEC Planning Area comes from groundwater and surface water. Groundwater sources include the Biscayne Aquifer, the Surficial Aquifer System (SAS) and the Floridan Aquifer System (FAS). Lake Okeechobee, the Water Conservation Areas (WCAs), rivers and an extensive network of canals are the principal sources of surface water and provide recharge for the groundwater.

Other important ecosystems in the region do not provide water for consumptive uses, but are dependent on adequate freshwater resources to maintain healthy communities of flora and fauna. These ecosystems include Florida and Biscayne bays, the Northwest Fork of the Loxahatchee River, and the St. Lucie and Caloosahatchee estuaries. Actions taken to protect the water supplies for these natural systems, and to implement restoration strategies, are an important influence on water availability in the LEC Planning Area.

Surface Water

The water resources of the Lower East Coast region are integrally interconnected as part of the Kissimmee – Okeechobee – Everglades ecosystem (**Figure 4**). Historically, water flowed from the Kissimmee Chain of Lakes into the Kissimmee River and then into Lake Okeechobee. The lake in turn would overflow as a large sheet flow across the Everglades and into Florida Bay. As discussed in Chapter 1 of the *2005–2006 Consolidated Water Supply Plan Support Document* (SFWMD 2007), a series of efforts have been undertaken for more than a century to manage the system.

Authorized by Congress in 1948, the Central and Southern Florida Flood Control Project (C&SF Project) is a multipurpose project that provides flood control; water supply for municipal, industrial and agricultural uses; prevention of saltwater intrusion; water supply for Everglades National Park; and, protection of fish and wildlife resources. The primary system covers the Kissimmee – Okeechobee – Everglades system and includes about 1,000 miles of levees, 720 miles of canals, and almost 200 water control structures.

Lake Okeechobee

Lake Okeechobee is the heart of the C&SF Project and a key water storage feature with multiple functions, including flood protection, urban and agricultural water supply, navigation, and fisheries and wildlife habitat. A complex system of water control structures and locks regulates Lake Okeechobee's water levels. The lake is also managed under certain conditions to provide water to other ecosystems, such as the Caloosahatchee Estuary, to help maintain environmentally friendly salinity levels. The primary tool for managing the lake's levels is the Water Supply and Environmental (WSE) Regulation Schedule, in effect since its approval in July 2000.

The C&SF Project links Lake Okeechobee and the Everglades with the agricultural and urban areas, and with other major ecosystems. The ability of water managers to store and move freshwater supplies from Lake Okeechobee and the Everglades into coastal canals to recharge the aquifer during dry times has been critical in meeting the needs of 5.6 million people in highly urbanized coastal counties. Access to supplemental water from Lake Okeechobee to farming operations in the Lake Okeechobee Service Area allowed for the development of an expansive agricultural industry that includes sugarcane, citrus, vegetables and cattle.

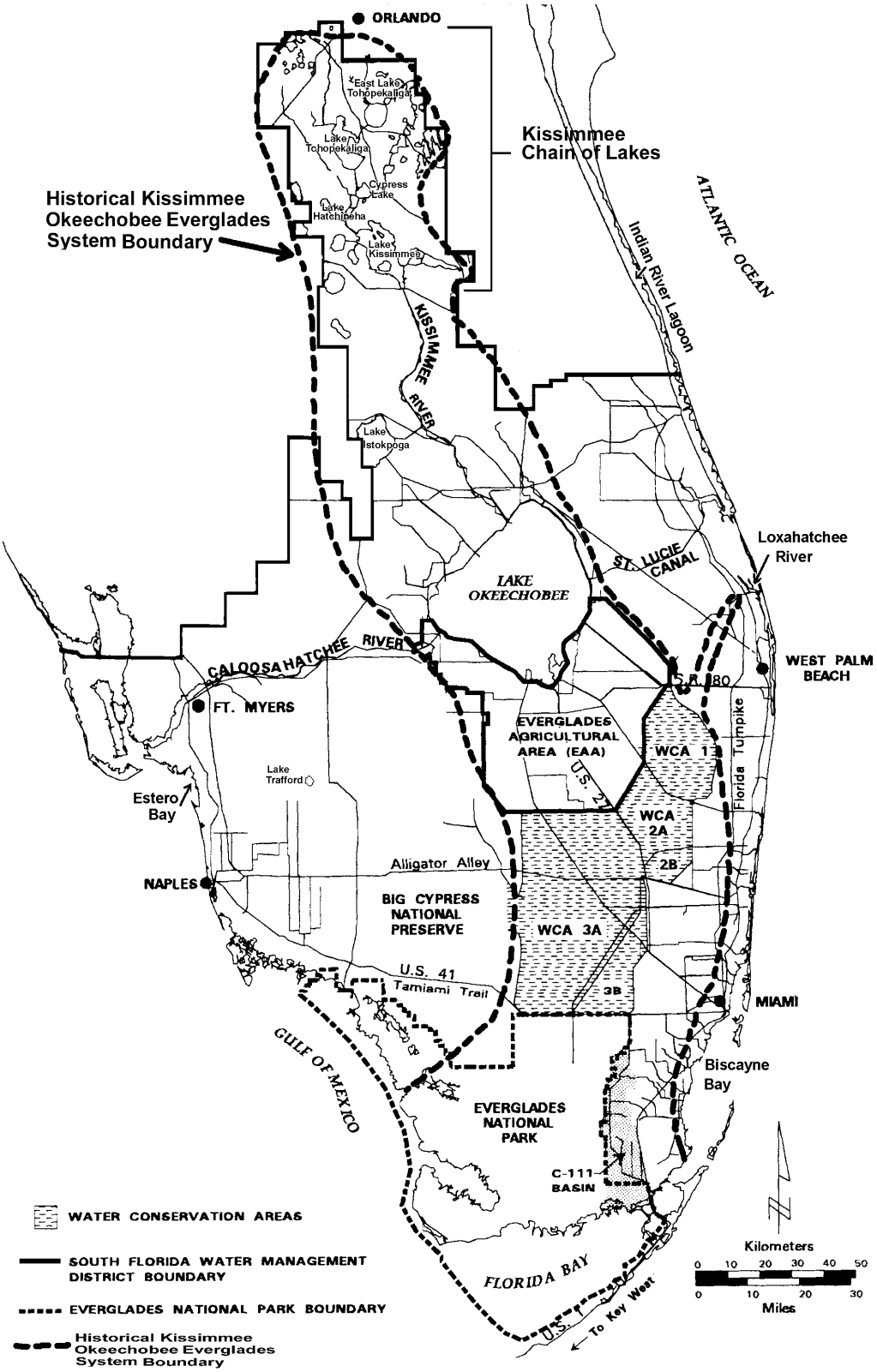


Figure 4. Kissimmee – Lake Okeechobee – Everglades Ecosystem.

As a result of the C&SF Project, the remaining Everglades south of Lake Okeechobee and north of U.S. 41 in Palm Beach, Broward and Miami-Dade counties were divided into three hydrologic units known as the Water Conservation Areas. The WCAs are shallow, diked marshes maintained for flood control, environmental restoration and water supply to the Lower East Coast region and comprise about 1,350 square miles.

The WCAs serve as the first source of supplemental water to the coastal canals. Moving water east into the canal system helps recharge the Biscayne Aquifer and provides higher stages to help retard saltwater intrusion into the aquifer during the dry season. On average, approximately 550 million gallons per day (MGD) is sent to the Lower East Coast region canals from the Everglades ecosystem to recharge the coastal aquifers in the dry season.

ON AVERAGE, APPROXIMATELY 550 MGD IS SENT TO THE LOWER EAST COAST REGION CANALS FROM THE EVERGLADES ECOSYSTEM TO RECHARGE THE COASTAL AQUIFERS IN THE DRY SEASON.

Surficial and Biscayne Aquifers

The Surficial and Biscayne aquifers provide most of the fresh water for public water supply and other urban uses within the LEC Planning Area. Although the Biscayne Aquifer is part of the Surficial Aquifer System (SAS), it exists only along the coastal areas in Miami-Dade, Broward and southern Palm Beach counties. The Biscayne Aquifer is highly productive with high-quality fresh water. The extension of the SAS through central and northern Palm Beach County is less productive, but is still used for consumptive uses, including potable water. These aquifers are shallow, generally located within 200 feet of ground surface, and are connected to surface water systems, including canals, lakes and wetlands.

The Biscayne Aquifer and the extension of the SAS into northern Palm Beach County provide more than 1 billion gallons per day of high-quality, inexpensive fresh water for the populations of Palm Beach, Broward and Miami-Dade counties and the Florida Keys portion of Monroe County. This volume is heavily supported, especially during the annual dry season, as well as in periodic droughts, by water from the regional system, primarily the Everglades. During droughts, water from Lake Okeechobee has been required to supplement water from the Everglades to meet the needs of the coastal counties.

The Biscayne Aquifer is designated as a sole source aquifer by the U.S. Environmental Protection Agency (USEPA) under the *Safe Drinking Water Act* because it is a principal source of drinking water and is highly susceptible to contamination due to its high permeability and proximity to land surface in many locations. Protection of the Biscayne Aquifer is provided for through the District's

Basis of Review for Water Use Permit Applications (SFWMD 2003) and in Chapter 373, Florida Statutes (F.S.), which limit the water availability for consumptive uses.

Floridan Aquifer

The Floridan Aquifer System (FAS) is one of the most productive aquifers in the world and a multiuse aquifer system. North of Lake Okeechobee, where it contains fresh water, the Floridan Aquifer is the principal source of water supply.

The FAS exists not just in the LEC Planning Area, but throughout the entire state and portions of adjacent states. The Upper Floridan Aquifer in southeast Florida contains brackish water and is increasingly being tapped as a source of raw water for treatment with reverse osmosis (RO) to create potable water. Brackish water from the Floridan Aquifer is also blended with fresh water prior to conventional water treatment to expand water supplies during the dry season. Additionally, the Floridan Aquifer is used for seasonal storage of treated fresh water within aquifer storage and recovery (ASR) systems. The Floridan Aquifer has been more extensively developed in the Upper East Coast (UEC) and Lower West Coast (LWC) planning areas of the South Florida Water Management District (SFWMD or District) than in the LEC Planning Area.

From Jupiter to southern Miami, water from the FAS is highly mineralized and not suitable for drinking water without specialized treatment. More than 600 feet of low permeability sediments confine this aquifer and create artesian conditions in the LEC Planning Area. Although the potentiometric surface of the aquifer is above land surface, the low permeability units of the intermediate confining unit prevent significant upward migration of saline waters into the shallower freshwater aquifers. The top of the Upper Floridan Aquifer is approximately 900 feet in southeast Florida, and the base of the Upper Floridan extends as deep as 1,500 feet. At the base of the Lower Floridan Aquifer, there are cavernous zones with extremely high transmissivities collectively known as the boulder zone. Because of their depth and high salinity, these deeper zones of the Lower Floridan Aquifer are used primarily for disposal of treated wastewater.

The hydraulic properties (i.e., ability to yield water to wells) and water quality may vary greatly within even localized areas of the individual aquifers and affect their water supply potential. Chapter 9 of the *2005–2006 Consolidated Water Supply Plan Support Document* (SFWMD 2007) provides additional information about the aquifer systems, hydrogeologic units and typical aquifer yields in this region. **Figure 5** depicts the generalized geologic cross-section of the LEC Planning Area.

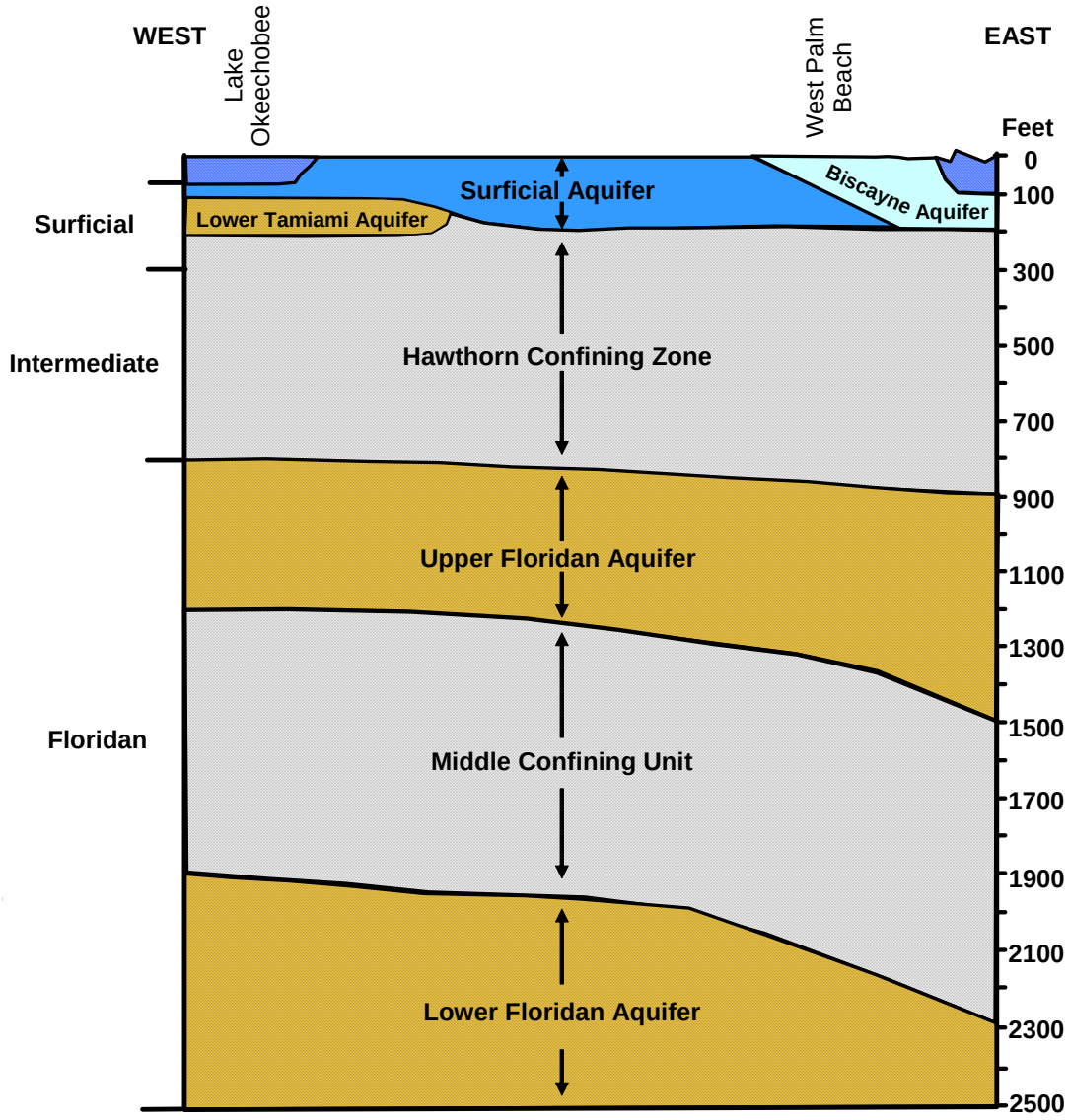


Figure 5. Generalized Geologic Cross-section of the LEC Planning Area.

OTHER SOURCES

Other sources of water, particularly high-quality reclaimed water and captured storm water, are available to meet the future needs of the LEC Planning Area. Both of these alternative sources offer the potential to offset demand on the regional system for environmental restoration and public water supplies. Additional information about these source options is discussed in **Chapter 5**.

Reclaimed Water

Throughout the SFWMD, the use of reclaimed water is an important component in water supply planning in terms of managing water resources and wastewater effluent. Reclaimed water is water that has received at least secondary treatment and basic disinfection, and is reused after flowing out of a domestic wastewater facility. In 2005, the Kissimmee Basin (KB) Planning Area reused 100 percent of its wastewater flows, the LWC Planning Area reused 90 percent and the UEC Planning Area reused 48 percent. In comparison, the LEC Planning Area reused only 11 percent of its wastewater flows (FDEP 2006). Only Palm Beach County has adopted a mandatory reuse ordinance that requires all new development in the area defined in the ordinance to use reclaimed water for irrigation.

Reclaimed Water Facility

In southeast Florida, reclaimed water has primarily been used for nonpotable purposes, such as landscape irrigation (e.g., residential lots and golf courses). In other parts of the country, reclaimed water is used for surface water and groundwater recharge, agricultural irrigation, industrial uses, environmental enhancement, and fire protection. In the LEC Planning Area, highly treated reclaimed water offers an excellent opportunity to recharge and augment available water supplies and enhance natural systems. Reclaimed water is available in abundance during the dry season without the need for expensive storage facilities.

The Florida Legislature recognized that this form of reuse could potentially provide substantial benefit. In 2004, the Florida Department of Environmental Protection (FDEP) was directed, in consultation with the SFWMD, to conduct a study to investigate the feasibility of discharging highly treated reclaimed water into canals and the aquifer system as an environmentally acceptable means of augmenting groundwater supplies and enhancing natural systems in the LEC Planning Area. The treatment of highly treated reclaimed water is equal to or greater than the treatment of advanced wastewater treatment, which refers to the addition of filtration and high-level disinfection to a secondary treatment facility.

On February 1, 2007, the FDEP provided public notice that it had completed a preliminary final draft document, entitled *Canal Recharge: A Report to the Governor and Legislature*, dated December 2006, which is available for review (FDEP 2006a).

Captured Storm Water

Storm water also offers the potential to recharge canals and aquifers in the LEC Planning Area by capturing and storing surface water during wet-weather flows to provide supplemental water supplies. In the LEC Planning Area, several utilities are investigating projects that would use captured storm water for groundwater recharge.

Local and regional reservoirs can be used to collect recycled irrigation water from agricultural operations or local stormwater runoff; provide stormwater attenuation; provide water quality treatment in conjunction with stormwater treatment areas; and, store seasonally available supplies for use during dry times. Stormwater reservoirs could also be located with ASR facilities and provide a water source for the facility.

In-ground reservoirs and aboveground impoundments are being constructed as part of the District's Acceler8 initiative to improve stormwater quality, reduce the potential for saltwater intrusion and reduce wetland drawdowns. Additional information about these Acceler8 projects is available in **Chapter 6**.

Significant volumes of storm water flow to tide every year from the drainage systems in Palm Beach, Broward and Miami-Dade counties. Currently, an annual average of 2.9 million acre-feet of water flows to tide from the tri-county area. This amount could be reduced by approximately one-third by Everglades restoration storage projects. A portion of the remaining flows is needed to support coastal ecosystems, especially the Northwest Fork of the Loxahatchee River and Biscayne Bay. However, large volumes of storm water will still be available for capture, especially in Broward and Palm Beach counties. A major limiting factor for capturing storm water is the availability and cost of land for storage facilities.

CHANGES ANTICIPATED IN THE MANAGEMENT OF THE LEC REGIONAL SYSTEM IN THE 2000 PLAN

As mentioned previously, the C&SF Project plays a key role in providing the water for urban and agricultural uses. This federal water control project was authorized in the late 1940s and constructed by the U.S. Army Corps of Engineers (USACE). The SFWMD is the local sponsor for the projects and plays a vital role in the operation and maintenance of the system. In 1992, Congress authorized a Comprehensive Review Study (Restudy) of the C&SF Project. The purpose of the Restudy was to develop modifications to the C&SF Project to restore South Florida's ecosystems, while providing continuation of other project benefits, including flood control and water supply. In 1999, the USACE and the SFWMD completed a plan to modify

the C&SF Project, which is known as the Comprehensive Everglades Restoration Plan (CERP) (USACE and SFWMD 1999).

The CERP was designed to restore and preserve south Florida's natural environment, enhance water supplies and maintain flood protection in the Everglades. The CERP included 68 projects, which modified existing features and added new facilities to the existing C&SF Project, creating additional storage and water quality treatment. In addition to improving the quantity, quality, timing and distribution of water needed to restore the Everglades, the CERP projects appear to create additional water for consumptive use. Design and construction of the CERP projects were to occur over a 30-year horizon.

Prior to the authorization of the CERP, structural modifications and additions to the existing C&SF Project were authorized for the restoration of several portions of the Everglades ecosystem. In effect, these projects form the foundation of the CERP.

Key among these foundation projects is the Modified Water Deliveries to Everglades National Park Project (ModWaters), which will establish more natural flows to Everglades National Park and contribute much of the early increases in sheet flow. ModWaters and other Foundation projects include the federally authorized Kissimmee River Restoration Project; modifications to the C-111 Project; the Critical Restoration projects; the C-51/STA-1E Project; and, the State of Florida's Everglades Construction Project.

C-111 Spreader Canal

The 2000 LEC Plan concluded that additional water anticipated from the CERP projects would allow significant reliance on the Biscayne Aquifer to continue through 2020. The plan also concluded that water to meet agricultural demands in the Lake Okeechobee Service Area could be met with an adjustment to water shortage rules for Lake Okeechobee.

In the 2000 LEC Plan, the resource evaluation for Lake Okeechobee was based on an assumption that the lake would continue to be managed under the WSE Regulation Schedule, which had just been developed to improve lake operations.

CHANGES SINCE THE 2000 LEC PLAN

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.

Rule 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.

Since approval of the 2000 LEC Plan, a number of significant events have occurred to implement the plan. Seven minimum flows and levels (MFLs) recommended in the plan have been adopted. The CERP was authorized by Congress and a series of initiatives concerning Lake Okeechobee have been undertaken. These actions are summarized in this section, which concludes with a discussion of each of the water bodies and the factors influencing water availability in the LEC Planning Area.

Establishing MFLs identified in the 2000 LEC Plan represents a major milestone since 2000 and has had significant impact on the water available to coastal utilities.

If the MFLs established for priority surface water bodies and aquifers cannot be achieved under existing conditions or may not be achieved in the future, recovery or prevention strategies for those water bodies and resources must be developed. As directed by state law, the District annually adopts a priority list for the adoption of MFLs for specific water bodies. The establishment of a MFL for three key tributaries of the Northwest Fork of the Loxahatchee River is scheduled for completion in 2007 and a MFL for Biscayne Bay – South is slated for completion in 2008. The schedule for development of MFLs is presented in **Chapter 6**.

The District established MFLs, pursuant to Rule 40E-8.011(2), Florida Administrative Code (F.A.C.), for seven ecosystems, including the Biscayne Aquifer, the Everglades, the Northwest Fork of the Loxahatchee River, the Caloosahatchee River and Estuary, the St. Lucie Estuary, and Florida Bay. Recovery plans were established for three of the water bodies, while prevention strategies were adopted for the remaining four. The recovery plans developed for the Everglades, the Northwest Fork of the Loxahatchee River, and Caloosahatchee River and Estuary protect these natural systems from further degradation. Water availability for new consumptive uses has been limited where additional withdrawals would be in conflict with the recovery plan. **Appendix H**: Minimum Flows and Levels Criteria and Recovery and Prevention Strategies provides additional information and updated information regarding these ecosystems.

A number of factors have emerged over the past six years that have created considerable uncertainty concerning water availability for additional demand within the LEC Planning Area. While many of the emerging factors focus on environmental concerns and the timing and availability of water, some are related to other regulatory and policy changes both within and outside the District.

The overall implementation of the CERP has been slower than anticipated in 2000 due to federal procedural and funding issues. Uncertainty of technology, such as ASR systems, which are a major storage component of the CERP, has lowered the expected availability of new water supplies for urban, agricultural and natural systems needs within the planning horizon of this water supply plan update. Because of the far-reaching scope of the CERP, changes in schedule and performance expectations since 2000 have had a major impact on the assumptions of the 2000 LEC Plan.

To avoid delays caused by the federal procedures and funding shortfalls related to the CERP, the District has undertaken a series of projects called Acceler8. Acceler8 includes the construction of some CERP projects using state and District funds for regional-scale reservoirs and impoundment storage options. Information about the specific projects is included in **Chapter 6**.

Five of the Acceler8 projects are located in the LEC Planning Area: Everglades Agricultural Area (EAA) Reservoir; EAA Stormwater Treatment Areas (STAs) Expansion; Water Preserve Areas (Fran Reich Preserve, C-9, C-11, Acme Basin B, WCA-3A/3B Seepage Management); Biscayne Bay Coastal Wetlands; and, C-111 Spreader Canal.

EAA Expansion at STA 6

The EAA Reservoir is a component of the larger CERP EAA Storage Reservoir Project and designed to provide significant additional water storage in the southern region of the EAA. The EAA STAs Expansion will expand the size and enhance the performance of existing STAs created as part of the Everglades Construction Project. The Water Preserve Areas consist of a series of five project components located adjacent to the Everglades WCAs in Palm Beach, Broward and Miami-Dade counties. The Biscayne Bay Coastal Wetlands is a component of a larger project that will expand and restore the wetlands adjacent to Biscayne Bay in Miami-Dade County and enhance the ecological health of Biscayne Bay National Park. The C-111 Spreader Canal is a multipurpose project that provides for ecosystem restoration of freshwater wetlands, tidal wetlands and inshore habitat, maintenance of flood protection, and recreational opportunities.

Because the LEC Planning Area is affected by activities in the Caloosahatchee and St. Lucie river basins for water supply, two additional Acceler8 projects are important to this region: the C-43 (Caloosahatchee River) West Reservoir and the C-44 (St. Lucie Canal) Reservoir/Stormwater Treatment Area. The C-43 (Caloosahatchee River) West Reservoir Project, located in Hendry County in the LWC Planning Area, is designed to capture water from the Caloosahatchee River (C-43) during high-flow times for use in the dry season to provide flows to the estuary downstream. The C-44 (St. Lucie Canal) Reservoir/STA, located in southern Martin County in the UEC Planning Area, is designed to capture and treat local stormwater runoff from the C-44 Basin, thereby decreasing flows and improving water quality into the St. Lucie Estuary.

The following sections discuss the specific water bodies and the factors influencing water availability in the LEC Planning Area.

Lake Okeechobee

As a result of the hurricane seasons of 2004 and 2005, the Lake Okeechobee ecosystem suffered significant setbacks due to prolonged high stages and extreme wave action, resulting in loss of habitat and poor water quality. The actions taken to lower the lake stages under the existing WSE Regulation Schedule and a federally approved schedule deviation resulted in sustained, high-volume discharges to the

Caloosahatchee and St. Lucie estuaries. The impact of the hurricanes also elevated concerns about the integrity of the Herbert Hoover Dike to protect lakeside communities (Bromwell *et al.* 2006). To address impacts to the estuaries and public safety matters, the USACE is expediting modifications to the Lake Okeechobee regulation schedule to protect the lake, its surrounding communities and the downstream estuaries.

Lake Okeechobee Regulation Schedule

Lake Okeechobee Lock and Gate

Lake Okeechobee is a critical water supply component for virtually the entire Lower East Coast region. The Lake Okeechobee Service Area includes an extensive agricultural industry that depends on water directly from the lake, as do other users within the service area. Most lakefront communities have traditionally relied on the lake for potable water, although four cities are in the process of converting to alternative water supplies. The lake is also a source of water for environmental deliveries, such as deliveries made under certain conditions to manage salinity conditions in the Caloosahatchee Estuary.

Water supply potential from Lake Okeechobee was evaluated in the 2000 LEC Plan. The plan assumed the WSE Regulation Schedule developed by the USACE was in place, and the CERP projects would be constructed on schedule and perform as conceptually designed. The Lake Okeechobee water shortage trigger line was lowered by 0.5 feet from 11.0 to 10.5 feet National Geodetic Vertical Datum (NGVD) as a result of the plan's analysis and recommendation. The lowering of the water shortage trigger was necessary to meet water supply needs at the intended level of certainty.

Currently, the USACE is completing an evaluation of changes to the Lake Okeechobee regulation schedule. The goal of this effort is to develop a new schedule that reduces high water stages within the lake, as well as the frequency and volume of high-flow discharges to the Caloosahatchee and St. Lucie estuaries. Analyses of potential lake schedule modifications include consideration of the impacts to water supply. The USACE expects to finalize a new schedule in 2007.

Temporary pumps have been purchased to address water supply concerns associated with low Lake Okeechobee levels, while permanent forward pumps and structures are under design. The SFWMD has initiated a rule revision process to

develop additional water quality and quantity criteria for environmental resource permits.

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's findings included an opinion 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 reduce the water supply available from the lake for agriculture and public supply.

Lake Okeechobee & Estuary Recovery

The Lake Okeechobee & Estuary Recovery (LOER) Plan was developed in 2006 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. State agencies charged with carrying out this plan include the SFWMD, the FDEP, the Florida Department of Agriculture and Consumer Services (FDACS) and the Florida Department of Community Affairs (FDCA).

The LOER Plan includes five "fast-track" capital projects and numerous interagency initiatives to provide short-term relief and long-term protection. Planned construction projects include the S-154 Basin, S-133 Basin, Taylor Creek Reservoir, Nubbin Slough STAs Expansion and Lakeside Ranch STA, which are being constructed as part of the District's Acceler8 initiative. Additional components of LOER include revisions to environmental resource permit criteria for new development in the Upper and Lower Kissimmee basins, Lake Okeechobee, and St. Lucie and Caloosahatchee estuary basins; establishment of total maximum daily loads (TMDLs) for the St. Lucie and Caloosahatchee tributaries and estuaries; mandatory fertilizer best management practices (BMPs); alternative storage/disposal of excess surface water; innovative land use planning; and, revisions to the Lake Okeechobee regulation schedule. The LOER Plan also involves the continued implementation of the Lake Okeechobee Protection Program (LOPP) and the CERP's Lake Okeechobee Watershed Project (LOWP).

In conjunction with the LOER Plan, the Critical Project Pilot STAs at Nubbin Slough and Taylor Creek have been completed. Four pilot projects are moving forward to store water on private land, and a water storage assessment on public land in northern and southern Lake Okeechobee watersheds has been completed. Information from this assessment is being used to develop preliminary designs, costs and schedules for implementation.

Minimum Flow and Level

In 2001, the SFWMD adopted a minimum level for Lake Okeechobee based on: a) the relationship between water levels in the lake, and flooding and drying of the littoral zone, which provides habitat for fish and wildlife; b) the ability to store enough water in the lake during the dry season to protect the coastal aquifer against saltwater intrusion; c) providing water supply to Everglades National Park; and, d) ensuring navigational and recreational access to the lake. Consideration was also given to the lake's function as a storage area for supplying water to adjacent areas, including the EAA, the Seminole Indian Tribe Brighton Reservation, the Caloosahatchee and St. Lucie basins, and the Lake Okeechobee Service Area.

The MFL Rule 40E-8.221(1), F.A.C., states that a MFL violation occurs in Lake Okeechobee when an "exceedance," as defined herein, occurs more than once every six years. An "exceedance" is a decline below 11 feet NGVD for more than 80, nonconsecutive or consecutive days, during an 18-month period. The 18-month period shall be initiated following the first day that Lake Okeechobee falls below 11 feet NGVD, and shall not include more than one wet season, defined as May 31 through October 31 of any given calendar year.

Lake Okeechobee

In addition to fish and wildlife, other users of Lake Okeechobee water include the communities surrounding the lake, the Lake Okeechobee Service Area, as well as the LEC and LWC planning areas. During periods of water shortage, the SFWMD equitably implements water use restrictions to prevent serious harm to the water resources and distributes available water supplies to consumptive and nonconsumptive users. These types of restrictions may be used for the purpose of managing water supplies in Lake Okeechobee.

Currently, the SFWMD is developing rules to modify its Water Shortage Plan. The Water Shortage Plan (Chapter 40E-21, F.A.C.) provides specific guidelines for implementing these water restrictions. As part of this overall plan, the *Lake Okeechobee Supply-Side Management Plan* (SFWMD 2002a) provides protocols for implementing water use restrictions and managing water resources during declared water shortages. The specific method for implementing restrictions is determined through Governing Board order.

The District's current Supply-Side Management Plan is being revised through an ongoing rulemaking effort. Now known as the Lake Okeechobee Water Shortage Management Plan, this effort includes provisions in Chapters 40E-21 and 40E-22,

F.A.C., and identifies how water supplies are allocated to users within the Lake Okeechobee Service Area during declared water shortages. The existing plan allows for supply allotments and cutbacks to be identified on a weekly basis based on the remaining water within the lake, demands, time of year and rainfall forecasts.

The MFL criteria and recovery strategy for Lake Okeechobee are discussed in greater detail in **Appendix H**.

Water Conservation Areas and Everglades National Park (Everglades)

Water Conservation Area-3

In 2001, the SFWMD adopted MFL criteria for the Everglades based on the effects of water levels on Everglades hydric soils and their associated plant and wildlife communities, and the frequency and severity of fires. Impacts associated with significant harm included increased oxidation of organic soils (soil subsidence); frequency of severe fires; loss of dry season aquatic refugia for Everglades wildlife; impacts to tree island communities; and, long-term changes in the Everglades vegetation and wildlife habitat. The proposed MFL criteria were based on protecting the Everglades peat-forming and marl-forming wetlands.

The analyses supporting the 2000 LEC Plan indicated that MFL exceedances in portions of the Water Conservation Areas (WCAs) and Everglades National Park would occur over the ensuing 20 years. Thus, a recovery plan was adopted that identifies several actions to achieve the MFLs. The CERP projects are the primary requirements to achieve MFL recovery, but in conjunction with the CERP, the District adopted rules limiting permit renewals and increases in consumptive uses dependent on the regional system (SFWMD 2000c).

Consistent with the modeling analyses in the 2000 LEC Plan, additional water supplies made available for consumptive use from the CERP would be available as increasing demands in the LEC Planning Area occurred. In addition, alternative water supplies to supplement the regional system were identified in the 2000 LEC Plan. Water use permitting rules were adopted, allowing for renewal of existing permitted allocations as long as: a) the allocation would result in no changes in impacts from that modeled in the LEC Plan, and b) the CERP projects required for

the recovery plan were progressing in a timely fashion to offset the increasing demands from the regional system, while achieving Everglades restoration. Increases in allocations were authorized under the rule only if additional water had been made available to meet such demand, such as through implementation of a CERP project, or if additional impacts were prevented through offsets, such as aquifer recharge.

Regionwide, the public water supply demands projected for 2025 are not significantly greater than the public water supply demands projected for 2020 in the 2000 LEC Plan. However, individual communities do show significant differences. Generally, the demands in Miami-Dade County are less than projected, while the demands in Broward and Palm Beach counties are occurring earlier than reflected in the 2000 LEC Plan. By 2003, it became apparent that the demands for certain communities were growing at a faster rate than the 2000 LEC Plan had projected, based on the requests from public water supply users to increase allocations from the regional system. These increases were occurring prior to the creation of additional water from the regional system through the CERP and other water resource development projects. Issues were raised that the issuance of such permit requests were not consistent with the Everglades MFL recovery strategy. As a result, the District, through a Water Resources Advisory Commission (WRAC) subcommittee, developed Consumptive Use Permit/CERP (CUP/CERP) Guiding Principles to provide specific criteria that would be used to determine whether these increases in demand would be authorized.

Under the CUP/CERP consistency procedures, applications containing reasonable-beneficial demands equal to or less than the 2005 demands, calculated from information derived from the 2000 LEC Plan, Appendix B, were considered consistent with the 2000 LEC Plan. Modeled environmental responses equal to or better than the responses calculated in the series of incremental runs were considered consistent with the 2000 LEC Plan. As a result, increased demands beyond the projections in the 2000 LEC Plan were permittable, as long as the environmental responses in the Everglades as modeled in incremental runs with CERP implementation were not impacted by the increased demands. Based on the South Florida Water Management Model (SFWMM) evaluation, up to a 20 percent increase in demands over 2003 permitted allocations would not significantly change the environmental performance projected under the CERP, with the exception of a few hot spots (withdrawals adjacent to Everglades National Park and the WCAs). Increases in withdrawals with impacts to environmental performance identified in the CERP performance measures would not be allowed unless the applicant provided alternative sources, such as aquifer recharge, which prevented the impacts.

In 2003, along with the B-List rulemaking process, a permit duration rule was adopted, which identified the C&SF Project and dependent groundwater sources as a "source of limited availability." This meant that only historically used demand would receive a 20-year duration at permit renewal, and increases over that amount would only be authorized for a five-year period. This short duration was specifically

implemented to reassess whether the recovery strategy for the Everglades (e.g., the CERP) was going forward as planned, or whether growth was occurring as planned.

Therefore, the District continued to allow measured increases in regional system use based on the CUP/CERP Guiding Principles until late 2005, at which time additional information and changing technical evaluations raised policy and legal concerns regarding the continuation of this allocation process. In April 2006, the SFWMD Governing Board initiated rule development to limit increased reliance on the Everglades system and dependent groundwater sources, as well as withdrawals from the Loxahatchee River Watershed. The Regional Water Availability Rule was adopted in February 2007.

Biscayne Aquifer

In 2001, the SFWMD adopted minimum levels for the Biscayne Aquifer, set forth in Chapter 40E-8, F.A.C. The MFL criteria developed for the Biscayne Aquifer were based on analysis of technical relationships among groundwater levels, canal water levels and the potential for saltwater intrusion. The results of the Biscayne Aquifer MFL Study (SFWMD 2000c) concluded that under current and future operating conditions, the MFL criteria were not being exceeded and were not expected to be exceeded during the next 20 years. Therefore, a recovery strategy was not needed. A minimum level prevention strategy is detailed in the report (SFWMD 2000c) and in the MFL Rule 40E-8.421(4), F.A.C.

Part of the basis for the Biscayne Aquifer MFL is that water from the regional system, primarily the Everglades, would be provided in sufficient quantities to maintain canal stages to recharge the aquifer and prevent intrusion of salt water during dry times. The availability of additional water to recharge the coastal canal system and the Biscayne Aquifer is limited for several reasons, including the Everglades MFL, which was discussed earlier in this chapter. Because the Everglades MFL cannot presently be achieved, this water body is in recovery, and therefore, protected from allocations that would increase MFL exceedances.

In addition, as previously mentioned, the SFWMD designated the regional system as a source of limited availability in 2003 as part of an extensive rulemaking process to implement the water supply plan. Rulemaking was authorized by the District Governing Board in 2006 to establish the Regional Water Availability Rule, which addresses water availability from both the Everglades and the Loxahatchee River Watershed.

Northwest Fork of the Loxahatchee River

Minimum flow and level criteria for the Northwest Fork of the Loxahatchee River were adopted in 2003. Pursuant to the MFL Rule 40E-8.221(1), F.A.C., a MFL violation occurs in the Northwest Fork of the Loxahatchee River when a MFL exceedance occurs more than once in a six-year period. A MFL exceedance occurs in the Northwest Fork of the Loxahatchee River when flows over the Lainhart Dam, located in the Northwest Fork of the Loxahatchee River, decline below 35 cubic feet per second (cfs) for more than 20 consecutive days, or the average daily salinity concentration expressed as a 20-day rolling average exceeds two parts per thousand. The average daily salinity will be representative of mid-depth in the water column at River Mile 9.2.

Loxahatchee River

The MFL study indicated that the proposed criteria for the Loxahatchee River will be exceeded on a regular and continuing basis, and therefore, a recovery plan was developed to protect water resources in the river from significant harm. Analysis of historical information shows that based on data from the past 10 years, the proposed minimum flow level of 35 cfs was exceeded approximately 25 percent of the time under current conditions (SFWMD 2002b). These low-flow conditions occurred frequently, such that an exceedance of the MFL criteria (flow less than 35 cfs for 20 consecutive days) occurred 34 times in 31 years, or approximately once per year. The proposed criteria cannot be met because of a lack of sufficient water conveyance infrastructure and regional storage facilities. To address these issues, the MFL document identified specific projects needed to provide additional water to supplement the river and continue monitoring efforts to track the effects of these changes on water resources. The SFWMD has acquired an in-ground storage site, constructed two new structures needed to deliver water to the river, and is moving forward with key features of the recovery plan. These elements are part of the CERP North Palm Beach County Project.

In addition, the FDEP and the SFWMD developed a practical restoration goal and plan in 2006 for the Loxahatchee River (SFWMD *et al.* 2006), which was federally designated as Florida's first Wild and Scenic River in May 1985. This plan identifies water flows well above the MFL criteria, which are intended to move the saltwater interface downstream from its present location near River Mile 9.2 to the eastern edge of Jonathan Dickinson Park near River Mile 5.5. This increased flow is

expected to result in significant regrowth of freshwater vegetation along the riverbanks and floodplain of the wild and scenic portions of the river. Once implementation of the restoration plan has been completed, the MFL criteria for the Northwest Fork will be reviewed to address anticipated changes in the nature and location of resources that need to be protected.

The SFWMD has under development two other key products to enhance the protection of the Northwest Fork of the Loxahatchee River: an initial water reservation of flows to the river and a MFL for three key tributaries, both scheduled for completion in 2007. As noted previously, the Loxahatchee Watershed is also included in the Regional Water Availability Rule.

Florida Bay

The MFL criteria for Florida Bay were developed by the District and adopted by the Governing Board in November 2006. Data analysis and modeling studies provided in the report, entitled *Technical Documentation to Support Development of Minimum Flows and Levels for Florida Bay* (SFWMD 2006), indicated that the MFL criteria were not likely to be exceeded under recent historic climatic conditions (represented by 36 years of historical rainfall records from 1965 to 2000) and current operational policies and procedures. Therefore, a recovery strategy is not required for the northeastern Florida Bay MFL. However, a prevention strategy is provided to ensure that any future operational changes will not result in additional MFL violations. The prevention strategy is discussed in **Appendix H**.

If water demands on the regional system increase in the future, or water is diverted away from Taylor River to meet demands elsewhere within the Everglades, then future planning efforts and field tests may be required at that time to evaluate the feasibility of providing additional regional storage that may be needed to meet these Taylor River flow requirements.

Caloosahatchee River and Estuary

The Caloosahatchee River (C-43) is an important component of the C&SF Project, and along with the St. Lucie Canal (C-44), is used as a primary outlet for water releases from Lake Okeechobee when lake levels exceed the USACE regulation schedule.

Adverse impacts to the Caloosahatchee Estuary occur whenever prolonged, high-volume regulatory releases are made through the C-43 Canal (SFWMD 1989, 1997). These excessive discharges from the lake alter estuarine salinity gradients and transport significant quantities of sediment to the estuary. Biota within the Caloosahatchee Estuary and in near-shore seagrass beds are periodically impacted by these high-volume discharges.

During dry periods, the C-43 Basin receives supplemental water supply releases from Lake Okeechobee (SFWMD 2000a). Water releases from Lake Okeechobee are also an important management tool within the MFL Recovery Plan for the Caloosahatchee River (SFWMD 2003a). Water releases from Lake Okeechobee to the estuaries currently depend on policies contained within the Water Supply and Environmental (WSE) Regulation Schedule for Lake Okeechobee, which is structured to provide additional flexibility for discretionary releases of water from the lake for environmental benefits (USACE 2000). The SFWMD created a procedure to allow additional releases beyond the WSE Regulation Schedule. The adaptive protocol document was approved by the District's Governing Board in 2002 and has been used to deliver water to the Caloosahatchee River and Estuary. An adaptive protocol process is used to guide operations to protect Lake Okeechobee and downstream ecosystems, while continuing to provide a reliable water supply for agricultural and urban areas that depend on the lake (SFWMD *et al.* 2003). The District is supporting continued efforts by Lee County to develop alternative water supplies, including aquifer storage and recovery (ASR), for the Olga Water Treatment Plant so it does not rely on water from the Caloosahatchee River during declared water shortages on Lake Okeechobee.

S-79 Structure

The MFL Rule established for the Caloosahatchee Estuary states that a minimum mean monthly flow of 300 cfs is required to maintain sufficient salinities at the Franklin Lock and Dam, or S-79 Structure, in order to prevent a MFL exceedance that would cause significant harm to downstream submerged aquatic vegetation communities. A MFL exceedance occurs during a 365-day period when: a) a 30-day average salinity concentration exceeds 10 parts per thousand at the Fort Myers salinity station, or b) a single, daily average salinity exceeds a concentration of 20 parts per thousand at the Fort Myers salinity station. Exceedance of either "a" or "b" for two consecutive years is a violation of the MFL.

The Caloosahatchee River MFL reports indicated that proposed criteria for the Caloosahatchee River and Estuary (SFWMD 2000d, 2003a) would be exceeded on a regular and continuing basis until additional storage is provided in the basin to supply the water needed. Therefore, the MFL documents include a recovery strategy.

The structural and operational features of the recovery plan will be implemented through ongoing SFWMD water supply development efforts, including the development of regional water supply plans, the CERP and the District's Acceler8

projects. The SFWMD has completed a *2000 Lower West Coast Water Supply Plan* (2000 LWC Plan) (SFWMD 2000b) and a *2000 Caloosahatchee Water Management Plan* (SFWMD 2000a), pursuant to Section 373.0361, F.S., which included projects needed to implement the MFL recovery and prevention strategy. The MFL assumes that local basin stormwater contribution downstream of S-79 Structure will not be diminished during dry times.

The CERP includes features that will increase storage in the Caloosahatchee Basin through the construction of a reservoir and ASR wells (USACE and SFWMD 2002). Modeling studies using discharge scenarios, which included the CERP and LEC Plan projects, indicate that the MFLs will be met by 2020 when these facilities in the Caloosahatchee Basin are completed and fully operational.

Caloosahatchee River

The MFL Rule 40E-8.011(3), F.A.C., also states that the minimum flow criteria for the Caloosahatchee River and Estuary should be reviewed and amended as needed within one year of the effective date of the rule. The purpose of this review is to re-examine the technical and scientific basis of the Caloosahatchee MFLs in light of comments by a scientific peer review committee and results obtained from additional field observations, laboratory experiments and numerical model development. The review, contained in the *Technical Documentation to Support Development of Minimum Flows and Levels for the Caloosahatchee River and Estuary 2003 Status Update Report* (SFWMD 2003a), specifically evaluated the ability of the 300 cfs discharge at the S-79 Structure to protect the submerged aquatic vegetation.

This study concluded that the 300 cfs target for flows across the S-79 Structure, by itself, probably does not provide sufficient flow to fully protect water resources from significant harm. Additional or improved storage facilities may need to be provided in the watershed, including downstream of the S-79 Structure. The MFL should incorporate local basin runoff west of the S-79 Structure. Flows higher and lower than the average of 300 cfs should be considered based on the downstream impact. However, before any decisions are made to modify the CERP projects or the MFL criteria, estuarine and biological models need to be completed and fully calibrated, and improved flow measurements need to be obtained, especially for downstream tidal basin inflows.

Since establishing the MFL criteria for the Caloosahatchee River, the criteria have been exceeded during three of four years, resulting in one MFL violation (two consecutive years). The expectation is that periodic to frequent exceedances and

violations of these criteria will continue to occur until the recovery plan, which includes projects, such as the Acceler8 C-43 West Reservoir Project, are constructed and become operational, providing additional flow to the estuary during dry periods.

St. Lucie River and Estuary

Like the Caloosahatchee River (C-43), the St. Lucie Canal (C-44) is an important component of the C&SF Project and is used as a primary outlet for water releases from Lake Okeechobee when lake levels exceed USACE regulation schedules. Adverse impacts to the St. Lucie Estuary occur whenever prolonged, high-volume regulatory releases are made through the C-44 Canal (SFWMD 1989, 1997). These excessive discharges from the lake alter estuarine salinity gradients and transport significant quantities of sediment to the estuary. Biota within the St. Lucie Estuary and in inshore seagrass beds are periodically impacted by these high-volume discharges. The Acceler8 C-44 (St. Lucie Canal) Reservoir/Stormwater Treatment Area (STA) project, located in southern Martin County, is designed to capture and treat local stormwater runoff from the C-44 Basin, thereby decreasing flows and improving water quality into the St. Lucie Estuary.

The MFL Rule 40E-8.341, F.A.C., for the St. Lucie River and Estuary states that mean monthly flows to the St. Lucie Estuary should not fall below 28 cfs from the Gordy Road Structure to the St. Lucie River North Fork for two consecutive months during a 365-day period, for two consecutive years. The proposed MFL criteria for the St. Lucie River and Estuary were based on the determination that significant harm occurs to the oligohaline zone when net freshwater flows (sum of surface and groundwater inflows minus evaporation) to the estuary are at or below zero for a period of two consecutive months for two or more years in succession (SFWMD 2002c).

Although the river and estuary presently receive an adequate supply of fresh water, and are expected to continue to do so as the CERP is implemented, a prevention strategy may be required to protect this resource. The ability to better manage water in the watershed may also make it possible to capture and retain water from the watershed for allocation to other users (e.g., urban and agricultural water supply).

C-139 Basin and Western Basins

One of the Everglades Protection Area's tributary basins is the C-139 Basin, which encompasses approximately 170,000 acres. Land within the C-139 Basin has generally five uses: 1) agricultural (vegetable, sugarcane and citrus); 2) cow-calf operations; 3) urban; 4) wetlands; and, 5) native areas. Agricultural land dominates the C-139, Feeder Canal and L-28 Interceptor basins. The remaining land cover in these three basins is primarily wetlands and forested uplands, while the L-28 Gap Basin consists almost entirely of wetlands (98 percent) within the Big Cypress National Preserve. Urban land uses occupy 4 percent of the C-139 Basin and less

than 1 percent of the remaining basins. The anticipated trend is that more intensified agricultural land uses and urban lands will expand, reducing the native and cattle lands. Both water supply and water quality of storm water are challenges facing the development of the basin.

Florida's 1994 *Everglades Forever Act*, Section 373.4592, F.S., establishes long-term water quality goals designed to restore and protect the Everglades Protection Area and the stormwater treatment areas of the Everglades Construction Project. The *Everglades Forever Act* mandates that landowners within the C-139 Basin should not collectively exceed average annual historic total phosphorus load adjusted for rainfall.

In 2002, the C-139 Basin Best Management Practices (BMPs) Regulatory Program (Chapter 40E-63, F.A.C.) was adopted to ensure total phosphorus load requirements would be met. After four years of implementing the mandatory BMPs Program, the C-139 Basin has not been able to meet the historic total phosphorus load required by rule; therefore, rulemaking must be initiated to address future compliance.

Shade for Cattle

Water management in general (water supply and discharges) is thought to be a critical factor affecting loads from the basin. The effects of availability and allocation of water supply for the C-139 Basin have not been defined with certainty and require further study. Water supplies for the basin from the Surficial Aquifer System (SAS) are constrained by the presence of isolated wetlands. Water supply demands fluctuate seasonally, with emphasis on the fall-to-winter and winter-to-spring growing seasons, which require optimal water table levels. Accordingly, flow and total phosphorus discharge data from the basin indicate the C-139 Basin is subject to significant fluctuation between the dry- and wet-weather months, with almost 85 percent of phosphorus load and flow recorded during the wet season on average, in the past 27 years.

Due to the limited availability of water supply sources, water management practices, including storage and runoff, have led to declining water quality. Alternatives to increase the availability of water supply sources, permanently or seasonally, involve studying ways to develop water supply storage capacity for periods of need, and further supporting a means to optimize and reuse irrigation water in the areas identified. Coordinated long-term plans are needed, which consider water supplies,

water use permitting, and impacts on water quantity and quality, with an emphasis on total phosphorus.

RESOURCE PROTECTION TOOLS

Water resource protection tools under Chapter 373, F.S., are used to protect water supplies for natural systems and human needs. In addition to minimum flows and levels (MFLs), other resource protection tools include consumptive use permitting, water shortage declarations and the reservation of water.

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, F.S.) Applicants for a CUP must provide reasonable assurances that withdrawals will not harm the environment, degrade the resources or adversely affect other existing legal users. 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 the water level, duration and frequency of components, and are used to define the amount of water that can be allocated from the resource.

Saltwater Intrusion in Wetland

Wetland protection standards and thresholds have been established in Section 3.3 of the *Basis of Review for Water Use Permit Applications* (SFWMD 2003) to protect wetlands and other surface waters from harm caused by consumptive use withdrawals of water. This rule was based on analysis of wetland monitoring data.

Saltwater intrusion, wetland drawdown, aquifer mining and pollution prevention criteria in Chapter 40E-2, F.A.C., together define the harm standard for purposes of consumptive use allocation. These harm criteria are currently applied using climate conditions that represent an assumed

1-in-10 year level of certainty. The District's *Basis of Review for Water Use Permit Applications* (SFWMD 2003) outlines narrative standards, numeric standards and assessment methodologies used by the District to determine if a proposed consumptive use meets the conditions of issuance in Rule 40E-2.301, F.A.C., and therefore, will not cause harm to the resource.

Within the LEC Planning Area, drainage associated with urban and agricultural development has had a significant impact on the fresh groundwater flow toward the ocean, resulting in an inland migration of the saline interface. The construction of coastal canal water control structures and deliveries of water from the regional system have helped stabilize or slow the advance of the saline interface, although isolated areas still show evidence of continued inland migration of salt water.

The expansion of existing wellfields and development of new wellfields in southeast Florida are also limited in some areas by SFWMD wetland protection criteria.

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 can be used as a tool to prevent serious harm.

Reservations of Water

LAW / CODE

Section 373.223(4), F.S., provides: 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.

The Florida Legislature has defined water reservations as one of several tools that can be used by water management districts to protect water resources potentially threatened by consumptive use activities. Specifically, Section 373.223(4), F.S., provides the basis for establishing reservations as a means to protect fish and wildlife resources.

Water reserved under this statute is not available for allocation for consumptive uses. 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." All presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest.

The two types of water reservations are being developed by the SFWMD. The first is an *initial water reservation*. Development of initial reservations focuses on determining the volume, duration and timing of existing flows required to protect fish and wildlife resources. The first drafts of initial water reservation criteria for the Northwest Fork of the Loxahatchee River and the Caloosahatchee Estuary are expected by the end of 2007. The technical approach and methodology for establishing initial water reservations for the Everglades will be reassessed after completion of the Regional Water Availability Rule in 2007.

The second type of water reservation, known as a *project reservation*, will be used in the implementation of CERP-related projects. Project reservations determine the appropriate quantity, timing and distribution of water that is generated by individual CERP projects for the protection of fish and wildlife. Project reservations protect water anticipated to be available in the future through implementation of a project for the protection of fish and wildlife. The water is reserved in advance, ensuring that when a project is completed, those quantities remain available for the protection of fish and wildlife, or public health and safety. A methodology to identify water for the natural system made available for restoration is being drafted under the federal CERP process and is expected to be finalized in 2007.

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 south Florida region. 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.

Previous Modeling Results Indicated Potential Exceedance of Resource Protection Criteria

Modeling submitted as part of CUP applications has consistently supported the analyses and conclusions of the 1998 and 2000 LEC plans, as well as this 2005–2006 LEC Plan Update. Issues identified in past analyses included potential wetland impacts, saltwater intrusion and general aquifer protection criteria.

Modeling was also used to analyze water availability and water demands on the Biscayne Aquifer, Lake Okeechobee, Everglades, Loxahatchee River and Caloosahatchee Basin. These modeling efforts are described in the 2000 LEC Plan (SFWMD 2000b) and *Caloosahatchee Water Management Plan* (SFWMD 2000a). Analytical tools used in these analyses included the South Florida Water Management Model (SFWMM), a series of LEC Planning Area groundwater

models, and the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model.

Current and Future Modeling Efforts

Computer models are used to simulate the hydrologic system and to aid the SFWMD's understanding of how water supply and water management projects affect natural and managed systems. The 2000 LEC Plan, the Restudy, and the Everglades, Caloosahatchee River and Lake Okeechobee MFLs were developed using various versions of the SFWMM. Since then, the SFWMM has continued to be refined. Currently model version 5.4.2 is being used for the CERP and Acceler8 project evaluations, as well as for operational evaluations, such as the Lake Okeechobee regulation schedule modification.

The SFWMD has also undertaken the implementation of the Regional Simulation Model (RSM) for the majority of south Florida to replace the SFWMM. This transition is currently under way in support of the CERP and Acceler8 projects.

Regional Simulation Model

As part of the 2000 LEC Plan, implementation of the Lower East Coast Density-Dependent Floridan Aquifer System Model was specifically recommended. Phase 1 of the model is the District's effort to quantitatively assess the Floridan Aquifer System (FAS) along the east coast of Florida. This phase includes refinement of the existing FAS groundwater flow model using data collected for the construction of aquifer storage and recovery (ASR) projects associated with the CERP and individual utilities with deep well injection facilities. The implementation of the steady-state component was completed in Fiscal Year 2006. Water quality sampling will continue in conjunction with the new exploratory wells installed within the LEC Planning Area. Phase 2 of this project will be expanded to include the UEC Planning Area, which includes Martin and St. Lucie counties.

Several high-resolution, subregional groundwater flow models used in the LEC 2000 Plan have been modified, updated and combined into the LEC Subregional Model (LECsR), whose study area encompasses approximately 7,500 square miles. The calibration results indicate a reasonable match between observed and measured water levels in most areas of the model domain. The model was verified from September 1999 through December 2000 and produced similar results to the calibration period. This model should be used for regional to subregional or basin-level projects, and interpretation of the results should be at that scale. In addition,

the model provides a reasonable estimate of drawdowns associated with wellfield withdrawals and the ground/surface water interactions with wetland systems.

SUMMARY

This chapter describes the water resources available in the Lower East Coast (LEC) Planning Area and the relationships of the ecosystems to these resources. Since approval of the 2000 LEC Plan, significant progress has been made toward balancing adequate supplies for natural systems and human needs. This includes the development of the programs and activities affording protection of these water resources based on key assumptions concerning water availability for consumptive use. However, previous and ongoing analyses of historically used water resources in the LEC Planning Area have identified resource development issues that may affect the availability of traditional freshwater supplies to meet new demands projected for the next 20 years. In addition, recent state legislation and District actions to increase alternative water sources and to promote increased protection for the natural systems will also affect the expanded development of freshwater supplies. Finally, environmental impacts from hurricanes have played a role in the future direction of the management of the Lake Okeechobee ecosystem.

Osprey

The following section highlights the most significant water resource issues resulting from these efforts for the LEC Planning Area, which are discussed further in **Chapter 4**.

Minimum flows and levels (MFLs) have been established for seven regional ecosystems in or related to the LEC Planning Area. Recovery plans required for three of the ecosystems—the Everglades, the Caloosahatchee River and the Northwest Fork of the Loxahatchee River—have resulted in limited water availability for increased consumptive use demands in order to prevent significant harm to the water resources. In addition to these MFLs and recovery plans, the Governing Board has initiated rule development for initial reservations for the Everglades ecosystem.

The expected timing and availability of water to provide new water supplies for urban, agricultural and natural systems demands as provided by the CERP project schedules have been modified. In response, the District launched Acceler8, an initiative to construct a series of Everglades restoration projects using state and District funds to avoid delays caused by federal procedures and funding shortfalls.

In April 2006, the SFWMD Governing Board initiated rule development to limit increased reliance on the Everglades system and dependent groundwater sources, as well as withdrawals from the Loxahatchee River Watershed. The Regional Water Availability Rule was adopted in February 2007.

RECOVERY PLANS REQUIRED FOR... THE EVERGLADES, THE CALOOSAHATCHEE RIVER AND THE NORTHWEST FORK OF THE LOXAHATCHEE RIVER HAVE RESULTED IN LIMITED WATER AVAILABILITY FOR INCREASED CONSUMPTIVE USE DEMANDS IN ORDER TO PREVENT SIGNIFICANT HARM TO THE WATER RESOURCES.

Efforts to protect the Lake Okeechobee ecosystem—a critical water supply component for virtually the entire LEC Planning Area—and the integrity of the Herbert Hoover Dike will continue to be a primary consideration. Furthermore, operations to lower lake stages under the existing WSE schedule have resulted in sustained, high-volume discharges to the Caloosahatchee and St. Lucie estuaries. Therefore, the Lake Okeechobee regulation schedule is being revised in 2007 to better protect the environmental resources of the lake and the downstream estuaries.

In 2005, the Florida Legislature strengthened laws to link land use and water supply planning, with new requirements for regional water supply plans and added responsibilities for local government comprehensive planning. A component of this comprehensive planning will be the need to assess population growth rates with water demand needs consistently throughout the LEC Planning Area. For example, population growth rates within individual counties have shifted since the 2000 LEC Plan, with less growth projected for Miami-Dade County and more expected in Broward County. The Florida Legislature also enacted laws encouraging the development and use of alternative water supplies to prevent competition with natural systems and provide cost-sharing funds for the development of alternative water supplies. Options that may increase the availability of water include the capture and storage of excess water during the wet season, or recharging canals and aquifers with highly treated reclaimed water or captured storm water. These options are discussed in **Chapter 5,** as are local and regional storage options and reservoirs for seasonally available water for use during dry times. The Acceler8 regional-scale reservoir and impoundment projects are summarized in **Chapter 6**, while specific, local projects are identified in **Chapter 7**.

4
Issue Identification

Since approval of the *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan), a series of policy, legislative and technical changes have emerged regarding the availability and demand for water supplies for both human and natural systems. Overall, the 2025 projected population in this *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) is consistent with the 2020 projected population in the 2000 LEC Plan. Despite this overall consistency, significant differences in the growth rates and projected water demands within individual counties have been identified.

Over the next 20 years, population in the Lower East Coast (LEC) Planning Area is expected to increase from 5.6 million to 7.3 million. Public water supply and domestic self-supply demands will require 317 million gallons per day (MGD) of additional potable water. While overall agricultural demands are expected to decline, new issues in meeting these demands have emerged. Projects needed to restore water flows for natural systems are moving ahead, but concerns remain regarding the potential competition between human and natural system needs.

PUBLIC WATER SUPPLY AND DOMESTIC SELF-SUPPLY DEMANDS WILL REQUIRE 317 MILLION GALLONS PER DAY (MGD) OF ADDITIONAL POTABLE WATER.

As discussed in **Chapter 3**, the 2000 LEC Plan concluded that the projected growth in urban water supply could be met using traditional sources (with high reliance on the Everglades to provide recharge during dry times), provided the identified water resource development projects contained in the plan were completed on time and performed as contemplated. Likewise, it was projected that agricultural demands could be met with operational changes and water resource development projects. However, much of the foundation for the conclusions of the 2000 LEC Plan has changed. The anticipated reliance on traditional sources without alternative sources to meet increased demands associated with growth no longer appears valid.

As a result of these changes, the following issues have emerged for this update of the 2000 LEC Plan. A summary of these issues is followed by a discussion of each issue.

ISSUES CONCERNING LAKE OKEECHOBEE AND RELATED AREAS

- Changes to the regulation schedule for Lake Okeechobee associated with efforts to lower the lake level for lake and estuarine protection, as well as levee protection, will affect supply availability from the lake for the Lake Okeechobee Service Area (LOSA) and for backup water supply in the LEC coastal service areas.
- Operation of Lake Okeechobee at a lower level may reduce of the level of certainty for the LOSA to less than the South Florida Water Management District's (SFWMD or District) 1-in-10 year level of certainty.
- The Seminole Tribe, which has surface water federal entitlement rights for both the Brighton and Big Cypress reservations, depend on Lake Okeechobee as a secondary irrigation supply source for these deliveries.
- Increased urban development in the traditionally agricultural basins of the LOSA may shift the nature of demands and affect the level of certainty for existing agricultural uses.
- Operation of Lake Okeechobee at lower levels under a new regulation schedule may impact the minimum flow and level (MFL) performance of the lake compared to the existing Water Supply and Environmental (WSE) Regulation Schedule.
- Based on new data and analyses, the Lake Okeechobee MFL may not adequately define significant harm.

ISSUES CONCERNING THE C-139 BASIN AND WESTERN BASINS

Agricultural operations in the C-139 Basin face continued challenges to meet water quality requirements for runoff and limited water availability for expansion of farming.

ISSUES CONCERNING THE EVERGLADES AND RELATED AREAS

- Limitations on water availability from the Everglades to support consumptive uses will require some urban communities to develop alternative water supplies or offsets to meet demands of population growth.
- The recovery plan for the Everglades MFL is heavily dependent on the implementation of the Comprehensive Everglades Restoration Plan (CERP) projects.

- Completion of projects to implement the *Restoration Plan for the Northwest Fork of the Loxahatchee River* will increase flows to this Wild and Scenic River (SFWMD *et al.* 2006).
- The development of alternative water supply sources, such as the Floridan Aquifer System and reuse of reclaimed water, will generate regulatory questions that must be addressed through coordination with other agencies.

LIMITATIONS ON WATER AVAILABILITY FROM THE EVERGLADES TO SUPPORT CONSUMPTIVE USES WILL REQUIRE SOME URBAN COMMUNITIES TO DEVELOP ALTERNATIVE WATER SUPPLIES OR OFFSETS TO MEET DEMANDS OF POPULATION GROWTH.

ISSUES CONCERNING THE ENTIRE LOWER EAST COAST PLANNING AREA

- Specific actions by county and municipal governments concerning future water supply sources and facilities, including amendments to local government comprehensive plans, are required in response to this LEC Plan Update to implement state legislative mandates since 2003.
- Saltwater intrusion, wetland protections and interference with existing users will continue to limit availability of fresh groundwater, unless recharge projects intended to offset these concerns are designed and constructed on a permit-by-permit basis.

LAKE OKEECHOBEE AND RELATED AREAS

The Lake Okeechobee Service Area (LOSA) includes those areas surrounding the lake that are directly supplied by it. These include the Everglades Agricultural Area (EAA); the Caloosahatchee and the St. Lucie river basins; areas north of the lake; and, the S-4 and the L-8 basins. Supplies to these basins include primarily water for agricultural production and relatively small amounts for public consumption. In addition, the natural systems within these areas, such as the Caloosahatchee River and Estuary, have water supply needs. The lake also supplies supplemental irrigation water to the Seminole Indian Brighton and Big Cypress reservations, and serves as a backup supply for the Lower East Coast region under extreme dry conditions. As discussed in the following section, the Lower East Coast urban areas and natural systems within the Lower East Coast, such as Everglades National Park, rely on deliveries from Lake Okeechobee during the dry season.

Lake Okeechobee Regulation Schedule Revisions

Forward Pumping Tank Development

As discussed in **Chapter 3**, the U.S. Army Corps of Engineers (USACE) is developing a proposed new operating schedule for Lake Okeechobee. The SFWMD and other agencies are participating in the schedule development process, which is expected to be completed in 2007. Operational changes may include periodic drawdowns of the lake, as well as more frequent discharges to avoid higher stages in the lake. Lower Lake Okeechobee management levels have the potential to significantly affect water supply functions of the lake for both the LOSA and Lower East Coast Service Areas 1, 2 and 3 in the LEC Planning Area. One of the options for addressing this issue is the ability to use forward pumps to access water from the lake when levels are too low for use of the gravity structures. In a previous drought, temporary forward pumps proved to be very useful in meeting water supply needs at lower lake stages. The SFWMD has proceeded with the preliminary design of forward pumps to address this issue. The SFWMD will continue to actively participate in development, implementation and analyses of regulation schedule modifications and related operational processes. Over time, the District's Consumptive Use Permit (CUP) and Water Supply programs will need to be adjusted to reflect the resulting changes in Lake Okeechobee water availability as a backup source for the Lower East Coast region.

Level of Certainty for Agricultural Water Users in the Lake Okeechobee Service Area

In 1997, the Florida Legislature mandated that regional water supply plans should be developed to provide sufficient water supplies to meet the needs of reasonable-beneficial users in drought conditions, which could occur on average once every 10 years. This concept, known as 1-in-10 year level of certainty, was subsequently incorporated into the 2000 LEC Plan, which recommended the District adopt the standard in its consumptive use permitting rules (SFWMD 2000).

In 2003, the SFWMD adopted rules affecting the allocation of water to agricultural users within the EAA. These rules require the demonstration that water supplies will be available during a 1-in-10 year drought and require supplemental irrigation to be calculated for 1-in-10 year drought conditions (SFWMD 2003).

The ongoing efforts to institute changes in the management of Lake Okeechobee may impact the availability of water for use by LOSA agricultural users.

Agricultural trends continue to show reduced acreage as Acceler8 and Everglades Protection Area projects are constructed. Some of the displaced farming is relocating into other areas of the LOSA. As discussed in the following section, there is potential for urban encroachment into the LOSA agricultural lands.

Depending on the eventual changes to the Lake Okeechobee regulation schedule, the level of certainty in LOSA potentially could be reduced and some agricultural consumptive use permits may be retired as land use is converted to non-farming activities. Under such scenarios, the SFWMD Governing Board will need to determine whether the "retired allocation" should be available for allocation to new users, or should be retained in order to improve the level of certainty for already existing legal users.

Revising the Lake Okeechobee Water Shortage Management Plan

In addition to efforts to revise the existing Lake Okeechobee regulation schedule, the District's current Supply-Side Management Plan is being revised through an ongoing rulemaking effort. Now known as the Lake Okeechobee Water Shortage Management Plan, this effort includes provisions in Chapters 40E-21 and 40E-22, Florida Administrative Code (F.A.C.), and identifies how water supplies are allocated to users within the Lake Okeechobee Service Area during declared water shortages. The plan allows for supply allotments and cutbacks to be identified on a weekly basis based on the water level within the lake, demands, time of year and rainfall forecasts.

During drought conditions in 2000 and 2001, Lake Okeechobee receded to levels below 9 feet National Geodetic Vertical Datum (NGVD). During this time, issues with the current process for identifying short-term (weekly) user allotments within the LOSA were identified. The ongoing rulemaking includes a new process for allocating the water based on pre-identified cutback goals, similar to water shortage phases in Chapter 40E-21, F.A.C. The Lake Okeechobee Water Shortage Management Plan incorporates temporary forward pumps—designed to deliver water out of the lake when gravity-driven flows can no longer occur (below approximately 10.2 feet NGVD). It also considers the USACE's proposed revision to the Lake Okeechobee regulation schedule. This rulemaking effort is ongoing and expected to be completed in 2007.

Water Supply for the Seminole Tribe of Florida Reservations

Two reservations of the Seminole Tribe of Florida rely on Lake Okeechobee as a supplemental irrigation supply source for their surface water federal entitlement rights, with specific volumes of water identified for this purpose for the Big Cypress Seminole Indian Reservation and an operational plan addressing this same subject for the Brighton Seminole Indian Reservation during drought-water shortage declarations.

Concerns have been raised by the Seminole Tribe (Tribe) about the reliability of Lake Okeechobee as a source under the pending Lake Okeechobee regulation schedule change. Securing a dependable source of water for the Tribe's reservation is of particular importance considering the Tribe's surface water federal entitlement rights.

For the Brighton Reservation, other avenues of making supply deliveries to agricultural operations in the southern Indian Prairie Basin are being reviewed. These include dredging the C-40 Canal into deeper areas of Lake Okeechobee to maintain the connection from Lake Okeechobee to the G-207 and G-208 pump stations, aquifer storage and recovery (ASR), and local reservoirs and deliveries of water from the Kissimmee River.

For the Big Cypress Reservation, forward pumps to deliver water from the lake at lower stages to the Miami Canal will be an important consideration.

Shifting of Agricultural Demands to Urban Demands

Increasing urban demands in the LOSA over the 20-year planning horizon are projected to occur as existing agricultural lands are transitioned into urban areas or become integrated into environmental restoration projects.

Neither U.S. Census data nor population projects developed for this plan update reflect a significant trend of urban development in the LOSA. This same situation has been observed in other regional water supply plan updates because projection techniques are not designed to predict such changes. However, growing interest in development within the LOSA by local governments and some landowners suggests the potential for growth in the predominately agricultural areas of eastern Lee, northern Hendry and western Palm Beach counties.

INCREASING URBAN DEMANDS IN THE LOSA OVER THE 20-YEAR PLANNING HORIZON ARE PROJECTED TO OCCUR AS EXISTING AGRICULTURAL LANDS ARE TRANSITIONED INTO URBAN AREAS OR BECOME INTEGRATED INTO ENVIRONMENTAL RESTORATION PROJECTS.

At the same time, agricultural development within the LOSA, but outside of the Everglades Agricultural Area (EAA) and the LEC Planning Area, is expected to continue as growers replace farm operations lost to environmental restoration projects. The potential for competition between urban and agricultural uses requires that land use trends in the LOSA be closely monitored and given additional consideration in the next update of the LEC and Lower West Coast (LWC) water supply plans.

Lake Okeechobee Minimum Flow and Level

As discussed in **Chapter 3** and **Appendix H**, Lake Okeechobee's MFL was based on an assumption that the lake would be managed under the WSE Regulation Schedule. It was concluded that the MFL could be met over the ensuing 20 years and that a recovery plan was not needed.

Analyses of the proposed options under consideration for revising the lake regulation schedule have the potential to cause the MFL criteria to be exceeded.

An action plan has been developed to improve the lake's ecosystem if water levels fall below the existing MFL criteria. The plan is discussed in detail in **Appendix H**.

Given the anticipated ecological benefits of managing Lake Okeechobee at lower levels, the SFWMD should review the current lake minimum level over the next five years.

C-139 BASIN

C-139 Basin

The sparsely populated area known as the C-139 Basin in Hendry County faces challenges in water quality, water quantity and wetland protection. Storm water from the basin drains into the Everglades, entering the northwest corner of Water Conservation Area-3A in Broward County via stormwater treatment areas. Currently, the basin does not meet Everglades Protection Area water quality standards and is under increasing pressure to reduce nutrient levels.

Groundwater provides supplemental irrigation water in the basin during the dry season. However, groundwater withdrawals in some areas of the basin have the

potential to impact nearby isolated wetlands. Additional storage and treatment of storm water is being pursued by some water use permittees to meet on-site water quality targets. In order for these on-farm storage/treatment areas to be affordable, landowners need to convert more passive agricultural lands into active uses. Intensification of agricultural use in the area may be limited due to potential impacts to wetlands caused by the additional water use.

Combining water storage and treatment areas designed for crops that rely on seepage irrigation with tailwater recovery systems or other options as hybrid best management practices may offer water quality improvements in the basin.

The District will continue to incorporate regulatory practices into the environmental resource and consumptive use permitting processes, while working with landowners and other agencies.

In order to address these issues, a subregional model is needed to evaluate existing uses and sources. Alternatives, such as combined water storage and treatment, tailwater recovery and other options, should continue to be explored by the landowners and the Florida Department of Agriculture and Consumer Services (FDACS). All appropriate alternatives, including tailwater recovery, should continue to be assessed within the Alternative Water Supply Funding Program.

EVERGLADES AND RELATED AREAS

This section discusses the water supply issues related to the Water Conservation Areas (WCAs) and Everglades National Park; the urban areas in Palm Beach, Broward and Miami-Dade counties and the Florida Keys portion of Monroe County; and, three adjacent regional ecosystems—the Northwest Fork of the Loxahatchee River, Biscayne Bay and Florida Bay. Although it is located in the Upper East Coast (UEC) Planning Area, Martin County is considered to the degree that future water supply may be affected by rulemaking related to the Northwest Fork of the Loxahatchee River.

As described in **Chapter 3**, the Everglades and these three ecosystems were naturally interconnected by sloughs and rivers prior to man's creation of drainage and other features, and the ecosystem components are still connected by water management facilities. Extensive efforts are under way to restore more natural water movement to and between the areas, while addressing the needs of a growing population.

Water Availability from the Everglades Water Bodies

In the 2000 LEC Plan, the Governing Board recommended development of a rule to identify the water available from the Everglades ecosystem (WCAs, Everglades National Park, and Holey Land and Rotenberger wildlife management areas) for allocation to consumptive uses. The 2000 LEC Plan recognized there were several tools to do this, including reservations, MFLs and consumptive use allocation rules. Prior to 2000, the District did not have any rules in place to analyze the cumulative regional effect of consumptive uses on the Everglades systems. The modeling conducted in the 2000 LEC Plan to estimate the additional water available from the Everglades assumed that the CERP would be implemented as scheduled, growth would increase as projected, and that operations of major regional sources, such as Lake Okeechobee, would not change.

The Everglades

A MFL for the Everglades was adopted in 2001, which found that significant harm was occurring to the ecosystem and a recovery strategy for achieving the MFL was adopted. This recovery plan did not propose to place strict limits on projected increases from the regional system; however, it assumed that if growth occurred in the projected time frames and the CERP was implemented as scheduled, increases in allocation depending on the Everglades source for recharge could continue at a measured pace. This approach was implemented for the next several years. Also in 2003, along with the B-List rules, a permit duration rule was adopted that identified the Central and Southern Florida Flood Control Project (C&SF Project) and dependent groundwater sources as a "source of limited availability." This meant that only historically used demands would receive a 20-year duration at permit renewal, and increases over that amount would only be authorized for a five-year period. In 2004, as a next step to respond to requests for additional water from sources dependent on Everglades recharge greater than the volume contemplated in the LEC 2000 Plan, the District developed the Consumptive Use Permit/CERP (CUP/CERP) Guiding Principles. Under these principles, the District continued to authorize measured increases in allocations even over those projected in the 2000 LEC Plan, as long as no impacts from such allocations were projected to occur on water availability from the Everglades.

During the next two years, however, these assumptions relied on implementing the MFL recovery plan, and the consumptive use permitting process did not bear out as planned. As a result, in the consumptive use permitting process (even as early as 2002) the Governing Board continued to develop policies to address the increasing requests for water from the Everglades ecosystem. In these permits, increased demands over historic use were authorized only for a temporary time period during which alternative sources or offsets to replace the increased reliance on the Everglades were required to be developed. These policies continued to be developed on a permit-by-permit basis until April 2006 when the Governing Board authorized staff to initiate rule development on a Regional Water Availability Rule to limit increased dependence on the Everglades system. This rulemaking effort also addressed withdrawals requiring increased water from the Loxahatchee River Watershed water bodies.

The rule, adopted by the Governing Board in February 2007, limits allocations on renewal or permit modification to conditions or pumpage, depending on the specific use class, that existed prior to April 1, 2006, known as the "base condition water use." The rule only allows allocations over the "base condition water use" if additional impacts to the Everglades are avoided through alternative source development, or eliminated through the implementation of offsets (recharge barriers, recharge trenches), or reduced or retired water uses that existed as of April 1, 2006. Wet-season water can also be allocated if the permit applicant demonstrates that such flows are not needed for restoration of the Everglades pursuant to the CERP, Acceler8 or the *Northern Palm Beach County Water Management Plan* (for the Loxahatchee River Watershed water bodies) (SFWMD 2002).

The net result of these changes will be a need for some local governments to develop alternative sources for part or all of their future water supply. These sources must not directly or indirectly impact the Everglades or conflict with restoration projects. Such alternatives can be a source, such as brackish water from the Floridan Aquifer, which is treated with reverse osmosis (RO) to create potable water. Other alternatives can provide water to offset potential impacts to the Everglades from new groundwater withdrawals by recharging canals or aquifers in such a manner as to meet a 1-in-10 year level of certainty. Either highly treated reclaimed water or storm water could be used for this purpose.

Everglades MFL Recovery

The recovery plan for the Everglades MFL is heavily dependent on the implementation of CERP projects.

As discussed previously, the MFL recovery plan for the Everglades did not place specific limitations on water availability from the regional system, but anticipated that implementation of CERP projects to achieve recovery would occur as originally scheduled. Today, the Acceler8 initiative includes many of the major projects

identified as needed to achieve recovery. While some of these projects will likely come on-line in time frames similar to the original schedule, other CERP projects needed to fully achieve recovery will not. Additional analysis is needed to determine how changes to the CERP schedule will impact the timing of Everglades recovery. See **Appendix H** for a list, schedule and estimated costs of CERP and other projects associated with the Everglades MFL recovery plan.

No water from a restoration project can be made available for consumptive uses until the SFWMD Governing Board certifies that the project is producing a volume of water in excess of that needed for restoration purposes.

Restoration of the Northwest Fork of the Loxahatchee River

Several projects required for the restoration of the Northwest Fork of the Loxahatchee River have been completed and others are under way. Over the next several years, the SFWMD will be able to provide additional flows to this Wild and Scenic River to address both the MFL and the 2006 restoration plan. Moreover, the Regional Water Availability Rule will limit the availability of water for additional consumptive uses if such withdrawals would otherwise impact existing or future restorative flows to the river. This rule was adopted in February 2007.

At the same time, the SFWMD continues to develop other measures to protect flows to the Northwest Fork. The SFWMD is scheduled to adopt MFLs for three important tributaries to the river and to adopt an initial reservation for existing available water. Additional project reservations will be necessary to protect water made available by projects for restoration of the Loxahatchee River Watershed. No water from a restoration project can be made available for consumptive uses until the SFWMD Governing Board certifies that the project is producing a volume of water in excess of that needed for restoration purposes.

Development of Alternatives

The development of alternative water supply sources, such as the Floridan Aquifer System and reuse of reclaimed water, will generate regulatory questions that must be addressed.

An issue that emerged during the development of this plan update is related to regulatory questions for implementing alternative water supply sources. Specifically, concerns have been expressed that the magnitude of the proposed Upper Floridan Aquifer use could create conflicts between users due to drawdown, water quality and other factors. Increased development of the Floridan system in the LEC Planning Area has been under way for the past two years, and is generating additional data and experience within the Upper Floridan. The SFWMD should

continue its data collection and analysis efforts to determine if changes to consumptive use permitting criteria need to be developed.

Regulatory issues related to another major source of alternative water supply, reclaimed water, will also require additional consideration. While use of reclaimed water for landscape irrigation is routinely permitted in south Florida, the application of highly treated reclaimed water to recharge surface and groundwater during the dry season is relatively new in the planning area and may face regulatory hurdles. Continued efforts are needed to more clearly define the level of treatment that is appropriate for specific applications of reuse. In particular, additional analyses are needed to determine levels of nutrient removal that should be expected for surface and groundwater recharge projects.

Palm Beach County Southern Regional Reclaimed Water System

Similar issues may also confront proposed recharge projects using captured storm water, especially if storm water imported from another basin raises nutrient-loading or other water quality concerns.

The SFWMD should continue to work with the Florida Department of Environmental Protection (FDEP) and other state agencies, local agencies, the U.S. Environmental Protection Agency (USEPA), and the public to address regulatory issues.

REGIONWIDE

Specific actions by county and municipal governments concerning future water supply sources and facilities, including amendments to local government comprehensive plans, are required in response to this LEC Plan Update to implement state legislative mandates since 2003.

New Connections to Local Government Comprehensive Plans

During the 2002 through 2005 Florida Legislative sessions, the statutory direction to link 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.

Besides 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), Florida Statutes, (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 (EAR) Include an analysis of the implementation of the 10-year work plan for building all water supply facilities within the local government's jurisdiction. (Subsection 163.3191(2)(l), F.S.)

Other Permitting Issues

Consumptive use permits for some public water supply wellfields and other uses have specific limiting conditions or limited allocations of fresh groundwater based on resource protection criteria, such as saltwater intrusion and wetland drawdown. Some permits also may be limited due to potential interference with existing users. Water users should be encouraged to seek creative uses of reclaimed water, such as groundwater or surface water recharge projects designed to offset these limiting factors.

SUMMARY

As a result of the increasing urban demands, combined with the new challenges in sustaining and protecting the natural resources of the region, the Lower East Coast (LEC) Planning Area will need to develop alternative sources, such as brackish water, reclaimed water, storage of storm water and groundwater recharge.

Great Egret

As population and the demand for available water supplies increase in the LEC Planning Area, there is an increased need to balance the protection of the natural systems with efficient use of current and future water resources.

5

Evaluation of Water Source Options

This chapter presents a discussion of water supply options available within the Lower East Coast (LEC) Planning Area. As prescribed by Section 373.0361(2), Florida Statutes (F.S.), water supply options, including traditional and alternative water supplies, as well as conservation and reuse projects, were evaluated to meet the future urban, agricultural and natural systems needs of the LEC Planning Area. Traditional sources in the LEC Planning Area vary by region and include the Surficial and Biscayne aquifers, and fresh water from surface sources, such as Lake Okeechobee and other lakes, rivers and canals. Alternative water supplies or nontraditional sources include brackish water or seawater; reclaimed water; surface water or storm water captured during wet-weather flows for consumptive uses and new storage capacity for seasonal use; and, any other nontraditional source used by the planning region. These options may make additional water available from historically used sources by providing improved management of the resource, or there may be a new source of water specific to that service area.

LAW / CODE

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 permittable and financially and technically feasible.

With the development of alternative water supply projects, numerous issues, such as technical and regulatory constraints and cost uncertainties, will need to be addressed. For example, new water supply projects for the south Florida area must consider steeply rising land costs, limited construction supplies following active hurricane seasons, and competing demands for services related to the development of the Floridan Aquifer.

The following evaluations of water source options for the LEC 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 about the sustainability of the resources and potential impacts to the natural systems.

The *Draft Water Supply Cost Estimation Study*, which is expected to be completed in early 2007, will provide an updated evaluation of various water treatment technologies where applicable. When finalized, this cost study will be posted on the South Florida Water Management District's (SFWMD or District) Web site, along with other materials relative to the *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update). However, given the rapidly rising costs of land and construction, these costs must not be viewed as a substitute for the detailed evaluation that should accompany utility-specific feasibility and design studies needed to assess and construct such facilities.

Over time, with the implementation and reporting of alternative water supply projects, and the information in the *Draft Water Supply Cost Estimation Study*, cost-estimating relationships and curves for various water withdrawal facilities, technologies, by-product disposal methods, and surface storage and aquifer storage and recovery (ASR) systems can be updated and refined.

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. Where traditional sources have been determined to have limited availability, alternative sources of water must be identified and developed.

In the LEC Planning Area, traditional sources of water have typically included the Surficial and Biscayne aquifers, fresh surface water from Lake Okeechobee and, to a limited extent, other fresh surface water systems.

In the coastal basins of the LEC Planning Area, the Surficial and Biscayne aquifers are the traditional sources for public water supplies with only a few exceptions. For example, the City of West Palm Beach uses surface water obtained through a system of lakes and wetlands. On the other hand, the traditional source of water used for agricultural irrigation has been fresh surface water with limited groundwater use, primarily in south Miami-Dade County.

While the Surficial and Biscayne aquifers in the LEC Planning Area are easily recharged by infiltration from rain or local surface water bodies, wellfields using the Surficial Aquifer directly or indirectly cause water to move out of the primary canal system, which receives water from the Everglades.

Opportunities exist, however, for limited development of the Surficial and Biscayne aquifers through:

- Use of locally derived water that is not dependent on the regional system.
- Modifications to wellfield locations, configurations and pumping regimes.
- Capture and storage of excess water in the wet season, such as through the use of reservoirs or ASR.
- Recharge of canals and aquifers using highly treated reclaimed water or captured storm water.

However, any significant increase in withdrawals from these aquifers will need to be balanced against resource protection criteria.

Surface water systems in the LEC Planning Area could be enhanced by providing supplemental recharge in the dry season using highly treated reclaimed water. Another option is capturing, treating and storing seasonally available surface water in reservoirs. Considerations involving these options include the availability of water; seasonal fluctuations of the source; environmental impacts both upstream and downstream during the withdrawal and recovery stages; and, treatment and storage costs.

Lake Okeechobee is the most significant water source for the interior areas of the LEC Planning Area and agriculture is the primary user of this source. In the LEC Planning Area, water released from Lake Okeechobee supports sugarcane and, to a lesser extent, vegetables and sod in the Everglades Agricultural Area (EAA), which comprises almost 500,000 acres of irrigated agricultural land. Lake Okeechobee also serves as a backup water supply source for both agricultural and urban users in the coastal basins of the LEC Planning Area. In addition, surface water from Lake Okeechobee and local runoff support more than 200,000 acres of irrigated citrus, sugarcane, vegetables and other crops that lie within basins in the Lower West Coast (LWC), Kissimmee Basin (KB) and Upper East Coast (UEC) planning areas and are part of the Lake Okeechobee Service Area.

ALTERNATIVE WATER SUPPLY SOURCES

Each alternative water supply source option is discussed in this section to identify its potential for use in the LEC Planning Area.

Brackish Groundwater

The Upper Floridan Aquifer of the Floridan Aquifer System (FAS) is the principal source of brackish supply in the LEC Planning Area. Supply from the Floridan Aquifer is not considered to be a limited resource in the LEC Planning Area. Local governments have proposed significant increases in FAS development. Water from the FAS throughout the planning area is generally nonpotable due to salinity and requires desalination or blending to meet potable standards.

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. Advanced treatment technologies, such as reverse osmosis (RO), electrodialysis (ED) or electrodialysis reversal (EDR), must be employed before this type of supply is suitable for human consumption.

Utilities in the LEC Planning Area using the FAS as a drinking water source typically employ reverse osmosis (RO) to remove excess salinity as part of the treatment process. To some extent, FAS water can be blended with fresh water and treated with lime softening or nanofiltration technology, while still meeting drinking water standards for chlorides. The ability to use blending depends on the water quality of the FAS system water and the water quality of other treated water produced by the utility.

Reclaimed Water

Reclaimed water is a key component of Florida's regional water supply plans for water resource management, and remains a largely untapped source in the LEC Planning Area, except in northern Palm Beach County.

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.

Potential uses of reclaimed water include recharge of surface water and groundwater, environmental enhancement, landscape irrigation

(e.g., residential lots and golf courses), agricultural irrigation and industrial uses.

Some types of reclaimed water offer the ability to recharge and augment available water supplies with high-quality reclaimed water. Reclaimed water also offers an environmentally sound means for managing wastewater that dramatically 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.

Reclaimed Water Facility

Reclaimed water is not as widely used in the LEC Planning Area as in other regions of south Florida. The Florida Department of Environmental Protection's (FDEP) *2005 Reuse Inventory Report* (FDEP 2006) indicates that of the 640 million gallons per day (MGD) in wastewater flows in 2005, the average percentage of reused water was only 11 percent across the LEC Planning Area. In Miami-Dade and Broward counties, the percentage ranged from 6 percent to 7 percent of the combined 515 MGD in wastewater flows. In comparison, Palm Beach County reuses 28 percent of the 125 MGD of wastewater it generates (FDEP 2006). Furthermore, Palm Beach County has adopted a mandatory reuse ordinance requiring all new development in the area defined in the ordinance to use reclaimed water for irrigation.

Several reuse feasibility studies are currently being conducted in the LEC Planning Area. A pilot-scale study completed in January 2006 investigated the feasibility of treating wastewater to meet irrigation demands by using a membrane bioreactor to capture wastewater in distribution lines close to where reclaimed water is needed. A second study, slated for 2007, is proposed in the City of Sunrise. The purpose of this study is to develop and implement a pilot testing program to evaluate the technical and economic feasibility of treating the City of Sunrise's wastewater for aquifer recharge. This treatment would consist of commercially available highly treated wastewater technologies needed to meet water quality standards for groundwater recharge. The technology, if proven feasible, could be used for aquifer recharge for indirect potable use or the prevention of saltwater intrusion.

IN THE LEC PLANNING AREA, ACCORDING TO THE 2005 REUSE INVENTORY, ONLY 11 PERCENT OF WASTEWATER IS BENEFICIALLY REUSED.

In addition to the transmission and distribution system installation, reclaimed water systems typically include upgrading wastewater treatment facilities to advanced secondary treatment by adding increased filtration and high-level disinfection. Additional upgrades from advanced wastewater treatment to highly treated wastewater, which reduce nitrogen and phosphorous, may be needed if wetland rehydration, canal recharge or aquifer recharge projects are contemplated. A listing of reclaimed water facilities and capacities is provided in **Appendix E:** Potable and Wastewater Treatment Facilities.

Reclaimed Water System Interconnects

Reclaimed interconnects are connections between two or more reclaimed water distribution systems (which may be owned or operated by different utilities), or between two or more domestic wastewater treatment facilities that provide reclaimed water for reuse activities. Reclaimed water system interconnects offer a means to increase both the efficiency and reliability of reclaimed systems. When two or more reclaimed water systems are interconnected, additional system flexibility and reliability are often developed. Joint projects using reuse, especially for recharge, offer excellent potential to allow for expansion of Biscayne Aquifer development by avoiding impacts to the Everglades. For example, the potential exists for partnerships between Miramar and Pembroke Pines plants, Sunrise and Broward County, and other utilities to strategically place highly treated wastewater into lakes and canals to avoid or reduce dry season withdrawals from the Everglades and allow additional withdrawals from the Biscayne Aquifer.

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 ASR, reservoirs and impoundments.

Aquifer Storage and Recovery Technology

Aquifer storage and recovery technology shows promise on a larger scale than currently used at the local level for storing water during periods of water availability. The percent of water that can be recovered and the level of treatment required after storage and recovery depends on the use of the water, whether it's for

DISTRICT

Aquifer storage and recovery (ASR) is the underground storage of storm water, surface water 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 treatment and reuse in the future during dry periods.

public consumption, surface water augmentation, wetlands enhancement or irrigation. Consideration of the amount and quality of water with which the recovered ASR water can be blended before use will also affect the percent of water that can be recovered. Because ASR provides for the storage of water that would otherwise be lost to tide or evaporation, it represents an important water supply management option for Florida's future.

Lake Okeechobee Aquifer Storage and Recovery Pilot Project Groundbreaking

To date, a total of 28 ASR wells have been constructed within the District. Most of these wells store potable water, although other source waters include raw groundwater, and raw or treated surface water. Approximately 25 percent of the 28 existing ASR wells are operational, while 43 percent are in various stages of operation or testing. The remaining wells are either inactive, constructed and yet to be integrated into a water supply regime, or yet to be constructed. In addition to urban uses for ASR, the District, in cooperation with the U.S. Army Corps of Engineers (USACE), is pursuing regional ASR systems as part of the Comprehensive Everglades Restoration Plan (CERP). More than 300 ASR wells are proposed as part of the CERP, and most of these are planned around Lake Okeechobee.

In the LEC Planning Area, there are currently 15 ASR wells, 11 of which are inactive, three are in the testing phase and one is active in Boynton Beach. Miami-Dade Water and Sewer Department (WASD) has constructed five ASR wells (25-MGD capacity), but additional disinfection has been required by FDEP to meet regulatory requirements before full-scale testing can be conducted. Future ASR projects submitted for inclusion in this plan update are proposing 13 MGD of water to be made available by 2025.

Within the LEC Planning Area, a significant consideration in the location of ASR systems is the seasonal availability of water going to tide, which is not beneficial to downstream estuarine areas. This situation appears in Palm Beach County, where the environmental goal is to reduce freshwater discharges to Lake Worth Lagoon.

As recommended in the *2000 Lower East Coast Regional Water Supply Plan* (2000 LEC Plan) (SFWMD 2000), the construction of the Eastern Hillsboro Regional ASR Pilot Project, located in Palm Beach County, was completed in 2003 with financial support from the SFWMD. Developed in cooperation with Palm Beach County, the ASR pilot project was designed to store excess water from the Hillsboro Basin for later beneficial use in association with a new wellfield to serve Palm Beach County's Water Treatment Plant No. 9. Cycle testing, which began in 2004, is ongoing, and the county has applied to the FDEP for an operating permit.

Local and Regional Reservoirs

Surface reservoirs provide storage of seasonably available resources for use during dry times, improve irrigation efficiency and can be used 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, and for storage of seasonally available supplies for use during dry times.

New surface reservoir storage is generally off stream and located near a canal or other source water. Water is typically pumped from rivers or canals during wet-weather conditions and stored in an in-ground reservoir for use in the dry season.

The Acceler8 projects summarized in **Chapter 6** include several regional-scale reservoirs and impoundments. The C-43 West Reservoir in Hendry County will operate in such a manner. This reservoir is designed to include up to 52 billion gallons of off-stream storage for water captured from the Caloosahatchee River during high flows. Reservoir releases will be made to meet environmental requirements and sustain the resource for existing permitted users. In addition, the C-44 (St. Lucie Canal) and EAA reservoir projects are designed to primarily benefit the environment and provide additional water storage for their respective regions. The EAA Reservoir will have a total storage capacity of 190,000 acre-feet, and the C-44 Reservoir will have a total storage capacity of 50,600 acre-feet.

C-44 Reservoir Construction Project

Another Acceler8 project summarized in **Chapter 6** is the Water Preserve Areas in Broward County, which include the C-11 Impoundment (4,800 acre-feet) and the C-9 Impoundment (6,600 acre-feet). The canal conveyance improvements to connect the two impoundments and a 4,312-acre seepage management area will create a buffer between developed areas to the east and the Everglades Water Conservation Areas (WCAs) to the west.

Captured storm water is not commonly treated directly for potable water supply in the LEC Planning Area. The primary use of storm water use will be to recharge canals and aquifers to allow for an increased withdrawal from traditional

groundwater sources. The capture of surface water, primarily during wet-weather conditions and stored either aboveground or underground for future use, can provide supplemental water supply for municipalities, agricultural uses and environmental management.

Future projects involving this option in the LEC Planning Area, however, are limited by the availability of land for water storage. Therefore, several CERP projects recommend the use of areas where lime rock mining has occurred for seepage management.

The C-51 and Southern L-8 Reservoir Project at the Palm Beach Aggregate's (PBA) site provided the technical basis to confirm that the rock mining pits at the PBA site could effectively be used for water storage and is scheduled to be completed in 2008–2009.

L-8 Reservoir Near C-51 Canal

In the L-8 Basin, a rock pit has been acquired by the SFWMD as part of the CERP North Palm Beach County – Part 1 Project at a cost of $218 million. This project provides up to 47,000 acre-feet of storage for environmental water supply deliveries to Grassy Water Preserve, the Loxahatchee Slough and the Northwest Fork of the Loxahatchee River. An additional pit under excavation is the subject of a study by local government utilities and is also being analyzed in the CERP for storage of high volumes from the L-8 Basin to reduce discharges to Lake Worth Lagoon. Local governments in Palm Beach and Broward counties are analyzing the potential of using this rock quarry as in-ground storage to capture wet-season flows to use in the dry season. A preliminary determination of the conceptual project's feasibility is expected in 2007, with potential follow-up analysis extending into 2008.

IN THE L-8 BASIN, A ROCK PIT HAS BEEN ACQUIRED BY THE SFWMD AS PART OF THE CERP NORTH PALM BEACH COUNTY – PART 1 PROJECT... PROVIDING UP TO 47,000 ACRE-FEET OF STORAGE FOR ENVIRONMENTAL WATER SUPPLY DELIVERIES TO GRASSY WATER PRESERVE, THE LOXAHATCHEE SLOUGH AND THE NORTHWEST FORK OF THE LOXAHATCHEE RIVER.

Seawater

This source option involves using seawater—typically 35,000 milligrams per liter (mg/L) total dissolved salt—from the Atlantic Ocean or the Gulf of Mexico as a raw water source for desalination. The ocean is an unlimited source of water (salt water) from a quantitative perspective; however, removal of salts (desalination) is required before potable and irrigation uses are feasible. To accomplish salt removal, a desalination treatment technology would have to be used, such as distillation, reverse osmosis (RO) or electrodialysis reversal (EDR).

The Florida Keys Aqueduct Authority (FKAA) operates the first RO desalination plant in the State of Florida on Stock Island, as well as an RO desalination plant in Marathon. The FKAA maintains these two plants to meet peak demands as needed.

As part of the 2005–2006 water supply planning process, it was concluded that seawater desalination is a potential alternative supply that merits future consideration. Seawater treatment costs trends are declining due to improvements in membrane technologies and energy recovery research. In December 2006, the District completed a feasibility study, *Technical and Economic Feasibility of Co-located Desalination Facilities*, for co-locating seawater treatment facilities with once-through cooling power plants in south Florida (Metcalf & Eddy 2006). The study recommended three sites co-located with Florida Power & Light's (FPL) facilities in Fort Myers, Fort Lauderdale and Port Everglades.

WATER CONSERVATION

Water conservation is regarded as an important component in integrated water resource management and vitally important for the LEC 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 LEC Plan to meet the region's projected water demands and to reduce the potential for harm to wetlands and water resources.

Statewide Efforts

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 *2005–2006 Consolidated Water Supply Plan Support Document* (SFWMD 2007). The conservation methods best suited to the scope of the 2005–2006 LEC Plan Update are presented in **Appendix F**.

In addition to policy and regulatory measures, the following conservation measures were the highest ranked of the Water Conservation Initiative alternatives:

Agricultural Water Conservation

Agricultural irrigation accounts for one of the largest water uses in the LEC 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.

About 85 percent of the citrus acreage in the LEC Planning Area is now irrigated 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 Environmental Quality Improvement Program (EQIP) cost-sharing program.

Another approach being considered in the Lake Okeechobee Service Area, C-139 Basin and Western Basins is to recapture water through tailwater recovery, and then store and reuse that water to reduce losses from the farm's water management system. Implementation of this method could reduce the withdrawals of water from the source aquifers, as well as reduce runoff quantities and nutrient loads from the farm and, ultimately, from the basin. Additional storage and recovery projects in combination with water quality programs are key options to support agricultural expansion in the C-139 Basin.

C-139 Basin

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 12,700 gallons per year per home irrigation system. Pre-1992 housing units with in-ground irrigation systems would benefit the most from a rain sensor retrofit program. Based on housing age data per county, and assuming 75 percent of homes in the LEC Planning Area were to install rain sensors, the LEC Planning Area could save an estimated 22 MGD annually.

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 LEC Plan.

If 75 percent of homes built before 1984 were to retrofit at least one toilet and one showerhead, the region could potentially achieve a total annual savings of 147 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 LEC Plan Update. Water pricing rate structures (including drought rates) and informative utility billing are effective techniques to encourage water users to conserve water. Each year the District sets parameters for WaterSIP proposals that stress water conservation options recommended in the regional water supply plans.

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 (BMPs) and through water use audits, improved equipment design and installation, and greater use of reclaimed water.

Other Urban and Agricultural Measures

Reuse of reclaimed water can be used more efficiently 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 LEC Planning Area. Cooperative funding, cost-sharing, WaterSIP and other incentives to support cost-effective projects within all sectors of water use promoting increased efficiency 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. Twelve counties are served by the labs Districtwide. Funding is provided by a multiagency partnership between federal, state, regional and local levels of government. In the LEC Planning Area, there are four urban and three agricultural labs, four of which are District funded.

Agricultural Pump Station MIL

In Fiscal Years 2004 and 2005, recommendations for improvements to agricultural and urban irrigation systems in the LEC Planning Area have yielded an average potential water savings of 0.59 MGD if all recommendation were implemented. More information about conservation efforts for the LEC Planning Area can be found in **Appendix F**.

DISTRICT

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

All water supply options, including alternative water supplies and alternative water supply projects that allow for development of traditional sources, as well as conservation and reuse projects, must be considered to meet the future urban, agricultural and natural systems needs of the Lower East Coast (LEC) Planning Area. Each option bears economic, environmental and policy implications, which mandate a careful assessment from policy makers in making proactive yet feasible recommendations for the 20-year planning horizon.

Local governments have proposed 115 alternative water supply projects for this 2005–2006 LEC Water Supply Plan Update. These proposals are captured in **Chapter 7** and in **Appendix A**.

6

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. Water Supply Development projects and the South Florida Water Management District's (SFWMD or District) Alternative Water Supply Funding Program are discussed 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.

This chapter addresses the role of the SFWMD and other parties in Water Resource Development projects, and provides a summary of the Water Resource Development projects in the Lower East Coast (LEC) Planning Area, including schedules and costs for Fiscal Years 2006–2010. **Table 6** at the end of this chapter summarizes the estimated costs and time frames for completion of these projects.

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. Some of 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 reservations—do not produce water, but serve an important role in supporting the Water Supply Development projects described in **Chapter 7**. The Water Conservation Program is also discussed in this chapter, and encourages measures to use water more efficiently so the water saved can be used to meet new needs.

The SFWMD is implementing an unprecedented series of water resource projects as part of the Acceler8 and Comprehensive Everglades Restoration Plan (CERP) projects. Acceler8 alone is a $1.5 billion construction effort, which will result in more than 400,000 acre-feet of new storage.

The following water resource efforts are organized according to the current budget categories the District uses for funding both new and ongoing Water Resource Development projects. The District's Water Resource Development projects presented in this chapter encompass more than one region, and therefore, are considered to be Districtwide projects. However, aspects of these Districtwide projects specifically pertaining to the LEC Planning Area are identified in the project discussions, as well as the status of these projects and identification of implementing entities.

THE SFWMD IS IMPLEMENTING AN UNPRECEDENTED SERIES OF WATER RESOURCE PROJECTS AS PART OF THE ACCELER8 AND CERP PROJECTS. ACCELER8 ALONE...WILL RESULT IN MORE THAN 400,000 ACRE-FEET OF NEW STORAGE.

DRILLING AND TESTING PROGRAM

A Districtwide Drilling and Testing Program is providing an improved understanding of the geology and hydrology of the aquifers in 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 LEC 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 WETLAND 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, Intermediate and Floridan Aquifer Monitoring

Groundwater level and water quality monitoring in the LEC Planning Area was expanded between 2000 and 2005. Ongoing monitoring efforts continued in the Surficial Aquifer System (SAS) and Intermediate Aquifer System (IAS), and an additional 23 recorders were installed on SAS wells in Hendry County to evaluate local water-level trends. The FAS network was expanded to 12 sites in the LEC Planning Area, and two additional sites are expected to come on-line in 2007. Continuous water-level recorders have been installed at these sites, and periodic water quality assessments are available.

Floridan Aquifer Monitoring

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 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.

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 the 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 District 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 that occur throughout the District and the LEC Planning Area.

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, called "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, the 41 projects funded Districtwide were estimated to cumulatively make available 2.5 million gallons per day (MGD) of water. In Fiscal Year 2007, the 14 projects proposed for funding could save up to 0.9 MGD of water. Based on these estimates and proposed projects, the water savings for Fiscal Years 2002–2007 could be up to 3.4 MGD of water Districtwide. Since the program's inception in 2002 and through 2011, it is estimated that 4.25 MGD of water could be saved by WaterSIP.

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. The estimated quantity of water to be made available Districtwide by the MIL Program during Fiscal Years 2007–2011 is 10 MGD. Since the program's inception in 1989 through 2006, it is estimated that 106 MGD of water could have been saved if all the recommendations by the MIL Program were fully implemented.

Districtwide, there are 15 MILs serving 12 counties. Ten MILs are District funded and five are funded by other sources. In the LEC Planning Area, there are seven MILs, four of which are funded by the District. These include two agricultural MILs—one serving Miami-Dade County and one serving Broward and Palm Beach counties—and two urban MILs in Palm Beach and Broward counties. The Miami-Dade County agricultural MIL also performs urban evaluations. See **Appendix F**: Conservation for more information about the MIL Program in the LEC Planning Area.

Technician Testing Sprinkler Head for Flow and Pressure

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 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 using groundwater, surface water, seawater, aquifer storage and recovery (ASR), and reclaimed water for reuse.

Reuse Feasibility Study

A study slated for 2007 is proposed in the City of Sunrise. The purpose of this study is to develop and implement a pilot testing program to evaluate the technical and economic feasibility of treating the City of Sunrise's wastewater at its Southwest Wastewater Treatment Plant with advanced technologies to meet water quality standards for groundwater recharge. If proven feasible, the technology applied could be used for aquifer or surface water recharge for indirect potable use, or the prevention of saltwater intrusion.

Groundwater Replenishment via Canal Recharge Augmentation Study

The *Groundwater Replenishment via Canal Recharge Augmentation Study* in 2004, also known as the *Canal Recharge Feasibility Study* (CDM 2006), assessed the potential for augmentation and discharge of highly treated reclaimed water into canals and the aquifer system to provide an environmentally acceptable means of supplementing water supplies and enhancing natural systems. Data collected have been submitted to the Florida Department of Environmental Protection (FDEP) for review and for recommendation to the Florida Legislature. Currently, the District, in collaboration with the City of Plantation, is developing a pilot project for this study to be completed in 2007.

MODELING

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

Modeling for Minimum Flows and Levels

Minimum flows and levels are being developed pursuant to the requirements contained within the *Water Resources Act* and Sections 373.042 and 373.0421, Florida Statutes (F.S.), as part of a comprehensive water resources management approach to assure the sustainability of south Florida's water resources. As part of the MFL process, the SFWMD develops models to assist in determining the hydrologic relationships between MFL criteria and the water resources that need to be protected from significant harm.

FLORIDAN AQUIFER SYSTEM GROUNDWATER MODEL AND DATABASE DEVELOPMENT

In the LEC Planning Area, the use of the FAS as a water source 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 along the east coast of Florida. This effort involves two phases. Phase 1 includes the refinement of the existing FAS groundwater flow model using data collected for the construction of ASR projects associated with the CERP and individual utilities with deep well injection facilities. Phase 1 modeling was completed in Fiscal Year 2006.

As new Floridan exploratory wells are drilled and Floridan 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.

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. The schedule for development of MFLs is updated annually by the Governing Board for submittal to the FDEP. **Table 2** presents a slightly revised list from the one sent in 2006 to the FDEP and reflects the additional time needed to establish a MFL for Biscayne Bay.

Table 2. 2007 Minimum Flows and Levels Priority List and Schedule for Establishment.

Region	Water Body	Year to be Established
Lower East Coast	Loxahatchee River, N.W. Fork Tributaries	2007
	Biscayne Bay – South[a]	2008

a. Independent scientific peer review of available science for Biscayne Bay will be conducted in 2007.

RESERVATIONS ACTIVITIES

Reservations of water for the protection of fish and wildlife are a complex topic that has been the subject of several years of work by an interagency team. The consensus methodology for this option has proven elusive. Nonetheless, the SFWMD is working to complete its first reservation. **Table 3** presents the schedule for developing initial water reservations.

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.

Table 3. 2007 List and Schedule for Developing Initial Water Reservations.

Region	Water Body	Year to be Established
Lower East Coast	Everglades (ENP and WCAs) [a]	2007
	NW Fork Loxahatchee River	2007
	Biscayne Bay [b]	2008
Lower West Coast	Caloosahatchee River	2007
Upper East Coast	St. Lucie River and Estuary	2008
Kissimmee Basin	Kissimmee River	2008

a. Approach for initial reservation will be reassessed after Regional Water Availability Rule is completed.
b. Independent scientific peer review of available science for Biscayne Bay will be conducted in 2007.

CERP / ACCELER8 PROJECTS

Other efforts may be funded by District departments other than Water Supply and could include cofunding by local, state and federal agencies. Several efforts initially cited in the *2000 Lower East Regional Water Supply Plan* (2000 LEC Plan) now fall under the auspices of the CERP and Acceler8. These projects are also discussed in **Chapter 3**.

The amount of water that will be made available for allocation by these projects is uncertain and will be determined after projects are completed and operational experience gained. These Acceler8 and CERP projects are not directly reported as water made available in this *2005–2006 Lower East Coast Waster Supply Plan Update* (2005–2006 LEC Plan Update). Future plan updates will reconsider this assessment as projects are completed and water needed for environmental protection is identified.

Several Acceler8 projects are under way, such as the Fran Reich Preserve (Site 1 Impoundment), one of the Water Preserve Areas (WPAs) projects, which will capture and store runoff to reduce demands on the natural system. Other components of the WPAs, including the Water Conservation Area (WCA)-3A/3B Seepage Management and C-9 and C-11 impoundments, are being addressed within the Broward County WPAs Project.

Within the Lake Okeechobee Service Area, the C-44 Reservoir/STA Project will capture and treat local basin runoff for the environmental benefit of the St. Lucie Estuary when completed. Likewise, the C-43 Reservoir Project will capture stormwater runoff and regulatory releases from the lake, which will benefit the ecological health of the Caloosahatchee Estuary. In addition, the Lake Okeechobee Fast Track (LOFT) projects, as detailed in the Lake Okeechobee & Estuary (LOER) Plan, are designed to capture and treat stormwater runoff north of the lake to remove phosphorus before entering Lake Okeechobee.

For the purposes of tracking Acceler8 projects associated with the LEC Planning Area, **Table 4** and **Table 5** provide a summary of construction start and anticipated finish dates, budget estimates, and water supply benefits.

L-8 Reservoir Near C-51 Canal

The CERP's ASR Pilot projects and Lake Belt In-Ground Reservoir Technology, in which rock-mined areas are used for seepage management, are reservoir projects within the LEC Planning Area. The C-51 and Southern L-8 Reservoir Project at the Palm Beach Aggregate's site provided the technical basis to confirm that the rock mining pits at the Palm Beach Aggregate's site could effectively be used for water storage. The construction of up to 47,000 acre-feet of storage with associated inflow and pumping infrastructure is scheduled to be completed in 2008–2009. By using a phased approach to the construction, approximately 25,000 acre-feet of storage capacity has been made available for interim water management benefits in the L-8 Basin area, and this capacity will increase every year until full completion.

Table 4. Status of Acceler8 Projects in the LEC Plan Boundary East of the Everglades.

Project	Planning and Fieldwork (Basis of Design Report)	Main Construction Start	Finish Construction	Project Budget[b]	Water Resources Benefit
Biscayne Bay Coastal Wetlands	Completed	Aug-07	Dec-09	$32,519,228	Phase 1: Redistributes portion of canal point discharges to restore historic coastal wetlands.
C-111 Spreader Canal	Completed	Nov-07	Dec-10	$46,822,983	Phase 1: Diverts water from C-111 Canal for restoration of Taylor Slough and southern glades.
Acme Basin B	Completed	Completed Jun-06	Jun-08[a]	$36,863,569	Diverts existing untreated discharge into Loxahatchee National Wildlife Refuge to STA-1E to be treated prior to discharge into the refuge.
Fran Reich Preserve	Completed	Jun-07	Dec-09	$41,296,991	Phase 1: Captures and stores urban runoff, reducing demands on the natural system.
EAA STA Expansions	Completed	Jan-06	Sep-11	$182,000,000	Expands the existing stormwater treatment areas by 18,000 acres, which will improve treatment capability of stormwater runoff from the Everglades Agricultural Area (EAA) before entering the Everglades.
EAA Reservoir - Phase 1; Bolles Canal & Feasibility Study	Completed	Completed Jul-2006	Dec-10	$536,554,372	Reservoir with a total storage capacity of 190,000 ac-ft that captures and stores Lake Okeechobee discharges and local basin runoff, which can then be delivered for environmental and agricultural water supply.
WCA-3A/3B Seepage Management	Draft Submitted	Jun-07	Dec-09	$30,291,914	Reduces seepage from the WCA-3A/3B into the western C-11 Basin. Retaining Everglades quality water in the conservation areas.
C-11 Impoundment	Draft Submitted	Jun-07	Dec-09	$85,541,762	Total storage capacity of 4,800 ac-ft. Purpose is to reduce pumping of S-9 stormwater that now flows to WCA-3A.
C-9 Impoundment	Draft Submitted	Jun-07	Dec-09	$58,222,854	Total storage capacity of 6,600 ac-ft. Purpose is to reduce pumping of S-9 stormwater that now flows to WCA-3A.

a. Many of the projects are broken into phases, such as the EAA STA expansions.
b. Amended Project Budget includes Design/Land Management/Construction.

Table 5. Status of Acceler8 Projects in Lake Okeechobee Service Area.

Project	Planning and Fieldwork (Basis of Design Report)	Main Construction Start	Finish Construction	Project Budget[b]	Water Supply Benefit
C-43 West Reservoir	Completed	Jul-07	Dec-10	$334,000,000	Total storage capacity of 170,000 ac-ft. Captures stormwater runoff and regulatory releases from Lake Okeechobee.
C-44 Reservoir/STA	Completed	Jun-07	Dec-09	$339,768,479	Total storage capacity of 50,600 ac-ft. Stores and treats local basin runoff for the environmental benefit of the St. Lucie Estuary.
Execution of Lake Okeechobee Fast Track Projects	Start Date Jan-07	Mar-08 to Dec-09	Dec-09 to Sep-10	$184,895,956	Taylor Creek, Lakeside Ranch STA, Rerouting of S-133 and S-154 subbasins. Purpose is to capture and treat local basin runoff prior to entering Lake Okeechobee.

a. Many of the projects are broken into phases, such as the STA expansions.
b. Amended Project Budget includes Design/Land Management/Construction.

Table 6. Implementation Schedule and Costs for Non-Acceler8 Districtwide Water Resource Development Projects Fiscal Years 2006–2010.

Water Resource Development Projects	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	2,890
Groundwater and ET Assessments Est. start date: 1954 and 2002, respectively Est. finish date: ongoing	385	405	425	446	468	2,554
Water Conservation Program Est. start date: 1977/2000 Est. finish date: ongoing	1,650	1,381	1,331	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
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
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
Total	6,296	4,076	4,843	3,781	3,884	22,455

SUMMARY

Water Resource Development projects serve various purposes in support of water supply development. The beneficial outcomes of the resource development projects discussed in this chapter include:

- Improved understanding of the hydrologic system that is the source of both traditional and alternative water supplies for the Lower East Coast (LEC) Planning Area.
- Prevention of loss of natural resources.
- Preservation of existing supplies through better resource understanding, and management and implementation of regional resource improvement programs.
- Avoidance of potentially greater future expenditures associated with additional restoration of environmental degradation.
- Cost savings, including those savings associated with appropriate supply facilities design and use of existing resources.
- Increased future supply availability through testing or program implementation.

LAW / CODE

Section 373.196(3), Florida Statutes (F.S.), provides:

The primary roles of the water management districts in water resource development as it relates to supporting alternative water supply development are:

(a) The formulation and implementation of regional water resource management strategies that support alternative water supply development;

(b) The collection and evaluation of surface water and groundwater data to be used for a planning level assessment of the feasibility of alternative water supply development projects;

(c) The construction, operation, and maintenance of major public works facilities for flood control, surface and underground water storage, and groundwater recharge augmentation to support alternative water supply development;

(d) Planning for alternative water supply development as provided in regional water supply plans in coordination with local governments, regional water supply authorities, multijurisdictional water supply entities, special districts, and publicly owned and privately owned water utilities and self-suppliers;

(e) The formulation and implementation of structural and nonstructural programs to protect and manage water resources in support of alternative water supply projects; and

(f) The provision of technical and financial assistance to local governments and publicly owned and privately owned water utilities for alternative water supply projects.

7
Water Supply Development Projects

Increasing population in the Lower East Coast (LEC) Planning Area, which is expected to reach 7.3 million by 2025, is driving the need for water supply development. Net finished water demand for all users is projected to increase from approximately 1,450 million gallons per day (MGD) to 1,843 MGD between 2005 and 2025.

As discussed in previous chapters, the availability of fresh groundwater is limited to meet the needs of future growth in the LEC Planning Area. Therefore, the additional water needed to meet increased future urban demand is expected to be developed primarily from alternative water supplies. For the LEC Planning Area, alternative water supplies include the development of brackish groundwater sources; captured storm water during wet weather; recharge of the groundwater systems with highly treated reclaimed water; and, localized reclaimed projects.

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.

This chapter provides a summary of the Water Supply Development projects anticipated to meet the needs of the LEC Planning Area for the next 20 years. Information is provided for each water use category (described previously in **Chapter 2**), with an emphasis on the fast-growing Public Water Supply sector. Additional details about these projects, local government information, demand projections and project costs can be found in **Appendices A, B, D** and **G**, respectively. In addition, for each public water supply utility providing over 100,000 gallons per day (0.10 MGD) to its service area, a utility summary is included in this chapter following the discussion of Public Water Supply. The utility summary presents population and demand estimates, as well as proposed sources and projects to meet future demands. Currently in the LEC Planning Area, there are 58 permitted public water supply utilities, of which 55 utilities serve 113 local governments.

NET FINISHED WATER DEMAND FOR ALL USERS IS PROJECTED TO INCREASE FROM APPROXIMATELY 1,450 MGD TO 1,843 MGD BETWEEN 2005 AND 2025.

Government-owned utilities, local governments, 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.

For the public water supply utilities, the utility summaries in this *2005–2006 Lower East Coast Water Supply Plan Update* (2005–2006 LEC Plan Update) contain a variety of water supply-related information useful to local governments in the preparation and amendment of their comprehensive plans. For example, within 18 months following the approval of this LEC Plan Update, the potable water element must [Subsection 163.3177(6)(c), Florida Statutes (F.S.)]:

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

Appendix B provides a summary of the current requirements and information about how to use this plan update to address these requirements.

Given Governing Board direction to reduce reliance on the regional system for future water supply needs, projects selected for inclusion in this 2005–2006 LEC Plan Update are primarily 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 alternative water supply and traditional projects planned to meet their 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 this plan update, as detailed in the utility summaries.

Not all projects originally proposed in the questionnaires are included in this plan update and in the utility summaries. Several factors were evaluated to determine a project's inclusion in this plan update, such as resource constraints and whether a project actually contributes to new water supply. Also, many projects submitted

reflect such practices as maintenance of existing facilities and improvements to the distribution system. While these projects reflect good utility practice, they do not represent water supply development projects needed to meet new demands.

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), 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 alternative project(s), and the local government will need to include such information in its 10-Year Water Supply Facilities Work Plan. Any utility-proposed projects will, ultimately, need to be permitted by the District.

The District recognizes that some public water supply utilities are conducting additional studies to identify the most appropriate water supply project options to meet future needs. In addition, other large water users, especially thermoelectric utilities and agricultural users, will require time to identify the specific water supply projects to be developed once the locations of their water supply needs have been determined. For these reasons, the District will consider amending the regional water supply plan updates on an annual basis for the next three years to allow for the inclusion of additional, specific alternative water supply projects. Such amendments, if needed, are proposed to be done during January and February for the next three years. Only local governments affected by the additional alternative water supply projects would be required to amend their comprehensive plans, consistent with the requirements of Subsection 163.3177(6)(c), F.S. At the end of the three-year period, the need for this annual plan amendment process will be re-evaluated.

Funds for water supply development at the local level, as provided in Section 373.196, F.S., are a shared responsibility of water suppliers and users, the State of Florida, and the water management districts. In 2005, the state appropriated $100 million for the Water Protection and Sustainability Program, which was divided among all the water management districts.

Subsection 373.1961(3)(e), F.S., specifies that applicants seeking cost-sharing assistance must pay at least 60 percent of the project's construction costs; however, this can be waived at the discretion of each water management district for projects sponsored by financially disadvantaged small local governments. Water management districts or basin boards may also use *ad valorem* or federal revenues to help an applicant meet the 60 percent requirement.

In most cases, the project should be included in a region's water supply plan update, although 20 percent of the funds may be allocated—at the discretion of each

district—to projects that are not in the plan update, but are consistent with its goals. When the District deems it appropriate, the plan update should also specifically identify the need for multijurisdictional approaches to project options based on analysis, and permittable, financial and technical feasibility.

The fact that an alternative water supply project has been identified in the utility summaries and included in this LEC Plan Update makes that project eligible for funding consideration, but does not guarantee District funding of that project. Inclusion in the plan update does not serve by itself as an application for funding. The alternative water supply funding 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 funds are for construction of alternative water supply projects, and applicants must pay at least 60 percent of a project's construction costs. The application for alternative water supply funding, as well as submittal time frames and requirements are posted each year on the District's Web site.

The alternative water supply projects listed in this 2005–2006 LEC Plan Update include not only the alternative water supply projects submitted by local suppliers specifically for consideration in this plan update, but also projects submitted and approved for cost-sharing funds from the District for Fiscal Years 2006 and 2007. Of the projects approved for cost-sharing funds in Fiscal Year 2006, 34 were located in the LEC Planning Area and together received over $15.1 million in District allocated cost-share funding. In Fiscal Year 2007, 22 projects were approved for cost-sharing funds in the LEC Planning Area and together are expected to receive over $10 million.

In addition, this plan update includes projects recommended by the District for utilities that showed an unmet future need and did not submit projects with sufficient volumes to meet the future need. A listing of all projects can be found in **Appendix A.** Combining the projects submitted for the 2005–2006 LEC Plan Update, the projects that received funding in Fiscal Years 2006 and 2007, and the projects developed by the District, a total of 129 water supply projects are included in this plan update.

A discussion of the demand and supply conditions for each of the six major water use categories follows. Because most of the growth in demand during the next 20 years will occur in the urban sector, and more specifically within the public water systems, emphasis is placed on evaluating future needs and recommending water supply projects within the Public Water Supply category.

PUBLIC WATER SUPPLY

Urban Development – LEC Planning Area

Public Water Supply demand, which includes all potable uses served by municipal and private utilities, is projected to grow from the current 869 MGD to 1,174 MGD in 2025. This increase in water demand is distributed among 113 local governments, of which 45 have their own utilities. In addition, 13 special districts or private utilities serve at least a portion of these local governments. In **Appendix B**, service area maps are provided for 2005–2006 and 2025, which reflect the proposed changes in service area boundaries and legal municipal boundaries.

PUBLIC WATER SUPPLY DEMAND, ... IS PROJECTED TO GROW FROM THE CURRENT 869 MGD TO 1,174 MGD IN 2025.

Public water demand is currently met through a combination of traditional groundwater and surface water supplies, as well as alternative supplies, such as brackish groundwater. For consistency in the water supply planning process, the SFWMD, local governments and utilities worked closely with the Florida Department of Community Affairs (FDCA) in projecting demands and proposing alternative water supply projects. Individual utility summaries were prepared that provide service area data regarding each major utility's current and projected demands in the LEC Planning Area for 2005, 2015 and 2025. **Table 7** shows this summary for 2005 and 2025 by county in the LEC Planning Area.

Table 7. Public Water Supply Demands and Projections for 2005 and 2025.

County	2005 PWS Demand (MGD)	2025 Projected PWS Demand (MGD)[a]
Palm Beach[b]	232.3	325.6
Broward	245.4	351.3
Miami-Dade	374.5	472.8
Monroe[c]	17.4	23.9
Hendry[c]	0.0	0.0
Total	869.6	1,173.6

a. Projected finished water yields are from projects listed in the PWS utility summaries and do not include Domestic Self-Supplied projections.
b. Includes population in Martin County served by Jupiter and Tequesta utilities.
c. Portion of county in the LEC Planning Area.

The individual utility summaries presented at the end of this section provide consistent baseline information about finished water demands, yield from existing permitted supplies, as well as the conditions on the permits, where applicable. To provide this information, a number of assumptions were used. For the purposes of water supply planning, permanent resident populations and per capita finished water use rates form the basis of the projected water demands. In the consumptive use permitting (CUP) process, the demand and population concepts are different and the estimates generally cannot be interchanged. For example, the utility summaries present finished water demands (the customer demands), while, in general, the CUP process focuses on raw water withdrawals (the demand on the resource). In the CUP process, a raw water per capita use rate based on a five-year raw water use average is used. The per capita use rate used in the water supply plan, with some exceptions, reflects per capita finished water demands in 2000 as the baseline usage. Some utilities have significant differences in the raw water allocation and the finished water delivered due to treatment processes, such as membrane technology. If the efficiency is known or detailed in the permit, the differences are calculated based on this information.

In addition, permanent resident populations are used in this plan update and the estimates are consistent with the 2000 U.S. Census and closely track the medium population estimates and projections from the University of Florida, Bureau of Economic and Business Research (BEBR 2006). The estimates for this plan update have been developed for all utilities based on the same information and are consistent with the projected county permanent resident populations. In coordinating the planning process with the utilities and planning departments, population figures were adjusted in cases where the FDCA had approved alternative projections that support a local government's current comprehensive plan. Populations in CUP documents, on the other hand, may reflect seasonal, as well as permanent, resident populations and are developed independently at the time of permit issuance/renewal.

It is also understood that CUP rules for traditional freshwater sources may change during the 20-year planning period in the LEC Planning Area. The District initiated rule development related to the availability of regional water in the LEC Planning Area during the course of this plan update. Regional water regulated under the Governing Board adopted rule includes fresh groundwater from the Surficial and Biscayne aquifers, which are recharged by surface water from the Everglades and specified water bodies within the Loxahatchee Watershed, as discussed in **Chapter 3**. With the higher-than-expected growth in south Florida, the uncertainty in Everglades restoration project implementation schedules and performances (as compared with the original targets of the Comprehensive Everglades Restoration Plan), and pending changes in Lake Okeechobee operations, the availability of additional Everglades water to meet all the projected growth is questionable. To avoid competition for water supplies and to ensure Everglades restoration, this plan update promotes the diversification of sources through the development of alternative water supply projects to meet increased demands over the current use. To assess the current use, given the time frame of the 2005–2006 LEC Plan Update, the best available data are the average daily flow of finished water from January to December 2005, as reported to the Florida Department of Environmental Protection (FDEP). The effects of the Regional Water Availability Rule will be incorporated into future plan amendments.

For permits that have already been issued, the current traditional source allocations or withdrawal limitations will remain in effect throughout the specified time frame of the permits. A small number of 20-year permits are scheduled to expire just prior to 2025. For the purposes of this plan update, the final year's volume is held constant for the duration of the planning period.

For shorter-term permits that will expire within the 20-year planning period and those permits that are in-house for renewal, the current use (2005) of a traditional source is reflected from the time the permit expires until 2025. This does not preclude water suppliers from obtaining additional allocations for traditional groundwater not influenced by the regional system or from groundwater if appropriate offsets, such as canal or aquifer recharge, are developed.

In 2005, more than 90 percent of the region's current public water demand was met using traditional supplies. In 2025, the percentage is expected to be about 75 percent, as most of the increased demands will be met by alternative water sources. (These percentages may change as new projects proposed late in the planning development process are incorporated into future plan amendments.)

IN 2005, MORE THAN 90 PERCENT OF THE REGION'S CURRENT PUBLIC WATER DEMAND WAS MET USING TRADITIONAL SUPPLIES. IN 2025, THE PERCENTAGE IS EXPECTED TO BE ABOUT 75 PERCENT, AS MOST OF THE INCREASED DEMANDS WILL BE MET BY ALTERNATIVE WATER SOURCES.

Alternative Water Sources in the Utility Summaries

In addition to traditional fresh surface water or groundwater sources that may be available in the current permits, the utility summaries include alternative water sources in the following categories: Volume from Floridan Aquifer; Volume from "Other," which includes aquifer storage and recovery (ASR), captured storm water otherwise lost to tide, water conservation or sale/purchase agreements; and, Volume from Reclaimed. **Table 8** summarizes the number of alternative water supply projects (115) submitted for this plan update by public water suppliers and the potential new additional water supplies these projects would yield by 2025.

Table 8. Alternative Water Supply Projects and Yields (MGD) for 2025.

Alternative Water Source	Number of Projects	Yield (MGD)
Floridan Aquifer	45	290
Other	23	74
Reclaimed	47	201

The Floridan Aquifer category includes brackish water projects, which were evaluated in terms of finished water capacity to meet demands on an average annual daily basis. These projects generally included proposed construction of reverse osmosis (RO) treatment plants. Brackish water projects were proposed by utilities throughout the LEC Planning Area, with an almost equal share of the expected future yield distributed among Palm Beach, Broward and Miami-Dade counties.

In the "Other" water source category, current finished and raw water ASRs in this plan update have been evaluated using the 2005 finished water calculations. For future projects, finished water calculations will need to be determined as the scope of these projects becomes more defined. In addition, large sales or purchases of water to areas outside of an individual utility's respective service area were evaluated using the 2005 calculations. A projection of sale/purchase agreements for the 20-year planning period was evaluated using the best information available to date and will be tracked carefully in future updates.

Water conservation is a critical part of the District's efforts to protect and preserve the region's water resources. The District's programs include an annual funding initiative for water conservation efforts. The Water Conservation Program and local components are discussed in **Chapter 5**. Seven individual water conservation projects are included in the utility summaries.

Reclaimed water provides many benefits; however, assessing these projects will vary based on type, location and customers. For example, installing and mandating hook-ups to a reuse irrigation system in an area currently using treated drinking water

from a municipal utility for irrigation will lower the utility's per capita consumption and allow the utility to serve more customers with the same volume of potable water. On the other hand, supplying reclaimed water to self-supplied operations, such as golf courses or other large users, can reduce the competition for limited freshwater resources, but does not result in a reduction in demand on the potable water system.

Other reuse projects, such as aquifer or canal recharge using highly treated reclaimed water, can be designed to support additional allocations of fresh groundwater by offsetting potential resource impacts that otherwise would preclude permitting of additional traditional shallow groundwater sources.

For planning purposes, proposed reclaimed projects for the LEC Planning Area were evaluated based on the following assumptions:

- A canal or aquifer recharge project is assumed to be located in the same area and recharging the same source to offset the proposed increased use. This is consistent with Governing Board direction in recent permitting decisions and assumes that the project will be designed to achieve a maximum offset.
- Existing offsets, already defined in a current consumptive use permit, such as in the case of Palm Beach County, Delray Beach and Pompano Beach, are incorporated.
- Irrigation and other proposed projects generally have a wide range of potential offsets that need to be determined through additional analyses, concluding with an eventual CUP. These offsets for such projects are designated as "To Be Determined" (TBD).

Currently, 28 percent of the wastewater generated in Palm Beach County is reused; 7 percent of the wastewater in Miami-Dade County is reused; and, 6 percent of the wastewater in both Broward and Monroe counties is reused (FDEP 2006). In 2005, the total annual flow of wastewater (640 MGD) in the LEC Planning Area was more than the projected increase in potable water demands for 2025. Expansion of existing reuse projects in Palm Beach County is moving forward, and significant new projects have been proposed throughout the region.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Broward County Water and Wastewater Services

Permitted Entity: Broward County District 1

Service Area: Broward County Service Area 1, which includes portions of City of Lauderdale Lakes, City of North Lauderdale, City of Oakland Park and Unincorporated Broward County

Broward County Water and Wastewater Services (BCWWS) proposes to construct two Floridan wells and treatment systems to meet the future needs of District 1. A total capacity of 5.00 MGD for both wells is needed to account for the reverse osmosis (RO) treatment system process. The county should also investigate the potential of a highly treated reuse/recharge project (with reclaimed water from another utility) for canal recharge to allow additional development of groundwater from the District 1 System.

CURRENT AND PROJECTED WATER SUPPLY			
	Actual	Projected	
Item	2005	2015	2025
Population	73,137	87,644	100,941
Per Capita (gallons per day finished water)		131	131
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	9.24	11.48	13.22
Water Source: Volume from Biscayne/Surficial	9.24	9.24	9.24
Volume from Floridan	0.00	2.50	5.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
	Alt.	Total Cap.	Total Design Capacity			
Projects	Source	Costs	2010	2015	2020	2025
Two Floridan Wells and Treatment Systems	Brackish	$30,000,00	0.00	2.50	5.00	5.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Broward County Water and Wastewater Services

Permitted Entity: Broward County 2A/North Regional PWS

Service Area: Broward County 2A Service Area, which includes portions of City of Coconut Creek (City of Coconut Creek distributes to City of Parkland and Seminole Tribe Coconut Creek Reservation), City of Coral Springs, City of Deerfield Beach and City of Lighthouse Point

The District recommends that Broward County (BCWWS) construct a highly treated reuse/recharge project from its north plant for canal recharge to allow additional development of groundwater from the District 2A/North Regional Wellfield. The District is recommending this project be developed in conjunction with the City of Pompano Beach Utilities Dept. to meet its expected water demand shortfalls in 2025. Therefore, this project is also reported in the City of Pompano Beach summary for 5.00 MGD. The utility plans to provide two additional reuse projects for irrigation.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	112,643	134,426	142,618
Per Capita (gallons per day finished water)		143	143
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	15.07	19.22	20.39
Water Source: Volume from Biscayne/Surficial	[a]15.07	[a]15.07	[a]15.07
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	1.00	1.00
Volume from Reclaimed	0.00	4.50	5.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.04	0.00

a. The 0.59 MGD of raw water supplied to Deerfield Beach from the North Regional Wellfield is accounted for.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Use of ASR Well at Broward County 2A WTP	Other	$1,375,000	1.00	1.00	1.00	1.00
West Reclaimed Water Landscape Irrigation for City of Coconut Cr.	Reclaimed	$55,640,000	0.60	1.70	2.85	2.85
East Reclaimed Water Landscape Irrigation for City of Pompano B.	Reclaimed	$40,258,000	0.00	2.00	2.00	2.00
Highly Treated Reuse/Recharge Water for Canal Recharge [b]	Reclaimed	$44,200,000	0.00	6.50	6.50	10.00

b. This project reflects a 10.00 MGD highly treated reuse/recharge project for the county and municipal wellfields, including Pompano Beach. The volume of highly treated reuse/recharge may be increased if the ASR well or irrigation projects for BCWWS fall below predicted yields. However, these projects are assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Broward County Water and Wastewater Services

Permitted Entity: Broward County South Regional Wellfield

Service Area / Customers: City of Dania Beach, City of Hallandale Beach, City of Hollywood and Florida Power & Light (FPL)

Broward County South Regional Wellfield, also known as the Brian Piccolo Wellfield, supplies raw, untreated water to Hollywood, Hallandale Beach, Dania Beach and FPL. The increased withdrawals from a subset of these users are reflected in their respective summaries. However, the increased withdrawals beyond the reported 2005 use will require Broward County in partnership with the individual large users to provide sufficient offsets for those expected increases. The District recommends a multijurisidictional, highly treated reuse/recharge project that would provide recharge in sufficient quantities to allow for this increase in groundwater withdrawal. Reclaimed water could potentially be acquired from utilities in the vicinity of the Piccolo Wellfield, such as Pembroke Pines or Miramar.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual	Projected	
	2005	2015	2025
Population	N/A	N/A	N/A
Per Capita (gallons per day raw water)		N/A	N/A
(Note: All potable volumes are raw water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	10.52	20.07	21.73
Water Source: Volume from Biscayne/Surficial	10.52	10.52	10.52
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]0.00	[a]0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn. Volumes are reported in individual utility summaries for those large users identified above.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Highly Treated Reuse/Recharge Water for Canal Recharge	Reclaimed	TBD	0.00	10.00	10.00	12.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Cooper City Utilities Department

Permitted Entity: Cooper City Utilities

Service Area: City of Cooper City

Cooper City faces a small shortfall in water supply for 2015 and 2025, but could possibly meet demands with a District-recommended conservation program to reduce production losses at its treatment plant. Or, the utility proposes a preliminary Floridan reverse osmosis (RO) water treatment plant to make up this shortfall. The finished water for 2005 does not reflect the efficiency losses expected for membrane treatment. For example, the 4.64 MGD average day treated water will require withdrawals of 5.50 MGD of raw water, assuming a 25 percent efficiency loss. Cooper City treats 2.70 MGD of wastewater to secondary standards and sends it to Hollywood's WWTP.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual	Projected	
	2005	2015	2025
Population	29,437	38,176	38,776
Per Capita (gallons per day finished water)		120	120
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	3.21	4.57	4.64
Water Source: Volume from Biscayne/Surficial	3.21	4.25	4.25
Volume from Floridan	0.00	1.50	2.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Conservation Program	Other	$1,500,000	0.50	0.50	0.75	0.75
Floridan RO Facility	Brackish	$11,000,000	1.50	1.50	2.00	2.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Coral Springs

Permitted Entity: City of Coral Springs

Service Area: City of Coral Springs

The City of Coral Springs is served by five utilities: the City of Coral Springs, Coral Springs Improvement District (CSID), North Springs Improvement District (NSID), Royal Utility Company and Broward County Water and Wastewater Services (BCWWS). The city is proposing a 2.00 MGD Floridan wellfield and reverse osmosis (RO) water treatment plant for the portion of the city it serves. Another option is for Coral Springs to participate in a District-recommended joint, highly treated reuse/recharge project with Coral Springs Improvement District, North Springs Improvement District and/or North Lauderdale to provide recharge in sufficient quantities to allow for needed increases in groundwater withdrawal.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	61,345	67,328	70,088
Per Capita (gallons per day finished water)		137	137
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	7.86	9.25	9.63
Water Source: Volume from Biscayne/Surficial	7.86	7.86	7.86
Volume from Floridan	0.00	2.00	2.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
2.00 MGD Floridan RO Water Treatment Plant	Brackish	$10,000,000	2.00	2.00	2.00	2.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Coral Springs Improvement District

Permitted Entity: Coral Springs Improvement District

Service Area: City of Coral Springs

Coral Springs Improvement District's (CSID) current capacity is over 5.00 MGD. The utility is projected to have approximately a 1.80 MGD deficit for 2025. Currently, CSID's Wastewater Treatment Plant is in the design phase of numerous upgrades. The District recommends a highly treated reuse/recharge project to provide recharge in sufficient quantities to allow for this increase in groundwater withdrawal. This project could be expanded as a joint effort with Coral Springs, North Springs Improvement District and/or North Lauderdale to meet water supply shortages.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	39,274	42,231	44,586
Per Capita (gallons per day finished water)		138	138
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	4.38	5.82	6.14
Water Source: Volume from Biscayne/Surficial	4.38	4.38	4.38
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	1.50	[a]2.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Highly Treated Reuse/Recharge Water for Canal Recharge with Coral Springs and North Springs Imp. District (NSID) (2.00 MGD) for a Total of 5.00 MGD [b]	Reclaimed	$3,000,000	1.00	1.50	1.50	2.00

b. Assumes sufficient recharge to support additional withdrawals of fresh groundwater for the withdrawals.

B. UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Dania Beach

Permitted Entity: City of Dania Beach

Service Area: City of Dania Beach

The City of Dania Beach is experiencing saline water intrusion and is encouraged to find alternative water supply sources as soon as possible. Given this limitation from its wellfield and the historic use of purchases from the Broward County Water and Wastewater Services (BCWWS) South Regional Wellfield (Brian Piccolo Wellfield), it is recommended that the city join other Piccolo Wellfield customers and the county to develop a highly treated reuse/recharge project to allow increased withdrawals of fresh groundwater. The offsets for this increased withdrawal are reflected in the Broward County South Regional Summary.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	16,060	20,818	23,990
Per Capita (gallons per day finished water)		169	169
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	2.54	3.52	4.05
Water Source: Volume from Biscayne/Surficial	1.33	[a]1.33	[a]1.33
Volume from Floridan	0.00	0.00	0.00
Volume from Other	1.21	2.19	2.72
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
South Regional Wellfield Raw Water Purchase [b]	Other		1.21	2.19	2.56	2.72

b. See reuse/recharge project described in Broward County South Regional summary.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Town of Davie

Permitted Entity: Town of Davie

Service Area: Town of Davie and Seminole Reservation (Hard Rock Casino)

The Town of Davie proposes to develop an alternative source by eliminating the North WTP by 2010 (rated at 3.40 MGD) and developing a Floridan reverse osmosis (RO) water treatment plant. Recent issues concerning increased population demands will be assessed through the comprehensive planning process to ensure consistency, as well as the future potential for servicing the Ferncrest area. The town also anticipates a development proposal on U.S. 441 that will increase growth at a higher rate than projected.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual	Projected	
	2005	2015	2025
Population	29,635	36,631	41,949
Per Capita (gallons per day finished water)		155	155
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	4.57	5.67	6.49
Water Source: Volume from Biscayne/Surficial	4.57	4.57	4.57
Volume from Floridan	0.00	5.00	6.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
RO Addition to South WTP (6.00 MGD Capacity)	Brackish	$16,000,000	4.00	5.00	5.00	6.00
New RO Plant to Serve New 441 Corridor and Downtown Regional Activity Center (RAC) (6.00 MGD Capacity)	Brackish	$24,000,000	4.00	5.00	5.00	6.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Deerfield Beach

Permitted Entity: City of Deerfield Beach

Service Area: City of Deerfield Beach

Brackish water projects are proposed by the utility to expand the west reverse osmosis (RO) treatment facility and add a possible blending well. The District proposes increasing the second phase of this RO project to cover the increasing demands in 2025. The estimated per capita consumption for Deerfield Beach indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	54,613	60,538	66,381
Per Capita (gallons per day finished water)		228	228
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	11.30	13.78	15.11
Water Source: Volume from Biscayne/Surficial	[a]11.30	[a]11.30	[a]11.30
Volume from Floridan	0.00	3.00	4.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. The 0.59 MGD raw water purchase from District 2A/North Regional is included.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
West WTP Brackish Water RO Treatment Improvements - Phase I	Brackish	$5,000,000	1.50	1.50	1.50	1.50
West WTP Brackish Water RO Treatment Improvements - Phase II	Brackish	$2,500,000	1.50	1.50	1.50	3.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Ferncrest Utilities, Inc.

Permitted Entity: Ferncrest Utilities, Inc.

Service Area: Town of Davie

The District recommends that Ferncrest purchase additional water needed from the Town of Davie. This area may be brought into the Davie service area in the future.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	4,854	5,472	5,675
Per Capita (gallons per day finished water)		125	125
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.56	0.68	0.71
Water Source: Volume from Biscayne/Surficial	0.56	0.56	0.56
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	[a]0.56	[a]0.56
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Purchases from Davie.

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Purchases from Town of Davie	Other	TBD	0.56	0.56	0.56	0.56

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Fort Lauderdale

Permitted Entity: City of Fort Lauderdale

Service Area: City of Fort Lauderdale, Town of Lauderdale-by-the-Sea, Village of Lazy Lake, City of Oakland Park, Village of Sea Ranch Lakes, City of Tamarac and City of Wilton Manors

The city proposes to develop Floridan wellfields and reverse osmosis (RO) water treatment plants to meet future demands. The estimated per capita consumption for Fort Lauderdale indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	237,492	285,507	361,178
Per Capita (gallons per day finished water)		229	229
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	47.81	65.27	82.57
Water Source: Volume from Biscayne/Surficial	47.81	47.81	47.81
Volume from Floridan	0.00	32.25	37.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Dixie Floridan Water Supply/Treatment Facility	Brackish	$22,885,000	0.00	4.50	7.50	7.50
Prospect Floridan Water Supply/Treatment Facility	Brackish	$220,696,000	0.00	27.75	30.00	30.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Hallandale Beach

Permitted Entity: City of Hallandale Beach

Service Area: City of Hallandale Beach

Saltwater intrusion in the southern Broward region may threaten the viability of existing freshwater sources within the next 10 years. Hallandale Beach has proposed additional raw water withdrawals from the BCWWS South Regional Wellfield, also known as the Brian Piccolo Wellfield. It is recommended that the city join other Piccolo Wellfield customers and the county to develop a highly treated reuse/recharge project to allow increased withdrawals of fresh groundwater. The potential offsets for this increased withdrawal are reflected in the Broward County South Regional Summary. Any increased population projections that may be forthcoming from coastal redevelopment will be assessed through the comprehensive planning and permitting process to ensure consistency. A new membrane treatment plant is expected to come on-line in 2007 with a capacity of 6.50 MGD.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual	Projected	
	2005	2015	2025
Population	37,048	43,866	49,678
Per Capita (gallons per day finished water)		165	165
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	5.66	7.25	8.21
Water Source: Volume from Biscayne/Surficial	3.00	0.00	0.00
Volume from Floridan	0.00	0.00	0.00
Volume from Other	2.66	[a]7.25	[a]8.21
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Based on an 85 percent efficiency rate of raw/finished water.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
South Regional Wellfield Raw Water Purchase [b]	Other		7.67	8.53	9.19	9.66

b. See reuse/recharge project described in Broward County South Regional summary.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Town of Hillsboro Beach Public Water Supply

Permitted Entity: Town of Hillsboro Beach Public Water Supply

Service Area: Town of Hillsboro Beach

Hillsboro Beach is developing a Floridan reverse osmosis (RO) water treatment plant designed to meet peak flows. The utility originally submitted this project at 2.30 MGD, and the District is proposing to increase the timeline for water to be available by 2010. The estimated per capita consumption for Hillsboro Beach indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	2025
Population	2,333	2,770	3,592
Per Capita (gallons per day finished water)		435	435
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.84	1.20	1.56
Water Source: Volume from Biscayne/Surficial	0.84	0.00	0.00
Volume from Floridan	0.00	2.00	2.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
New Floridan Aquifer Water Supply Well and Treatment Plant	Brackish	$6,000,000	2.00	2.00	2.00	2.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Hollywood

Permitted Entity: City of Hollywood

Service Area: City of Hollywood, City of Dania Beach, Town of Pembroke Park, Seminole Hollywood Reservation, City of West Park and Portions of Unincorporated Broward County

The City of Hollywood is developing additional Floridan reverse osmosis (RO) water treatment up to 10.70 MGD finished water by 2025. The raw water withdrawals from BCWWS South Regional Wellfield (Brian Piccolo Wellfield) were assumed to increase to meet 2025 demands. The city also expects to implement a conservation water savings of 1.00 MGD in 2007. It is recommended that the city join other Piccolo Wellfield customers and the county to develop a highly treated reuse/recharge project to allow increased withdrawals of fresh groundwater. The offsets for this increased withdrawal are reflected in the Broward County South Regional Summary.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	185,169	234,298	285,899
Per Capita (gallons per day finished water)		133	133
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	24.53	31.04	37.88
Water Source: Volume from Biscayne/Surficial	24.53	[a]24.53	[a]24.53
Volume from Floridan	0.58	6.50	10.70
Volume from Other	5.23	[b]7.50	[b]7.50
Volume from Reclaimed	0.00	0.00	[c]0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.
b. Based on a 82 percent efficiency rate of raw/finished water and adding in 1.0 MGD in conservation.
c. Potential for the reuse system storage projects to reduce per capita demands will be examined during the permitting process and are not counted here.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Additional RO Trains (C, D, E, F & G) at the Water Treatment Plant (WTP)	Brackish	$16,500,000	6.50	6.50	10.70	10.70
Conservation Project	Other	$1,000,000	1.00	1.00	1.00	1.00
Reuse System Storage and Expansion (2)	Reclaimed	$29,000,000	0.00	0.00	4.00	4.00
South Regional Wellfield Raw Water Purchase [d]	Other		7.80	7.93	7.93	7.93

d. See reuse/recharge project described in Broward County South Regional summary.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Lauderhill

Permitted Entity: City of Lauderhill

Service Area: City of Lauderhill

The District recommends a Floridan wellfield and reverse osmosis (RO) water treatment plant to meet increased demands.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	61,573	70,355	76,937
Per Capita (gallons per day finished water)		136	136
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	6.42	9.60	10.50
Water Source: Volume from Biscayne/Surficial	7.78	7.78	7.78
Volume from Floridan	0.00	2.00	4.25
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Floridan RO and Expansion	Brackish	$15,500,000	2.00	4.00	4.00	4.25

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Margate

Permitted Entity: City of Margate Public Water Supply System

Service Area: City of Margate and City of Coconut Creek

The District recommends a Floridan reverse osmosis (RO) water treatment plant to meet projected demands.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	60,402	66,105	73,208
Per Capita (gallons per day finished water)		129	129
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	6.77	8.50	9.41
Water Source: Volume from Biscayne/Surficial	6.77	8.51	8.51
Volume from Floridan	0.00	2.50	2.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Floridan Well and RO Plant	Brackish	$17,000,000	2.50	2.50	2.50	2.50

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Miramar

Permitted Entity: City of Miramar Public Water Supply System

Service Area: City of Miramar

The City of Miramar is planning to develop a Floridan wellfield and reverse osmosis (RO) water treatment plant to yield 1.00 MGD. In addition, the city is designing a 1.00 MGD stormwater reuse project with the potential of ASR wells expanding to 4.00 MGD in 2025. The current reclaimed water treatment system is designed for 2.00 MGD and is expected to expand to 4.00 MGD by 2010. The city should consider a multijurisidictional highly treated reuse/recharge project that would provide recharge in sufficient quantities to allow for a needed increase in groundwater withdrawals.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	92,822	124,468	134,974
Per Capita (gallons per day finished water)		98	98
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	9.80	12.25	13.28
Water Source: Volume from Biscayne/Surficial	9.80	8.61	8.61
Volume from Floridan	0.00	1.00	1.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]3.00	[a]4.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for the reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process and are not counted here. The highly treated reuse/recharge project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
2.00 MGD Floridan RO Water System	Brackish	$4,250,000	1.00	1.00	1.00	1.00
2.00 MGD Reclaimed Water Expansion [b]	Reclaimed	$3,500,000	2.00	2.00	2.00	2.00
4.00 MGD Highly Treated Stormwater or Reuse/Recharge System	Other	$3,500,000	1.00	3.00	4.00	4.00

b. Assumes sufficient recharge for the withdrawals.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of North Lauderdale

Permitted Entity: City of North Lauderdale

Service Area: City of North Lauderdale

Due to the existing low per capita water use rate, conservation seems an unlikely method to achieve the projected shortfall. The District recommends a joint, highly treated reuse/recharge project with Coral Springs Improvement District's WWTP and/or with Broward County's North Regional WWTP to recharge the groundwater, potentially in combination with Coral Springs and North Springs Improvement District. Another option may be a bulk sales agreement with another utility.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	33,167	36,642	39,941
Per Capita (gallons per day finished water)		84	84
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	2.72	3.08	3.36
Water Source: Volume from Biscayne/Surficial	2.72	3.24	3.24
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]0.50	[a]0.50
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Highly Treated Reuse/Recharge Water for Canal Recharge [b]	Reclaimed	$1,500,000	0.50	0.50	0.50	0.50

b. Assumes sufficient recharge to support additional withdrawals of fresh groundwater for the withdrawals.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: North Springs Improvement District

Permitted Entity: North Springs Improvement District

Service Area: City of Parkland and City of Coral Springs

North Springs Improvement District's (NSID) water supply estimates appear to be approximately 2.60 MGD short for 2025. The District proposes a 3.00 MGD Floridan wellfield and reverse osmosis (RO) water treatment plant to meet the expected shortfalls for 2025. Another potential option is a District-recommended joint, highly treated reuse/recharge project with Coral Springs, Coral Springs Improvement District and/or North Lauderdale to provide recharge in sufficient quantities to allow for needed increases in groundwater withdrawal. North Springs has bulks sales with Parkland Utilities.

CURRENT AND PROJECTED WATER SUPPLY			
	Actual	Projected	
Item	2005	2015	2025
Population	34,879	46,869	47,978
Per Capita (gallons per day finished water)		136	136
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	3.91	6.38	6.53
Water Source: Volume from Biscayne/Surficial	3.91	3.91	3.91
Volume from Floridan	0.00	3.00	3.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
			Total Design Capacity			
Projects	Alt. Source	Total Cap. Costs	2010	2015	2020	2025
Floridan RO Water Treatment Plant	Brackish	$14,000,000	3.00	3.00	3.00	3.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Parkland Utilities, Inc.

Permitted Entity: Parkland Utilities, Inc.

Service Area: City of Parkland

A private company, Parkland Utilities serves a small portion of the population in Parkland. The remainder of the population is served by North Springs Improvement District (NSID). For the portion of water demands served by this private utility, the District recommends the utility increase its purchases from existing suppliers (NSID) to meet the projected shortfall of 0.25 MGD in 2025.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	Projected 2025
Population	2,491	3,482	4,110
Per Capita (gallons per day finished water)		114	114
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.26	0.40	0.47
Water Source: Volume from Biscayne/Surficial	0.26	0.28	0.28
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	[a]0.25	[a]0.25
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Purchases from NSID.

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Bulk Water Purchases (NSID)	Other	$500,000	0.25	0.25	0.25	0.25

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Pembroke Pines

Permitted Entity: City of Pembroke Pines

Service Area: City of Pembroke Pines and Town of Southwest Ranches

Pembroke Pines proposes a highly treated reuse/recharge project designed for an ultimate capacity of 6.00 MGD for recharge of groundwater to meet future needs. The projected shortfall in 2025 is expected to be 3.00 MGD. The city should consider participating in a multijurisidictional highly treated reuse/recharge project that would provide recharge in sufficient quantities to allow for a needed increase in groundwater withdrawals for the city and other local governments to the east.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	145,297	161,625	166,073
Per Capita (gallons per day finished water)		96	96
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	13.25	15.52	15.95
Water Source: Volume from Biscayne/Surficial	13.25	13.25	13.25
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]6.00	[a]6.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn and will be determined through the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Highly Treated Reuse/Recharge Project for 6.00 MGD	Reclaimed	$36,000,000	6.00	6.00	6.00	6.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Plantation Public Water Supply

Permitted Entity: City of Plantation Public Water Supply

Service Area: City of Plantation

The City of Plantation is currently participating in a pilot project with the District to examine the feasibility of producing highly treated reuse/recharge. The final design will be based on this pilot project, regulatory agencies' approval and financial considerations. The utility has also submitted a 3.00 MGD Floridan wellfield and reverse osmosis (RO) water treatment plant.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	85,157	96,463	105,944
Per Capita (gallons per day finished water)		158	158
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	12.97	15.24	16.74
Water Source: Volume from Biscayne/Surficial	12.97	17.24	17.24
Volume from Floridan	0.00	3.00	3.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This project is assumed to be located in the same area and recharging the same source to offset the proposed increased use and designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Highly Treated Reuse/Recharge Project for 2.00 MGD	Reclaimed	$14,000,000	2.00	TBD	TBD	TBD
3.00 MGD Floridan RO Water Treatment Plant	Brackish	$18,000,000	3.00	3.00	3.00	3.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Pompano Beach Utilities Department

Permitted Entity: Pompano Beach Public Water Supply

Service Area: City of Pompano Beach and City of Lighthouse Point

The city is proposing an expansion of its reclaimed water distribution system, which is expected to lower its per capita rate to below its 2005 level. The city may also have capacity to expand its eastern wellfield with dry season recharge using highly treated reclaimed water along U.S. 1 to combat saltwater intrusion. The District is proposing a joint highly treated reuse/recharge project with Broward County South Regional.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	89,192	104,056	116,381
Per Capita (gallons per day finished water)		191	191
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	17.27	19.87	22.23
Water Source: Volume from Biscayne/Surficial	17.27	17.75	17.75
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]2.33	[a]5.33
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for the reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
2006 Reclaimed Water Expansion	Reclaimed	TBD	1.25	1.25	1.25	1.25
Reuse Distribution Expansion FY 2016-2025	Reclaimed	TBD	0.60	1.10	1.40	1.50
Highly Treated Reuse/Recharge Area Project	Reclaimed	TBD	0.33	0.33	0.33	0.33
Highly Treated Reuse/Recharge Water for Canal Recharge [b]	Reclaimed	TBD	2.00	2.00	3.50	5.00

b. This project is a joint project with Broward County and is assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume is assumed to allow an equal amount of fresh groundwater to be withdrawn.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Royal Utility Company

Permitted Entity: Royal Utility Company

Service Area: City of Coral Springs

Royal Utility Company did not submit any projects. The District-proposed project is for conservation and water loss reduction.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	3,335	3,696	3,790
Per Capita (gallons per day finished water)		151	151
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.41	0.56	0.57
Water Source: Volume from Biscayne/Surficial	0.41	0.48	0.48
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.25	0.25
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Conservation and Water Loss Reduction	Other	$250,000	0.25	0.25	0.25	0.25

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Seminole Tribe of Florida Utility

Permitted Entity: Hollywood Reservation

Service Area: Seminole Hollywood Reservation

The District does not issue consumptive use permits to the Seminole Tribe of Florida. Rather, a Water Rights Compact provides information about water supply planning through an annual Work Plan. The Tribe has submitted projected water use for 2025 in the amount of 2.00 MGD finished water. It is expected that the City of Hollywood will no longer be servicing the northeastern section of the reservation and that the Tribe will build a new facility to serve this area. The Tribe is encouraged to submit information to assist in the water supply planning process.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	2,007	2,266	2,390
Per Capita (gallons per day finished water)		125	125
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	0.25	[a]0.28	[a]0.30
Water Source: Volume from Biscayne/Surficial	0.77	[b]2.00	[b]2.00
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. These data are based on the Tribe's usage reported in 2006 through the Work Plan and Broward County population projections.

b. Reflects the projected finished water demands as submitted by the Tribe.

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: Sunrise Utilities Department

Permitted Entity: City of Sunrise

Service Area: City of Sunrise, Town of Davie, Town of Southwest Ranches, City of Weston and Portions of Unincorporated Broward County

The city is proposing a highly treated reuse/recharge project to meet future 2025 demands. The city is also moving forward with the development of a Floridan reverse osmosis (RO) water treatment plant and an ASR blending well for this Floridan source water.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	215,143	251,969	260,631
Per Capita (gallons per day finished water)		127	127
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	27.50	31.97	33.07
Water Source: Volume from Biscayne/Surficial	27.50	27.50	27.50
Volume from Floridan	0.00	5.00	5.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]6.00	[a]11.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. These two projects are assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Springtree WTP Existing ASR Blending Well and Expansion	Brackish	$400,000	3.00	3.00	3.00	3.00
Sawgrass WWTP - Highly Treated Reuse/Recharge Project	Reclaimed	$108,000,000	0.00	4.00	7.00	9.00
Sawgrass WTP Floridan RO Water Treatment Plant	Brackish	$31,300,000	5.00	5.00	5.00	5.00
Southwest WWTP - Highly Treated/Indirect Potable	Reclaimed	$24,000,000	2.00	2.00	2.00	2.00

UTILITY SUMMARY

BROWARD COUNTY

Supply Entity: City of Tamarac

Permitted Entity: City of Tamarac

Service Area: City of Tamarac and City Fort Lauderdale

Tamarac is proposing a 2.00 MGD Floridan wellfield and reverse osmosis water (RO) water treatment plant to meet 2025 demands.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	Projected 2025
Population	55,108	60,937	66,935
Per Capita (gallons per day finished water)		124	124
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	6.25	7.54	8.28
Water Source: Volume from Biscayne/Surficial	6.25	7.19	7.19
Volume from Floridan	0.00	2.00	2.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
2.00 MGD Floridan RO Water Treatment Plant	Brackish	$10,000,000	0.00	2.00	2.00	2.00

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: Americana Village

Permitted Entity: Americana Village

Service Area: Unincorporated Miami-Dade County

It is not expected that Americana Village will exceed its allocation.

CURRENT AND PROJECTED WATER SUPPLY			
	Actual	Projected	
Item	2005	2015	2025
Population	2,000	2,000	2,000
Per Capita (gallons per day finished water)		120	120
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.26	0.24	0.24
Water Source: Volume from Biscayne/Surficial	0.26	0.26	0.26
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: Florida City Water and Sewer Department

Permitted Entity: Florida City Water Treatment Plant

Service Area: City of Florida City

Florida City proposes to diversify its water supply by developing brackish water sources, constructing a reverse osmosis (RO) water treatment plant, and providing highly treated reclaimed water and captured storm water as recharge offset for potable use. The city has experienced significant unaccounted for losses, and while it continues to make improvements, permitting of the Biscayne Aquifer water for future needs must be based on reasonable-beneficial uses, which will be less than total use.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	10,061	15,306	20,792
Per Capita (gallons per day finished water)		199	199
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	2.44	3.05	4.14
Water Source: Volume from Biscayne/Surficial	[a]2.44	[a]2.44	[a]2.44
Volume from Floridan	0.00	4.50	4.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[b]TBD	[b]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. This reflects only 2005 use, including significantly larger unaccounted for losses, which are not considered to be a reasonable-beneficial use. Future allocations may be lowered to adjust for volumes that were no reasonable-beneficial. For future years, there is potential for water to be affected by an inward migration of salt water.

b. Potential for reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Friedland Manor Stormwater for Indirect Potable Use	Captured Storm Water	$8,000,000	0.65	0.65	0.65	0.65
Floridan Wells	Brackish	$9,660,000	3.90	6.50	6.50	6.50
RO Plant/Brine Treatment RO	Brackish	$18,840,000	2.00	4.50	4.50	4.50
Satellite Treatment	Reclaimed	$4,900,000	0.50	0.50	0.50	0.50
Stormwater Reuse	Captured Storm Water	$2,850,000	0.36	0.36	0.36	0.36

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: City of Homestead

Permitted Entity: City of Homestead Water Division

Service Area: City of Homestead

The 2006 permit requires highly treated reclaimed water to recharge the Biscayne Aquifer at the wastewater treatment facility to offset the effects of withdrawals on the regional system and to provide a barrier to saltwater intrusion. The reclaimed amount of 6.00 MGD (included below) is based on an increase of 7.60 MGD facility capacity, to be approved by the Florida Department of Environmental Protection (FDEP). The present Surficial allocation of 13.40 MGD is expected to be reduced to 9.96 MGD for the projected period. Therefore, the District proposes a reverse osmosis (RO) water treatment plant for the Floridan Aquifer. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	47,890	72,420	89,486
Per Capita (gallons per day finished water)		231	231
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	9.51	16.76	20.70
Water Source: Volume from Biscayne/Surficial	13.39	9.96	9.96
Volume from Floridan	0.00	5.00	9.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]3.40	[a]3.40
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility was examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Reclaimed Capacity Expansion [b]	Reclaimed	$3,000,000	1.60	1.60	1.60	6.00
Floridan RO Wells, Lines, Mains and Treatment Facility	Brackish	$20,000,000	5.00	5.00	9.00	9.00

b. Assumes sufficient recharge for the withdrawals to allow for additional fresh groundwater withdrawal.

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: Miami-Dade County Water and Sewer Department

Permitted Entity: Miami-Dade County Water and Sewer Department

Service Area: Miami-Dade County (See Appendix B, Table 2, for Complete Service Area)

Miami-Dade County Water and Sewer Department (WASD) is developing an alternative water supply plan to address its needs over the next 20 years. A variety of options include recharging surface waters with highly treated reclaimed water, development of brackish groundwater to be treated by reverse osmosis (RO), use of and expansion of the county's ASR, and blending network and regional reuse projects.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	2,075,304	2,354,920	2,598,419
Per Capita (gallons per day finished water)		155	155
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	326.96	[a]365.01	[a]402.76
Water Source: Volume from Biscayne/Surficial	346.50	[b]346.50	[b]346.50
Volume from Floridan	0.00	22.20	27.20
Volume from Other	0.00	7.00	11.00
Volume from Reclaimed	0.00	[c]18.00	[c]28.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Assumes net bulk sales (6.00 MGD) to North Miami.
b. Based on Interim Consumptive Use Authorization and Agreement and reported 2005 water use.
c. These projects are assumed to be located in the same area and recharging the same source to offset the proposed increased use and will be designed to achieve a maximum offset. The reclaimed volume to offset allocations will be determined in the final permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Expanding Floridan RO Hialeah Facility	Brackish	$118,000,000	0.00	10.00	15.00	15.00
Floridan Blending Wells & ASR	Brackish	$10,200,000	7.40	7.40	7.40	7.40
Floridan Blending Hialeah/Preston	Brackish	$5,200,000	4.80	4.80	4.80	4.80
Reuse Projects North District	Reclaimed	$26,800,000	7.00	7.00	7.00	7.00
Reuse Projects Central District	Reclaimed	$15,300,000	1.00	1.00	1.00	1.00
South Dade Groundwater Recharge Phase I [d]	Reclaimed	$357,500,000	0.00	18.00	18.00	18.00
South Dade Groundwater Recharge Phase II [d]	Reclaimed	$298,000,000	0.00	0.00	0.00	20.00
Conservation	Other	TBD	5.00	7.00	9.00	11.00

d. Assumes sufficient recharge for the withdrawals.

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: City of North Miami

Permitted Entity: City of North Miami

Service Area: City of North Miami, Village of Biscayne Park, Village of Miami Shores and Portions of Unincorporated Miami-Dade County

A brackish project includes the expansion of the Winson Reverse Osmosis (RO) Plant by 8.00 MGD to reach 16.00 MGD in 2025. Since this expansion is intended to replace dependency on Miami-Dade County for future water supply, the bulk purchases of 4.2 MGD in 2005 are not accounted for in the future sources.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	95,073	107,081	115,034
Per Capita (gallons per day finished water)		147	147
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	12.86	15.72	16.89
Water Source: Volume from Biscayne/Surficial	[b]12.86	[a]9.30	[a]9.33
Volume from Floridan	0.00	10.00	16.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.
b. Includes purchase of 4.20 MGD for 2005 from WASD. There will be no bulk purchases in the future.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Winson Water Plant Expansion	Brackish	$37,000,000	8.00	10.00	12.00	16.00

UTILITY SUMMARY

MIAMI-DADE COUNTY

Supply Entity: City of North Miami Beach

Permitted Entity: City of North Miami Beach

Service Area: City of North Miami Beach, City of Aventura, Village of Biscayne Park, Town of Golden Beach, City of Miami Gardens, City of North Miami, City of Sunny Isles Beach and Portions of Unincorporated Miami-Dade County

The city is constructing the first Floridan reverse osmosis (RO) water treatment plant in the county and considering the expansion of this facility to meet future demands. At the same time, the city is investigating reclaimed water opportunities, but is dependent on Miami-Dade County to provide treated wastewater.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	162,205	176,867	189,357
Per Capita (gallons per day finished water)		148	148
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	22.49	26.20	28.05
Water Source: Volume from Biscayne/Surficial	[a]22.49	[a]14.49	[a]14.49
Volume from Floridan	0.00	17.50	17.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[b]TBD	[b]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Assumes bulk purchases from Miami-Dade WASD of 8.00 MGD in 2005. Future allocations are currently under review in the permit renewal process and may affect the data shown here.
b. Potential for reclaimed water projects to reduce per capita demands for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan RO Wells, Lines, Mains and Treatment Facility Phase I-III	Brackish	$8,210,000	12.50	12.50	12.50	12.50
Floridan RO Wells, Lines, Mains and Treatment Facility Phase IV	Brackish	$37,500,000	0.00	5.00	5.00	5.00
ASR Wells	Other	$4,500,000	2.00	2.00	2.00	2.00
Reclaimed Water Pipe & Storage for Truck Washing Facility	Reclaimed	$1,000,000	0.25	0.25	0.25	0.25
Reclaimed Water Infrastructure for Irrigation	Reclaimed	$3,000,000	1.00	1.00	1.00	1.00

UTILITY SUMMARY

MONROE COUNTY

Supply Entity: Florida Keys Aqueduct Authority

Permitted Entity: Florida Keys Aqueduct Authority

Service Area: Village of Islamorada, City of Key Colony Beach, City of Key West, City of Layton, City of Marathon and Portions of Unincorporated Monroe County

The Florida Keys Aqueduct Authority (FKAA) has a 20-year allocation for withdrawals from the Biscayne and Floridan aquifers. The FKAA is permitted to use Biscayne Aquifer water to recharge an ASR well during the wet season, and to recover during the dry season to limit withdrawals from the Biscayne Aquifer. The FKAA is proposing to build a large-scale Floridan Aquifer reverse osmosis (RO) plant to meet future needs. The FKAA also maintains two reverse osmosis desalination plants on Marathon and Stock Island to meet peak demands as needed. A "Demand Management Plan" for FKAA includes the continued implementation of conservation measures, including pressure reduction, especially in the dry season when demands peak with the seasonal population.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	82,413	85,800	88,600
Per Capita (gallons per day finished water)		258	270
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	17.42	22.10	23.90
Water Source: Volume from Biscayne/Surficial	17.40	17.40	17.40
Volume from Floridan	0.28	6.70	8.40
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for reclaimed water projects to reduce per capita demands for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan RO Plant at the FKAA's J. Robert Dean Water Treatment Plant in Florida City	Brackish	$30,200,000	4.50	6.00	6.00	6.00
North Key Largo (AKA Ocean Reef)	Brackish	$26,850,000	4.00	4.00	4.00	4.00
Reuse/Reclaimed in Unincorporated Monroe County	Reclaimed	$9,600,000	0.15	0.25	0.30	0.35

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: AG Holley

Permitted Entity: AG Holley State Hospital

Service Area: A State of Florida hospital facility in the Town of Lantana

This hospital facility's consumptive use permit shows a population of 498 with a per capita use rate of 178 gallons per day (GPD) raw water. It is not expected that this facility will exceed its allocation.

CURRENT AND PROJECTED WATER SUPPLY			
	Actual	Projected	
Item	2005	2015	2025
Population	0	0	0
Per Capita (gallons per day finished water)		N/A	N/A
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.07	0.09	0.09
Water Source: Volume from Biscayne/Surficial	0.07	0.09	0.09
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Beeline Community Development District

Permitted Entity: Beeline Community Development District

Service Area: Beeline Community Development District in Unincorporated Palm Beach County

Originally, this permit was for United Technologies (Pratt & Whitney), which included irrigation, industrial and public water supply/potable industrial. The population calculated in the permit for public water supply was 2,800 with a per capita use rate of 31 GPD raw water. The District recommends a conservation project or purchase water agreement to address the 250,000 gallons per day (GPD) shortfall.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	Projected 2025
Population	N/A	N/A	N/A
Per Capita (gallons per day finished water)		N/A	N/A
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.26	0.48	0.48
Water Source: Volume from Biscayne/Surficial	0.26	0.48	0.26
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.25
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Water Conservation or Purchased Water	Other	TBD	0.00	0.00	0.25	0.25

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Beeline Utilities, L.L.C.

Permitted Entity: Palm Beach Park of Commerce

Service Area: Palm Beach Park of Commerce in Unincorporated Palm Beach County

The permit states that two Floridan Aquifer wells are to be installed and the reverse osmosis (RO) water treatment facility to be expanded. After the wells and RO system come on-line, the Surficial Aquifer wells will be used for backup only. The District recommends a Floridan RO water treatment plant.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	Projected 2025
Population	0	0	0
Per Capita (gallons per day finished water)		N/A	N/A
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.02	0.55	0.55
Water Source: Volume from Biscayne/Surficial	0.02	0.00	0.00
Volume from Floridan	0.00	1.00	1.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan Wells and RO Facility	Brackish	TBD	1.00	1.00	1.00	1.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of Boca Raton

Permitted Entity: Boca Raton Public Water Supply

Service Area: City of Boca Raton

The City of Boca Raton proposes to expand its reuse system for irrigation use. Currently, the city is delivering 5.00 MGD of reclaimed water to customers and has proposed an expansion of 2.19 MGD. A project to recycle concentrate to eventually net 4.00 MGD for potable use has been proposed, but is not counted below. The remaining reuse projects will target recharging the Biscayne Aquifer and are listed here for future evaluation. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	[a]107,336	[a]116,301	[a]128,167
Per Capita (gallons per day finished water)		364	364
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	39.09	42.37	46.69
Water Source: Volume from Biscayne/Surficial	39.09	[b]39.09	[b]39.09
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	5.00	[c]TBD	[c]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For the purposes of water supply planning, permanent resident populations and per capita finished water use rates form the basis of the projected water demands.
b. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.
c. Potential for the reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process and are not counted here.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Expansion of Reclaimed System Infrastructure FY 2010	Reclaimed	$2,000,000	5.00	5.00	5.00	5.00
Expansion of Reclaimed Water Misc. Projects FY 2010	Reclaimed	TBD	2.19	2.19	2.19	2.19
Expansion of Reclaimed Water Projects for Biscayne	Reclaimed	TBD	2.60	4.25	4.25	4.25
Recycling of Membrane Concentrate for Potable Water FY 2011 - FY 2012	Other	$4,000,000	0.00	4.25	4.25	4.25

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of Boynton Beach

Permitted Entity: City of Boynton Beach

Service Area: City of Boynton Beach, Town of Briny Breezes, Town of Hypoluxo, Town of Ocean Ridge and Portions of Unincorporated Palm Beach County

The City of Boynton Beach has committed to the construction of a Floridan reverse osmosis (RO) water treatment plant for the Eastern Wellfield (withdrawals are restricted due to the presence of saline groundwater) and to convert the ASR and add a Floridan well to produce 7.50 MGD treated Floridan water. There is a commitment to expand the treatment facilities in the Western Wellfield. In addition, the city's water supply plan includes a potable water conservation program and expanded use of reclaimed water for irrigation.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	91,474	106,258	125,226
Per Capita (gallons per day finished water)		157	157
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	15.73	16.73	[c]19.71
Water Source: Volume from Biscayne/Surficial	13.73	13.73	[a]13.73
Volume from Floridan	0.00	3.00	6.00
Volume from Other	2.00	0.00	[b]0.00
Volume from Reclaimed	0.00	TBD	[b]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Includes purchased 2.00 MGD from PBC Utilities.

b. Potential for reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process.

c. A mapping error was discovered just prior to the plan approval concerning this utility. As a result, some of the populations in the Boynton Beach Service Area, previously expected to be self-supplied, may be served by the utility, increasing the population served by 9,500. Therefore, the finished water demands would increase by about 1.7 MGD in 2025 over those now reported on the fourth line of the Current and Projected Water Supply Table.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
West Water Plant RO for Floridan Option	Brackish	$30,000,000	0.00	7.50	7.50	7.50
Groundwater Recharge Enhancement [d]	Captured Storm Water	$2,000,000	4.00	4.00	4.00	4.00
Reclaimed Water Distribution Phase I: Coastal Business Area	Reclaimed	$1,600,000	1.00	1.00	1.00	1.00

d. Assumes sufficient recharge for the withdrawals from the Surficial Aquifer.

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of Delray Beach

Permitted Entity: City of Delray Beach

Service Area: City of Delray Beach and Town of Gulf Stream

The City of Delray Beach's water treatment system includes 2.50 MGD aquifer storage and recovery (ASR) system to augment traditional water use, although it is not yet functioning. The consumptive use permit requires at least 3.70 MGD of reclaimed water offsets before the expiration of the five-year portion of the permit. To support this, a South Central Regional Wastewater Treatment Plant expansion is planned to reduce the city's per capita consumption and make more of the existing water supply available for future needs. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD). The District recommends a Floridan reverse osmosis (RO) water treatment facility to meet the expected shortfall of 3.50 MGD in 2025.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	66,286	74,145	84,146
Per Capita (gallons per day finished water)		265	265
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	17.10	19.65	22.30
Water Source: Volume from Biscayne/Surficial	17.10	15.92	15.92
Volume from Floridan	0.00	1.00	3.50
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for the reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process and are not counted here.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Reclaimed Water Plant Expansion	Reclaimed	$6,905,000	3.00	3.00	3.00	3.00
Delray Beach Areas 1 Reclaimed Water System - 2005	Reclaimed	N/A	0.63	0.63	0.63	0.63
Delray Beach Areas 2 & 3 Reclaimed Water System - 2006	Reclaimed	$2,060,900	1.90	1.90	1.90	1.90
Delray Beach Areas 4, 6, 8, 11-13 Reclaimed Water System	Reclaimed	$8,560,000	4.65	4.65	4.65	4.65
Floridan RO Water Treatment Plant	Brackish	$14,000,000	0.00	1.00	2.50	3.50

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Village of Golf

Permitted Entity: Village of Golf

Service Area: Village of Golf and Portions of Unincorporated Palm Beach County

The Village of Golf's wastewater is sent to the South Central Regional Wastewater Treatment and Disposal Board (SCRWTDB). To meet the projected shortfall in 2025, the District recommends a reclaimed water project for irrigation to directly reduce the demand on the potable water supply.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	2,762	2,889	3,155
Per Capita (gallons per day finished water)		174	174
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.51	0.50	0.55
Water Source: Volume from Biscayne/Surficial	0.51	0.51	0.51
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for the reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process and are not counted here.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Delray Beach Expanded Areas Reclaimed Water System [b]	Reclaimed	$100,000	0.00	0.25	0.25	0.25

b. Assumes sufficient recharge for the withdrawals.

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Town of Highland Beach

Permitted Entity: Town of Highland Beach

Service Area: Town of Highland Beach

The Town of Highland Beach is a barrier island, residential community located east of the Intracoastal Waterway in southern Palm Beach County. The public water supply is 100 percent brackish water from the Floridan Aquifer, and the town proposes to expand its Floridan reverse osmosis (RO) water treatment facility by another 3.00 MGD to yield 2.25 MGD. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	3,970	4,482	5,662
Per Capita (gallons per day finished water)		378	378
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	1.60	1.70	2.14
Water Source: Volume from Biscayne/Surficial	0.00	0.00	0.00
Volume from Floridan	1.60	2.25	2.25
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Expansion and Improvement of Floridan RO Facility	Brackish	$4,833,809	2.25	2.25	2.25	2.25

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Town of Jupiter

Permitted Entity: Town of Jupiter

Service Area: Town of Jupiter, Town of Juno Beach, Portions of Unincorporated Palm Beach County and Portions of Unincorporated Martin County

Jupiter uses both Floridan and Surficial wellfields, using reverse osmosis (RO) for the Floridan sources, and lime softening and ion exchange for the Surficial sources. The lime-softening facility will be replaced with nanofiltration in 2007. Alternative water supply projects include expansion of the RO facility. In addition, recycling of 3.00 MGD nanofiltration membrane concentrate with the Loxahatchee River District reclaimed water system is shown. Reclaimed water from the LOX ENCON plant is 5.00 MGD, which is generated by Jupiter and returned to Jupiter. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	54,379	74,997	93,057
Per Capita (gallons per day finished water)		308	308
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	15.15	23.07	28.62
Water Source: Volume from Biscayne/Surficial	10.45	16.92	16.92
Volume from Floridan	4.55	6.15	11.70
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Jupiter Floridan Expansion (Additional Capacity)	Brackish	$34,250,000	6.50	10.00	10.00	12.00
Surface Water Improvements to Supplement Reclaimed Irrigation System	Captured Storm Water	$1,066,000	5.00	5.00	10.00	10.00
Nanofiltration Concentrate Transfer to Loxahatchee River District	Reclaimed	$718,000	3.00	3.00	3.00	3.00
Loxahatchee River District Reclaimed Water System	Reclaimed	$1,400,000	2.40	5.00	5.00	5.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of Lake Worth

Permitted Entity: Lake Worth Utilities Authority

Service Area: City of Lake Worth and Town of Lake Clarke Shores

Lake Worth was identified in the 2000 LEC Plan as a utility of concern due to salt water threatening its wellfield. The utility has since committed to development of a Floridan reverse osmosis (RO) water treatment plant. The Surficial allocation is reduced in 2008 to 5.82 MGD and will be used at 3.00 MGD out to 2025 in anticipation of the RO facility using Floridan source water.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	48,941	54,209	63,067
Per Capita (gallons per day finished water)		151	151
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	6.98	8.16	9.49
Water Source: Volume from Biscayne/Surficial	6.98	[a]4.17	[a]2.76
Volume from Floridan	0.00	4.00	6.75
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan RO Water Treatment Plant, 4.00 MGD Expanding to 9.00 MGD by 2025	Brackish	$46,970,000	2.61	4.00	6.50	6.75

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Town of Lantana

Permitted Entity: Town of Lantana

Service Area: Town of Lantana

The Town of Lantana is considered at risk for saline water intrusion and is encouraged to augment water supply sources from the City of Lake Worth. The District recommends a finished water purchase from Lake Worth to meet the projected shortfall of 0.97 MGD in 2025. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	9,558	10,531	12,359
Per Capita (gallons per day finished water)		262	262
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	2.09	2.42	2.84
Water Source: Volume from Biscayne/Surficial	1.87	[a]1.87	[a]1.87
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	1.00	1.50
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Purchase Water Agreement with Lake Worth	Other	$2,500,000	0.50	0.60	0.80	1.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Town of Manalapan

Permitted Entity: Manalapan Public Water Supply

Service Area: Town of Manalapan and Town of Hypoluxo

Manalapan is considered a utility at risk from saline water intrusion and is moving to a Floridan reverse osmosis (RO) water treatment plant and using about 0.58 MGD for blending and peak demands. Reducing the Surficial pumpage as the proposed RO plant comes on-line will minimize saline intrusion. The District-proposed project supports the expansion of the Floridan system. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	2,377	2,862	3,401
Per Capita (gallons per day finished water)		640	640
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	1.28	1.83	2.18
Water Source: Volume from Biscayne/Surficial	1.28	[a]0.58	[a]0.58
Volume from Floridan	0.00	1.25	1.60
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. For future years, there is potential for this volume of water to be affected by an inward migration of salt water.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan RO Expansion	Brackish	$3,000,000	1.10	1.25	1.44	1.60

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Town of Mangonia Park

Permitted Entity: Mangonia Park Utility Department

Service Area: Town of Mangonia Park

Mangonia Park includes a large amount of industrial and commercial property that contributes to a high per capita use rate. The District proposes increasing conservation efforts and exploring alternative water supply sources to meet future needs if population and demands increase above the projected value.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	2025
Population	2,527	2,546	2,552
Per Capita (gallons per day finished water)		194	194
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.49	0.49	0.49
Water Source: Volume from Biscayne/Surficial	0.49	0.49	0.49
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.0
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Maralago Cay

Permitted Entity: Maralago Cay (Arrowhead)

Service Area: Unincorporated Palm Beach County

Maralago Cay (AKA Arrowhead), a mobile home park, is not expected to exceed its allocation in future years.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	1,300	1,300	1,300
Per Capita (gallons per day finished water)		192	192
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.25	0.25	0.25
Water Source: Volume from Biscayne/Surficial	0.25	0.25	0.25
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Palm Beach County Water Utilities Department

Permitted Entity: Lake Region Water Treatment Plant

Service Area: City of Belle Glade, City of Pahokee and City of South Bay

By 2015, Palm Beach County, in partnership with Belle Glade, Pahokee and South Bay, will construct a Floridan reverse osmosis (RO) water treatment plant to completely replace surface water supplies.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual 2005	Projected 2015	Projected 2025
Population	33,416	36,755	42,115
Per Capita (gallons per day finished water)		168	168
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	6.40	6.17	7.07
Water Source: Volume from Biscayne/Surficial	7.00	0.00	0.00
Volume from Floridan	0.00	10.00	10.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Floridan RO Water Treatment Plant (WTP) Phase I	Brackish	$25,000,000	10.00	10.00	10.00	10.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Palm Beach County Water Utilities Department

Permitted Entity: Palm Beach County Water Utilities Department

Service Area: City of Atlantis, City of Belle Glade (future); City of Boca Raton, City of Boynton Beach, Town of Cloud Lake, City of Deerfield Beach, City of Delray Beach, Town of Glen Ridge, City of Greenacres, Town of Haverhill, Town of Highland Beach, Town of Lake Clarke Shores, City of Lake Worth, Town of Loxahatchee Groves, City of Pahokee (future), Village of Royal Palm Beach (future), City of South Bay (future), Village of Wellington, Village of Palm Springs, City of West Palm Beach and Portions of Unincorporated Palm Beach County

Palm Beach County Water Utilities Department includes four WTPs, of which two are lime softening and two are nanofiltration. The system includes wastewater reclamation, wetlands recharge and ASR. The future Lake Regional Water Treatment Plant appears in a separate summary. Palm Beach County is developing alternative water supplies of over 40.00 MGD to offset the impacts of increased demands on seepage from canals and to increase reclaimed water from 8.40 to 16.00 MGD by 2023. The current proposed projects include brackish water, ASRs and reclaimed water projects. Future population projections will be assessed through the comprehensive planning process.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	372,238	476,024	566,284
Per Capita (gallons per day finished water)		141	141
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	52.24	67.10	[a]79.83
Water Source: Volume from Biscayne/Surficial	52.24	86.99	86.99
Volume from Floridan	0.00	10.00	25.00
Volume from Other	0.00	0.00	[b]0.00
Volume from Reclaimed	7.90	14.40	[c]16.40
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Includes 2005 sales to Boynton Beach (2.00 MGD).
b. Capacities and recoveries of the current ASRs are assumed to be sufficient for the withdrawals. Future ASRs will be assessed as they come on-line.
c. Reclaimed water projects to reduce per capita demands or offset limitations on resource availability for this utility were determined during the permitting process.

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Palm Beach County Water Utilities Department (Continued)

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Palm Beach County WTP No. 2 Floridan Expansion (15.00 MGD)	Brackish	$45,000,000	0.00	15.00	15.00	15.00
New Northern Floridan Wellfield and Facility [d]	Brackish	$35,000,000	0.00	10.00	10.00	10.00
Reclaimed Pipeline Projects (3)	Reclaimed	$12,500,000	4.50	6.50	6.50	6.50
Western Communities Reclaimed Water Constructed Wetlands	Reclaimed	$6,000,000	0.00	0.00	0.00	2.00
Satellite Membrane Bioreactor Reclaimed Water Facilities (3)	Reclaimed	$9,000,000	2.00	4.00	4.00	6.00
Palm Beach County Water Reclamation Facility Projects (3)	Reclaimed	$39,500,000	3.00	3.00	18.00	21.00
Construct 0.50 MGD Reclaimed Water Facility in the Palm Beach County Agricultural Reserve Area	Reclaimed	$1,500,000	0.00	0.00	0.50	0.50

d. To be located in Royal Palm Beach to meet the Village's 2.5 MGD future water demands.

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Village of Palm Springs

Permitted Entity: Village of Palm Springs

Service Area: Village of Palm Springs, Town of Lake Clarke Shores and Portions of Unincorporated Palm Beach County

Palm Springs submitted water supply projects that were not considered alternative water supplies. The population projections and subsequent demands submitted for review by the District were not supported by the data, and therefore, are not included in this summary. The District recommends a purchase agreement with Palm Beach County Water Utilities Dept. to meet any projected unmet demands.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	35,142	38,835	42,772
Per Capita (gallons per day finished water)		130	130
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	4.33	5.06	5.58
Water Source: Volume from Biscayne/Surficial	4.33	4.33	4.33
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	[a]0.75	[a]1.25
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Purchases sufficient to meet demands.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Purchase Water Agreement	Other	$2,500,000	0.50	0.75	1.00	1.25

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of Riviera Beach

Permitted Entity: City of Riviera Beach

Service Area: City of Riviera Beach and Town of Palm Beach Shores

The City of Riviera Beach has indicated it will move completely to a Floridan water source for its water supply by 2025. The District recommends accelerating the timeline of this project to meet future demands and given the city's current operating conditions. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY			
	Actual	Projected	
Item	2005	2015	2025
Population	36,030	44,560	52,899
Per Capita (gallons per day finished water)		257	257
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	7.42	11.46	13.61
Water Source: Volume from Biscayne/Surficial	7.42	0.00	0.00
Volume from Floridan	0.00	12.00	15.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
			Total Design Capacity			
Projects	Alt. Source	Total Cap. Costs	2010	2015	2020	2025
New Riviera Beach 20.00 MGD Floridan RO Water Treatment Plant	Brackish	$60,000,000	10.50	12.00	13.50	15.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Palm Beach County Utilities Department

Permitted Entity: Palm Beach County Utilities Department: Royal Palm Beach Plant

Service Area: Village of Royal Palm Beach

The Village of Royal Palm Beach Utilities was recently acquired by Palm Beach County Water Utilities Department. All future demands and proposed projects are included in the Utility Summary for Palm Beach County Water Utilities Department. However, under current Comprehensive Plan Amendment requirements, the Village of Royal Palm Beach must address all of the water supply, treatment and distribution facilities planned by all entities providing service within its jurisdiction, regardless of ownership or responsibility for the individual facilities.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual	Projected	
	2005	2015	2025
Population	25,416	31,522	35,830
Per Capita (gallons per day finished water)		131	131
(Note: All potable volumes are finished water unless noted)	**MGD**	**MGD**	**MGD**
Potable Water Demands (daily average annual)	2.44	4.12	4.69
Water Source: Volume from Biscayne/Surficial	2.44	2.44	2.44
Volume from Floridan			[b]
Volume from Other			
Volume from Reclaimed			
Additional Potable Water Needed (after assessing historic use or proposed projects)		[a]1.68	[a]2.25

a. These demands are provided for by Palm Beach County Utilities as detailed in the summary.

b. The water supply project (New Northern Floridan Wellfield and Facility) to meet projected demands is reported in the Palm Beach County Utility Summary.

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Seacoast Utility Authority

Permitted Entity: Seacoast Utility Authority

Service Area: Town of Juno Beach, Town of Lake Park, Village of North Palm Beach, City of Palm Beach Gardens and Portions of Unincorporated Palm Beach County

The Hood Road WTP Project is for a 4.00 MGD Floridan reverse osmosis (RO) water treatment plant. The District proposes to increase this project to yield at least 8.00 MGD of finished water. There is also a conversion of the 30.00 MGD lime-softening treatment capacity with 26.00 MGD nanofiltration. The losses in efficiency of nano conversion should be met by the expanded Floridan wells. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	83,743	106,616	122,817
Per Capita (gallons per day finished water)		211	211
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	18.53	22.46	25.87
Water Source: Volume from Biscayne/Surficial	18.53	18.53	18.53
Volume from Floridan	0.00	3.90	7.30
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	[a]TBD	[a]TBD
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Potential for reclaimed water projects to reduce per capita demands or offset some limitations on resource availability for this utility will be examined during the permitting process.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Hood Road WTP RO System - Four Floridan Wells and Two RO Reject Wells	Brackish	$59,000,000	1.60	3.90	5.80	7.30
Seacoast 4.00 MGD Reclaimed Water Treatment Expansion - 2006 Funded Project	Reclaimed	$10,250,600	4.00	4.00	4.00	4.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Seminole Improvement District

Permitted Entity: Seminole Improvement District

Service Area: Seminole Improvement District, Lion County Safari (Unincorporated Palm Beach County) and Portions of Indian Trail Improvement District

Given the small service area and population at the present time, the District recommends a water conservation project or purchase water agreement to meet the expected shortfall of less than 400,000 GPD. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	207	504	754
Per Capita (gallons per day finished water)		914	677
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.12	0.46	0.51
Water Source: Volume from Biscayne/Surficial	0.12	0.12	0.12
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.50	0.50
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Water Conservation or Purchased Water	Other	TBD	0.00	0.50	0.50	0.50

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Village of Tequesta

Permitted Entity: Village of Tequesta

Service Area: Village of Tequesta and Town of Jupiter Inlet Colony

The Village of Tequesta has indicated plans to increase Floridan wells and distribution. Without additional information for any concurrent reverse osmosis (RO) water treatment plant expansions, the District recommends a Floridan RO expansion to meet future demands. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD).

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	12,199	12,936	13,834
Per Capita (gallons per day finished water)		278	278
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	3.57	3.59	3.84
Water Source: Volume from Biscayne/Surficial	1.98	1.06	1.06
Volume from Floridan	0.88	2.25	2.25
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
2006 Project Floridan Well #4 and Raw Water Main	Brackish	$1,210,000	0.88	0.88	0.88	0.88
Floridan RO Expansion	Brackish	TBD	1.00	2.25	2.25	2.25

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Tropical Breeze Estates

Permitted Entity: Tropical Breeze Estates

Service Area: Tropical Breeze Estates in Unincorporated Palm Beach County

Tropical Breeze Estates did not submit any alternative water supply projects. The estimated per capita consumption indicates it may be subject to the special water conservation permitting applicable to utilities with a per capita in excess of 200 gallons per capita per day (GPCD). The District recommends a water conservation project to reduce the per capita use rate to meet future demands.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	432	523	623
Per Capita (gallons per day finished water)		295	295
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	0.12	0.15	0.18
Water Source: Volume from Biscayne/Surficial	0.12	0.12	0.12
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	0.50	0.50
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Water Conservation	Other	TBD	0.00	0.50	0.50	0.50

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: Village of Wellington/Acme Improvement District

Permitted Entity: Village of Wellington/Acme Improvement District

Service Area: Village of Wellington and Portions of Unincorporated Palm Beach County

The Village of Wellington did not propose projects in sufficient detail to ensure that future projected demands can be met. The District recommends Floridan wells and a reverse osmosis (RO) water treatment facility to meet future needs.

CURRENT AND PROJECTED WATER SUPPLY			
Item	Actual	Projected	
	2005	2015	2025
Population	47,939	62,374	75,334
Per Capita (gallons per day finished water)		132	132
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	5.98	8.23	9.94
Water Source: Volume from Biscayne/Surficial	5.98	5.98	5.98
Volume from Floridan	0.00	4.00	5.00
Volume from Other	0.00	0.00	0.00
Volume from Reclaimed	0.00	0.00	0.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

PROJECT SUMMARY						
Projects	Alt. Source	Total Cap. Costs	Total Design Capacity			
			2010	2015	2020	2025
Floridan Wells and RO Facility	Brackish	TBD	4.00	4.00	5.00	5.00

UTILITY SUMMARY

PALM BEACH COUNTY

Supply Entity: City of West Palm Beach

Permitted Entity: City of West Palm Beach Utilities

Service Area: City of West Palm Beach, Town of Palm Beach and Town of South Palm Beach

West Palm Beach has an advanced program for diversifying its water sources and enhancing the region's natural resources. The program includes urban stormwater treatment, advanced water treatment at the East Central Regional Water Reclamation Facility, wetland rehydration and aquifer recharge. A 20-year permit was recently issued that included a commitment of alternative water supply projects that, at a minimum, will meet the service area projected demands. Wellfield withdrawals are being offset by the Wetlands-Based Water Reclamation Project.

CURRENT AND PROJECTED WATER SUPPLY

Item	Actual 2005	Projected 2015	Projected 2025
Population	111,302	134,147	156,217
Per Capita (gallons per day finished water)		253	244
(Note: All potable volumes are finished water unless noted)	MGD	MGD	MGD
Potable Water Demands (daily average annual)	29.93	33.96	38.14
Water Source: Volume from Biscayne/Surficial	29.93	28.06	28.17
Volume from Floridan	0.00	0.00	0.00
Volume from Other	0.00	[a]5.90	[a]9.97
Volume from Reclaimed	0.00	[b]10.00	[b]20.00
Additional Potable Water Needed (after assessing historic use or proposed projects)	0.00	0.00	0.00

a. Renaissance Project diversion to Clear Lake.
b. Wetland reclamation project.

PROJECT SUMMARY

Projects	Alt. Source	Total Cap. Costs	Total Design Capacity 2010	2015	2020	2025
Wetlands-Based Water Reclamation Project - 20.00 MGD	Reclaimed	$15,000,000	10.00	10.00	10.00	10.00
Wetlands-Based Water Reclamation Project - 30.00 MGD	Reclaimed	$25,000,000	0.00	10.00	10.00	10.00
2006 Project Alternative Sites 1 & 2 Wetlands Rehydration	Reclaimed	$255,000	1.50	1.50	1.50	1.50
2006 Project Wetlands-Based Water Reclamation Project - Phase III	Reclaimed	$950,000	0.50	0.50	0.50	0.50
11.00 MGD Western Water Treatment Plant	Reclaimed	$20,000,000	0.00	11.50	11.50	11.50
ASR Wells	Other	$10,000,000	0.00	10.00	10.00	10.00

AGRICULTURAL WATER USE

Agricultural water use includes supplies for irrigated commercially grown crops. This plan update does not include estimates for livestock watering or aquaculture, the former because of its small size and the latter because most of the use represents a localized flow-through process in which the water returns to the source from which it was taken.

Sugarcane Processing Plant - EAA

Traditional water sources used for irrigation are primarily fresh surface water with limited fresh groundwater use primarily in south Miami-Dade County. In the LEC Planning Area, net water use by agriculture is expected to decrease by approximately 37 MGD from 2005 to 2025, while agricultural acreage is expected to decline by almost 10 percent during this period, from about 690,000 acres to about 631,000 acres. Irrigated agricultural acreage is expected to decrease in coastal Palm Beach and Broward counties by approximately 25,000 acres to a total of 19,000 acres, largely due to the conversion of agricultural land to urban uses. Acreage in Miami-Dade County and the Hendry County–Western Basins area during this same period is expected to increase slightly. The largest change in Agricultural land use in the LEC Planning Area is an expected conversion of about 47,000 acres of agricultural lands in the Everglades Agricultural Area (EAA) to the District's Acceler8 EAA reservoir cells and the expansion of stormwater treatment areas (STAs). The largest portion of the lands for STAs had already been taken out of agricultural production by the end of 2005. Additional details about agricultural water use and projected demands are provided in **Appendix D**.

As described earlier in this document, there are uncertainties in the availability of traditional water sources that cannot be resolved by this planning effort. This does not preclude agricultural water users from applying for and potentially acquiring consumptive use permits from traditional sources, as long as the conditions of permit issuance are satisfied.

Alternative water supply opportunities for agriculture are limited due to the location of agricultural lands; availability of acreage for water storage; economic factors that limit the more expensive alternative sources; and, water quality issues associated with brackish and reuse water source options.

One emerging alternative solution for agriculture involves the capture 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, while reducing the amount of nutrients leaving the farm. Although individual growers select the irrigation system used in their operations, their choice is influenced by the conservation and efficiency requirements in the District's regulatory programs (Everglades permit and consumptive use permitting) as it applies to new installations and permit renewals. The District offers irrigation audits through the mobile irrigation labs (MILs) that serve Miami-Dade County, Palm Beach and Broward County in the LEC Planning Area. **Chapter 5** and **Appendix F** discuss these efforts.

THERMOELECTRIC POWER GENERATION SELF-SUPPLY

Thermoelectric Power Generation water use in the LEC Planning Area is expected to grow by approximately 98 MGD during the next 20 years as Florida Power & Light (FPL), south Florida's major power generator, develops seven new facilities in Miami-Dade, Broward and Palm Beach counties. To date, projects for three of these plants have been submitted by FPL. It appears that for these plants, capacity will be installed to operate completely using brackish water or surface water from canals. Surface water would be used only when the water available from that source is in excess of permitted demands and downstream of environmental needs.

RECREATIONAL SELF-SUPPLY

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 permitted or reported users of local fresh groundwater and surface water captured from canals or from ponds in stormwater management systems. In the LEC Planning Area, Recreational Self-Supply net irrigation demand is projected to exceed 63 MGD by 2025 from the current 49 MGD.

The projected modest increase for growth in this category can be easily met with the currently proposed alternative water supplies for reclaimed water. Reclaimed water can be used for irrigating large landscaped areas, such as golf courses, parks and cemeteries, as well as for residential and commercial landscaping in the LEC Planning Area. Of the 47 reclaimed projects submitted, it is expected that some projects will replace current freshwater sources with reclaimed water or provide irrigation needs of new development.

Specific users have not yet been identified for these projects submitted by utilities and wastewater generators. The overall annual average quantity of reclaimed water expected to be made available for recreational irrigation needs in the LEC Planning Area during the next 20 years exceeds the current and projected demands for Recreational Self-Supply. Therefore, there is an opportunity to switch current users from traditional sources, or even a potable source, to reclaimed water as an alternative.

COMMERCIAL AND INDUSTRIAL SELF-SUPPLY

Commercial and Industrial Self-Supply in the LEC Planning Area has shown no specific trend; therefore, it is projected to remain constant at the 2000 level of 61 MGD through 2025. No Commercial and Industrial projects were submitted for inclusion in this 2005–2006 LEC Plan Update.

DOMESTIC SELF-SUPPLY

Domestic Self-Supply demands in the LEC Planning Area are projected to increase from the current 37 MGD to 49 MGD in 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.

CONCLUSION

Meeting the projected increase of 393 MGD in water demand in the Lower East Coast (LEC) Planning Area during the next 20 years will require continued emphasis on the development of alternative water supply projects, which include highly treated reclaimed water for aquifer recharge, brackish water, captured storm water, water conservation and multijurisdictional projects.

Currently, the LEC Planning Area produces over 640 MGD of wastewater flows, but uses only 69 MGD for reuse. By increasing capacity and water quality treatment of the wastewater flows, tremendous potential exists for the benefit of the environment and the public.

The use of the Floridan Aquifer in this region is just beginning to be tapped, with less than 20 MGD currently online. However, Floridan Aquifer projects proposed for LEC Planning Area will total approximately 290 MGD by 2025.

The potential of capturing wet-weather stormwater not intended for restoration projects is also being investigated by some utilities. These projects provide benefits in the dry season for local governments that have high seasonal populations or need saltwater barriers.

Water conservation is a highly effective management tool to meaningfully reduce per capita demands. When the population in the LEC Planning Area exceeds 7.3 million by 2025, conservation becomes a very attractive option.

In addition, large multijurisdictional projects would be beneficial to the LEC Planning Area as a cost-effective measure. With 55 utilities serving 113 local governments, the opportunity to share in the capitalization of water facilities allows for economy of scale and increased savings.

The largest change in water demand during the next 20 years will occur in the Public Water Supply sector, which will increase from the current 869 MGD to 1,174 MGD.

Domestic Self-Supply use is projected to increase by approximately 12 MGD in the next 20 years.

Thermoelectric Power Generation water supply needs are projected to increase by 98 MGD, reflecting the development of new power generation facilities in the LEC Planning Area. Specific locations for new facilities are unavailable. Investigation of water resource availability should factor heavily into site selection for these new facilities. Meeting these needs is likely to require use and/or development of alternative water supplies.

Recreational Self-Supply is projected to grow by about 15 MGD, and future needs are expected to be met largely through use and development of alternative water supplies. Commercial and Industrial Self-Supply is expected to remain constant at 61 MGD in the next 20 years.

Urban Development in the LEC

As a result of the increasing urban demands, combined with the new challenges in sustaining and protecting the natural resources of the region, the Lower East Coast (LEC) Planning Area will need to develop alternative sources, such as brackish water, reclaimed water, storage of storm water and groundwater recharge.

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 the 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 Fran Reich Preserve, 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.

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

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

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

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.

Annual Withdrawal The quantity of water permitted to be withdrawn during any 12-month time period.

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) Storm water, surface water or reclaimed water that is appropriately treated to potable standards and injected into an aquifer through approved Class V injection wells during wet periods with the intent to recover the water for treatment and reuse 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.

Artesian A commonly used expression, generally synonymous with "confined" and referring to subsurface (ground) bodies of water, which, due to underground drainage from higher elevations and confining layers of soil material above and below the water body (referred to as an Artesian Aquifer), result in underground water at pressures greater than atmospheric.

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.

Baseline Period A specified period of time during which collected data are used for comparisons with subsequent data.

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.

Biota The plant and animal life of a region or ecosystem, as in a stream or other body of water.

Biscayne Aquifer A portion of the Surficial Aquifer System, which provides most of the fresh water for public water supply and agriculture within Miami-Dade, Broward and southeastern Palm Beach County. It is highly susceptible to contamination due to its high permeability and proximity to land surface in many locations.

Blaney-Criddle A formula to calculate evapotranspiration (ET) based on mean temperature and number of daylight hours. 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).

Boulder Zone A highly transmissive, cavernous zone of limestone within the lower Floridan Aquifer.

Brackish Water with a chloride level greater than 250 mg/L and less than 19,000 mg/L.

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 the 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.

Dike An embankment to confine or control water, especially one built along the banks of a river to prevent overflow of lowlands; a levee.

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, such as drinking, bathing, cooking or sanitation.

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

Downstream Augmentation Use of reclaimed water downstream of the point of treatment and discharge for indirect potable and nonpotable projects, such as wellfield recharge, wetland rehydration, applicable irrigation, and for maintaining minimum flows and levels.

Drainage District A locally constituted drainage, water management or water control district created by special act of the legislature and authorized under Chapter 298, F.S., to constrict, complete, operate, maintain, repair and replace any and all works necessary to implement an adopted water control plan.

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.

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.

Everglades Agricultural Area (EAA) Highly productive agricultural land, the EAA is an area of histosols (muck) extending south from Lake Okeechobee to the northern levee of WCA-3A, from its eastern boundary at the L-8 Canal to the western boundary along the L-1, L-2 and L-3 levees.

Everglades Construction Project (ECP) Twelve interrelated construction projects located between Lake Okeechobee and the Everglades. The cornerstone of the ECP is six large constructed wetlands known as Stormwater Treatment Areas (STAs). They use naturally occurring biological processes to reduce phosphorus that enters the Everglades. The ECP also contains four hydropattern restoration projects designed to improve the volume, timing and distribution of water entering the Everglades.

Everglades Protection Area This area comprises the Water Conservation Areas and Everglades National Park.

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

Exceedance The violation of the pollutant levels permitted by environmental protection standards.

Exotic Plant Species A nonnative species that tends to out-compete native species and become quickly established, especially in areas of disturbance or where the normal hydroperiod has been altered.

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

Fauna All animal life associated with a given habitat.

Fiscal Year (FY) The South Florida Water Management District's fiscal year begins on October 1 and ends on September 30 the following year.

Flora All plant life associated with a given habitat.

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) The 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. The 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) The 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 U.S. Environmental Protection Agency (USEPA) 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 Chapter 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.

Hydropattern Water depth, duration, timing and distribution of fresh water in a specified area. A consistent hydropattern is critical for maintaining various ecological communities in wetlands.

Hydroperiod The frequency and duration of inundation or saturation of an ecosystem. In the context of characterizing wetlands, the term hydroperiod describes the length of time during the year that the substrate is either saturated or covered with water.

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

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

Institute of Food and Agricultural Sciences (IFAS) Agricultural branch of the University of Florida that performs research, education and extension.

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

Intrusion (See Saline Water or Saltwater Intrusion.)

Invasive Exotic Species Species of plants or animals that are not naturally found in a region (nonindigenous). They can sometimes aggressively invade habitats and cause multiple ecological changes, including the displacement of native species.

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

Irrigation Audit A procedure in which an irrigation systems application rate and uniformity are measured.

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

Irrigation Water Use A water use classification, which incorporates all uses of water for supplemental irrigation purposes, including golf, nursery, agriculture, recreation and landscape.

Lagoon A body of water separated from the ocean by barrier islands, with limited exchange with the ocean through inlets.

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

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).

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

Lake Recharge The withdrawal of water for the purpose of replacing a volume of water removed from a lake system or other water body used as a source of water supply or indirectly as a source of wellfield recharge. Lake recharge does not include artificial maintenance of the water level of a surface water body at a desired elevation for aesthetic purposes, but may include augmentation of the volume of water stored within a surface water body that is affecting recharge to an adjacent wellfield.

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

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

Littoral Of, relating to, situated or growing on or near a shore.

Load Concentration times flow.

Marl A mixture of clays, carbonates of calcium and magnesium, and remnants of shells, forming a loam that is useful as a fertilizer.

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.

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, which is used to carry out on-site evaluations of irrigation systems and to provide recommendations on improving irrigation efficiency.

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

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.

Muck Dark, organic soil derived from well-decomposed plant biomass.

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 (msl)." 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.

Offset (Irrigation) The difference between the controlled variable and the referenced input, for example, in a canal system, the difference between the actual water level in the canal and the water level at design flow.

Oligohaline Term to characterize water with salinity of 0.5 to 5.0 parts per thousand (ppt), due to ocean-derived salts.

Other Surface Waters Surface waters other than wetlands, as described and delineated pursuant to Rule 62-340.600, F.A.C., as ratified by Section 373.4211, F.S.

Other Water Source Category Water sources that cannot be readily classified into well-defined categories, including water from other nontraditional sources identified in SFWMD water supply plans. This category also includes unique construction projects, such as water production from waste steam condensation, Lower Floridan Aquifer and ocean vapor condensation.

Outflow The act or process of flowing out of.

Peat Any mass of semi-carbonized vegetable tissue formed by partial decomposition in water of various plants, especially mosses of the genus *Sphagnum*. Peat varies in consistency from turf to slime. As it decomposes its color deepens, old peat being dark brown or black, and keeping little of the plant texture. According to its formation, it is known as Bog Peat (mosses), Heath Peat or Meadow Peat (grasses and sedges), Forest Peat or Wood Peat (trees), and Sea Peat (seaweeds).

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.

Permeability Defines the ability of a substrate to transmit fluid.

Phosphorus 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.

Pollutant Loading Influx of a chemical or nutrient that contaminates air, soil or water.

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.

Potentiometric Surface A surface that represents the hydraulic head in an aquifer and is defined by the level to which water will rise above a datum plane in wells that penetrate the 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.

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.

Recharge (Hydrologic) The downward movement of water through soil to groundwater; the process by which water is added to the zone of saturation; or the introduction of surface water or groundwater to groundwater storage, such as an aquifer. Recharge or replenishment of groundwater supplies consists of three types:

1) Natural Recharge, which consists of precipitation or other natural surface flows making their way into groundwater supplies.
2) Artificial or Induced Recharge, which includes actions by man specifically designed to increase supplies in groundwater reservoirs through various methods, such as water spreading (flooding), ditches and pumping techniques.
3) Incidental Recharge, which consists of actions, such as irrigation and water diversion, which add to groundwater supplies, but are intended for other purposes. Recharge may also refer to the amount of water so added.

Recharge Area (Groundwater) The land area over which precipitation infiltrates into soil and percolates downward to replenish an aquifer; the area in which water reaches the zone of saturation by surface infiltration. Infiltration moves downward into the deeper parts of an aquifer in a recharge area. Also referred to as a Recharge Zone.

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 Water used for landscape and golf course irrigation. The landscape subcategory includes water used for parks, cemeteries and other irrigation applications greater than 0.1 million gallons per day (MGD). The golf course subcategory includes those operations not supplied by a public water supply or regional reuse facility.

Regional Simulation Model (RSM) A regional hydrologic model developed principally for application in South Florida. The RSM is developed on a sound conceptual and mathematical framework that allows it to be applied generically to a wide range of hydrologic situations. The RSM simulates the coupled movement and distribution of groundwater and surface water throughout the model domain using a Hydrologic Simulation Engine to simulate the natural hydrology and a Management Simulation Engine to provide a wide range of operational capability.

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.

Resource Efficiency The efficient use of water as measured in terms of the net impact on the relevant water storage system. A relevant water storage system will include the surface water and groundwater bodies, which are determined by the District to provide storage, using the factors stated in Section 2.3.3.2 of the Basis of Review.

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 Central and Southern Florida Project Comprehensive Review Study (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. (~1 mg/L TDS = 0.5 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.

Saline Water, Seawater or **Brackish Water** Such water contains 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.

Salinity Of or relating to chemical salts, usually measured in parts per million (ppm) or milligrams per liter (mg/L).

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. (~1 mg/L TDS = 0.5 mg/L of Chlorides.)

Seawater An aqueous solution with a chloride concentration equal to or greater than 19,000 mg/L.

Seepage The passage of water or other fluid through a porpus medium, such as the passage of water through an earth embankment or masonry wall. Groundwater emerging on the face of a stream bank; the slow movement of water through small cracks, pores, Interstices, etc., of a material into or out of a body of surface or subsurface water. The Interstitial movement of water that may take place through a dam, its foundation or its abutments. The loss of water by infiltration into the soil from a canal, ditches, laterals, watercourse, reservoir, storage facilities, or other body of water, or from a field. Seepage is generally expressed as flow volume per unit of time. During the process of priming (a field during initial irrigation), the loss is called Absorption Loss.

Seepage Irrigation System A means to artificially supply water for plant growth that relies primarily on gravity to move the water over and through the soil, and does not rely on emitters, sprinklers or any other type of device to deliver water to the vicinity of expected plant use.

Self-Supplied The water used to satisfy a water need, not supplied by a public water supply utility.

Semi-confined Aquifer A completely saturated aquifer that is bounded above by a semi-pervious layer, which has a low, though measurable permeability, and below by a layer that is either impervious or semi-pervious.

Semi-confining Layers Layers with little or no horizontal flow, restricting the vertical flow of water from one aquifer to another. The rate of vertical flow is dependent on the head differential between the aquifers, as well as the vertical permeability of the sediments in the semi-confining layer.

Serious Harm As defined in Chapter 40E-8, F.A.C., the long-term loss of water resource functions resulting from a change in surface water or groundwater hydrology.

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

Significant Harm As defined in Chapter 40E-8, F.A.C., the temporary loss of water resource functions, which result from a change in surface water 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.

Slough A channel in which water moves sluggishly, or a place of deep muck, mud or mire. Sloughs are wetland habitats that serve as channels for water draining off surrounding uplands and/or wetlands.

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. Currently, model version 5.4.2 is being used for the CERP and Acceler8 project evaluations, as well as for operational evaluations, such as the Lake Okeechobee regulation schedule modification.

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.

Submerged Aquatic Vegetation (SAV) Wetland plants that exist completely below the water surface.

Subregional Groundwater Model A computer model 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.

Supply-Side Management The conservation of water in Lake Okeechobee to ensure that water demands are met, while reducing the risk of serious or significant harm to natural systems.

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*.

Transmissivity A term used to indicate the rate at which water can be transmitted through a unit width of aquifer under a unit hydraulic gradient. It is a function of the permeability and thickness of the aquifer, and is used to judge its production potential.

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.

Ultralow-volume Plumbing Fixtures Water-conserving plumbing fixtures that meet the standards at a test pressure of 80 pounds per square inch (psi) listed below.

Toilets - 1.6 gallons/flush
Shower Heads - 2.5 gallons/minute
Faucets - 2.0 gallons/minute

User/Customer Demand (See *Net Water 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 Conservation Areas (WCAs) Part of the original Everglades ecosystem that is now diked and hydrologically controlled for flood control and water supply purposes. The WCAs are located in the western portions of Miami-Dade, Broward and Palm Beach counties, and preserve a total of 1,337 square miles, or about 50 percent of the original Everglades.

Water Control District (See *Drainage District*.)

Water Preserve Areas (WPA) Multipurpose water-holding areas located along the western border of southeast Florida's urbanized corridor.

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 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 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 Shortage That situation within all or part of the District when insufficient water is available to meet the present and anticipated needs of the users, or when conditions are such as to require temporary reduction in total use within a particular area to protect water resources from serious harm. A water shortage usually occurs due to drought. (Rule 40E-21.051, F.A.C.)

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 Shortage Trigger Water shortage triggers are water levels at which phased restrictions will be declared under the SFWMD's Water Shortage Plan. Other considerations associated with the implementation of the water shortage plan are set forth in Rule 40E-8.441(4), F.A.C., and Chapter 40E-21, F.A.C.

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

Water Use 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.)

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

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

Wetlands Those areas that are inundated or saturated by surface water or groundwater at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptation, have the ability to grow, reproduce, or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto. The landward extent of wetlands shall be delineated pursuant to Rules 62-340.100 through 62-340.550, F.A.C., as ratified by Section 373.4211, F.S.

Wetland Drawdown Study Research effort by the SFWMD to provide a scientific basis for developing wetland protection criteria for water use permitting.

Wild and Scenic River A river as designated under the authority of the of Public Law 90-542, the *Wild and Scenic Rivers Act,* as amended, is a means to preserve selected free-flowing rivers in their natural condition and protect the water quality of such rivers. The Loxahatchee River was federally designated as the first Wild and Scenic River in Florida on May 17, 1985.

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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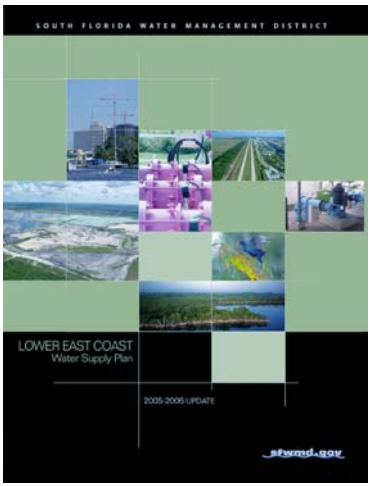
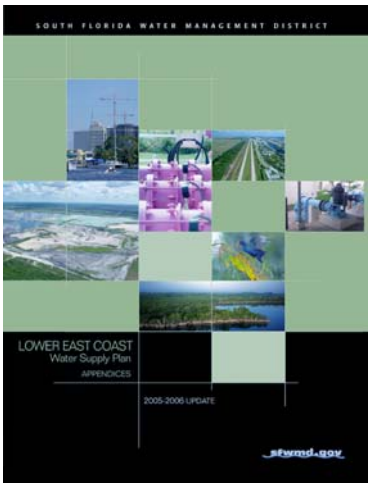
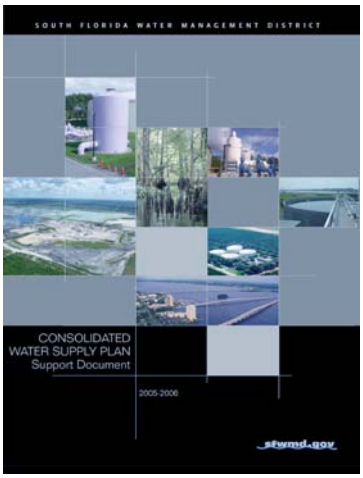


Planning Document
Printed with CDs on inside of back cover



Appendices
on CD from inside cover of Planning Document



Support Document
on CD from inside cover of Planning Document

CD 1 – Contains the Lower East Coast Water Supply Plan Update including the Planning Document, Appendices and the Comprehensive Water Supply Plan Support Document

CD 2 – Contains the 2000 Lower East Coast Water Supply Plan

SFWMD

MEETING SOUTH FLORIDA'S RAPIDLY GROWING WATER SUPPLY NEEDS WHILE SAFEGUARDING ITS NATURAL SYSTEMS REQUIRES INNOVATIVE SOLUTIONS, COHESIVE PLANNING AND A SHARED VISION FOR THE FUTURE.

South Florida Water Management District

Committed to managing and protecting our region's water resources

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