SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Planning Document





UPPER EAST COAST
WATER SUPPLY PLAN UPDATE

2011

Acknowledgements

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

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Executive Summary

This *2011 Upper East Coast Water Supply Plan Update* provides an assessment of the water supply for the South Florida Water Management District's Upper East Coast (UEC) Planning Area through 2030. The first UEC Water Supply Plan was completed in 1998 and updated in 2004. In addition, a limited plan amendment was published in 2006 to address statutory revisions and update urban population projections. This *2011 Upper East Coast Water Supply Plan Update* (2011 UEC Plan Update) augments the knowledge and assumptions of past plans, including local and regional efforts completed since the 2004 UEC Plan Update. The 2011 UEC Plan Update presents water demand estimates, water supply issues and evaluations, water source options, and water resource and water supply development projects to confirm water supplies are adequate to support the region's growth while sustaining its natural systems.

Affirming the findings of the District's 2004 UEC Plan Update, this 2011 UEC Plan Update concludes that water sources are sufficient to meet the water needs of this region during a 1-in-10 year drought condition over the 20-year planning horizon from 2010 to 2030. To meet the region's future water needs, this Plan Update advocates continued diversification of water supply sources, such as increased use of the Upper Floridan aquifer and reclaimed water, as well as increased emphasis and implementation of appropriate water conservation practices. Water users, utilities, the environmental community, and local governments are recognized for their proactive efforts, including previous and ongoing development of alternative water sources and ecosystem restoration efforts. These contributions help to ensure that the water needs of this region will be met.

This Plan Update incorporates the water supply development projects proposed by Public Water Supply (PWS) utilities to meet their future needs. Local governments, in coordination with utilities, will address these projects as they revise their 10-Year Water Supply Facilities Work Plans, which require submittal within 18 months of approval of this Plan Update.

The 2011 UEC Plan Update was developed in an open public forum with water users, water utilities, local governments, environmental organizations, agricultural interests, and other stakeholders through the District's Water Resources Advisory Commission. The process to develop the population and water demand projections began in summer 2009. It included many meetings with water users, local governments, industry representatives, agencies, and utilities. A series of workshops were also held during the plan development process to solicit input and provide information about planning results and progress.

The 2011 UEC Plan Update includes this Planning Document, as well as an accompanying Appendix volume, and the *2011–2012 Water Supply Plan Support Document*. All of these documents are in PDF format available on the CD included in the back of this volume, and online from http://www.sfwmd.gov/watersupply.

Introduction (Chapter 1)

The UEC Planning Area includes all of Martin and St. Lucie counties and the eastern portion of Okeechobee County. The region generally reflects the St. Lucie River Watershed and watersheds of the C-23, C-24, C-25, and C-44 canals. This planning area includes numerous coastal and inland natural systems including Lake Okeechobee, the Indian River Lagoon, the St. Lucie River and Estuary, and portions of the Loxahatchee River. The Indian River Lagoon features the greatest species diversity of any estuary in North America. The region also includes wetlands, such as Allapattah Flats, Cane Slough, DuPuis Reserve, Jonathan Dickinson State Park, Pal-Mar, and the Savannas. The Savannas ecosystem is one of the most endangered natural systems in south Florida.

The UEC Planning Area is currently home to approximately 437,000 permanent residents who live mainly in the eastern and coastal portions of the planning area. Agriculture, primarily citrus, remains the cornerstone of the region's economy. The UEC includes a portion of the Indian River Citrus District, known globally for producing Indian River grapefruit.

Demand Estimates and Projections (Chapter 2)

The population of an area greatly affects its water needs. By 2030, the UEC Planning Area's population is projected to almost double to nearly 800,000 people. This rise in population creates associated increases in potable water demands and water demands for Industrial/Commercial/Institutional, Recreational/Landscape, and Power Generation uses.

Total projected 2030 gross water demands for all water use categories in the UEC Planning Area are an estimated 320–340 million gallons of water per day (MGD). This projection represents an increase of 70–90 MGD from 2005 baseline data.

Agriculture remains the largest water user in the UEC Planning Area and is expected to continue as the dominant land use. Citrus is the area's primary crop. Despite recent acreage losses due to economic challenges, lands needed for the Comprehensive Everglades Restoration Plan (CERP), damage from hurricanes, and citrus diseases, citrus production is expected to recover and increase. Agriculture's important economic contribution to Florida is underscored by the research under way to evaluate options for managing citrus diseases and developing disease-resistant rootstock and new production practices. For this 2011 UEC Plan Update, actively cultivated agricultural acreage is expected to range from 97,587 to 115,768 acres by 2030, with a water demand estimate of 117–137 MGD.

Projected total 2030 gross water demands for all water uses except Agriculture are 203 MGD. Urban demand estimate and projection highlights for the UEC Planning Area include some of the following:

- The region's greatest growth will be in St. Lucie County, where the population is projected to increase from the 2005 baseline of about 240,000 to approximately 595,000 in 2030.

- Public Water Supply gross demands are expected to more than double from the 2005 baseline of 45 MGD to 96 MGD by 2030. Most, if not all, of this increase will be met using alternative water supply (AWS) sources.
- Recreational/Landscape Self-Supply gross demands are projected to increase to 45 MGD from the 2005 baseline of 17 MGD.
- Power Generation demands are expected to increase from the 2005 baseline of 17.4 MGD to 51.3 MGD by 2030.

Issues and Evaluation (Chapter 3)

As a result of the 2011 UEC water supply planning effort, the SFWMD has determined that the conclusions of previous evaluations are applicable to the current 20-year planning horizon. No additional groundwater modeling was conducted.

Three primary water supply issues influence water supply planning to meet 2030 projected water needs in the UEC Planning Area:

1. Increased withdrawals from the surficial aquifer system are limited due to potential impacts on wetlands, as well as the increased potential for saltwater intrusion.
2. Surface water availability in the C-23, C-24, and C-25 canals is not sufficient to meet projected agricultural demands.
3. Freshwater discharges (minimums and maximums) are affecting the health of the St. Lucie River and Estuary, and southern Indian River Lagoon.

The assessment contained in **Chapter 3** also confirms that historically used water sources alone are not adequate to meet the UEC Planning Area's growing water needs through 2030. However, with appropriate management and diversification of water supply sources, there is sufficient water to meet the needs of this region through 2030.

Over the past decade, water users have already made significant progress diversifying supply sources and reducing reliance on the surficial aquifer system:

- The majority of UEC utilities are using the Floridan aquifer system to meet all or a portion of their future water demands.
- Reclaimed water use in the area has increased significantly, offsetting use of groundwater.
- Conversion to more efficient irrigation and implementation of agricultural best management practices continue.

For PWS, continued use of the surficial aquifer at current levels, and continued development of the Floridan aquifer to meet the growing needs for potable water, show the most promise of satisfying future water demand. To meet landscape irrigation needs, continued use of the surficial aquifer at current levels and increased use of reclaimed water are the region's best options. Additional withdrawals from the surficial aquifer may be possible, but only on a permit-by-permit basis. For agricultural irrigation, the existing water source combination of

surface water from the primary canals supplemented with Floridan aquifer water is sufficient to meet the projected future water needs during a 1-in-10 year drought event. Increased water conservation is essential among all water users.

In 2002, a Minimum Flow and Level (MFL) was established for the North Fork of the St. Lucie River and Estuary. The analysis shows that the MFL is currently being met and no additional actions are required to ensure compliance for at least 20 years into the future. This Plan Update includes an updated MFL Prevention Strategy for the North Fork of the St. Lucie River. A MFL has also been established for the Northwest Fork of the Loxahatchee River, which partially flows into Martin County. The recovery strategy for this MFL will be addressed in the *2012 Lower East Coast Water Supply Plan Update* (SFWMD in process).

Construction of the CERP Indian River Lagoon – South Project components will address regional storage and freshwater flows from the watershed. A Water Reservation has been established for the North Fork of the St. Lucie River that will reserve water made available by the CERP Indian River Lagoon – South Project for the protection of fish and wildlife.

Evaluation of Water Source Options (Chapter 4)

In the UEC Planning Area, historical water sources include fresh groundwater from the surficial aquifer system, and surface water primarily from the C-23, C-24, C-25, and C-44 canals. The region's alternative water supply sources include brackish groundwater from the Upper Floridan aquifer, reclaimed water, and excess storm water captured and stored in reservoirs during the rainy season for later beneficial use. Water conservation is also an essential water source option for the planning area.

Historically, the surficial aquifer system served as the primary source of potable water for public consumption and urban irrigation throughout the UEC Planning Area. However, from a regional perspective, the development of the surficial aquifer system has been maximized over time, and potential increases in production are limited, especially in coastal areas.

In the UEC Planning Area, the Floridan aquifer is a brackish water source that requires desalination treatment before potable use. In 2010, 45 percent (23 MGD) of the water used to meet drinking water needs originated from the Floridan aquifer. Over the 20-year planning horizon, use of the Floridan aquifer for PWS is expected to almost double to accommodate area growth. In this 2011 UEC Plan Update, local governments propose 58 MGD of brackish water development projects for the planning area by 2030. Citrus growers continue to rely on the Floridan aquifer as a supplemental water supply for crop irrigation. The brackish water from the Floridan requires blending before use for agriculture.

Reclaimed water is a key component of water resource management in south Florida. Twenty-three of the planning area's 25 wastewater treatment facilities reuse at least a portion of their wastewater. Potential uses of reclaimed water include landscape irrigation, agricultural irrigation, groundwater recharge, industrial uses, environmental enhancement, and fire protection. In the UEC Planning Area, the volume of reclaimed water used for beneficial purposes has increased almost 86 percent from 1994 to 2008. In 2008, about

9.8 MGD (41%) of the wastewater treated in the planning area was reused for a beneficial purpose, primarily for irrigation. However, 15.0 MGD of potentially reusable water was disposed of via deep well injection. Wastewater flows are projected to increase from 23.7 MGD in 2008 to more than 40.0 MGD by 2030. Projects discussed in this Plan Update could significantly increase water reuse in the planning area.

Proactive, cooperative water conservation efforts among water users, utilities, local governments, and the District are also necessary to accomplish water savings. Efficient water use and conservation produces the cheapest gallon of water—the gallon not wasted. It is possible to achieve significant potential water savings through increased water conservation efforts, such as retrofitting older plumbing fixtures with high-efficiency fixtures in residential, industrial, commercial, and institutional units. Water conservation plans should include general policies, such as water conservation ordinances, public education, retrofits of indoor and outdoor devices, and use of alternative water sources.

Among agricultural water users, citrus growers continue to increase their irrigation efficiency. According to the Indian River Citrus League, 90 percent of growers use low-volume irrigation systems and 10 percent use seepage systems.

In March 2010, the Districtwide Year-round Landscape Irrigation Conservation Measures Rule (Year-round Irrigation Rule) went into effect. Broadly, this rule limits landscape irrigation to two days per week, with a provision for irrigation up to three days per week in counties wholly located within the jurisdictional boundaries of the District, including Martin and St. Lucie counties. The rule also provides local governments with the flexibility to adopt alternative landscape irrigation ordinances that are at least as stringent as the Year-round Irrigation Rule. In the UEC Planning Area, the City of Stuart adopted two-day-per-week irrigation limits within its jurisdictional boundaries.

Water Resource Development Projects and Water Supply Development Projects (Chapters 5 and 6)

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, such as regional modeling and data collection, are generally the responsibility of the District. Water users are responsible for water supply development projects. From Fiscal Year (FY) 2006 to FY 2009, completed PWS projects created 71 MGD of new water capacity in the UEC Planning Area.

The District offers two cost-share funding programs to assist local water users with development of alternative water supplies and water conservation: the Alternative Water Supply Funding Program (AWS Program) and the Water Savings Incentive Program (WaterSIP). Both programs are implemented through an annual competitive solicitation, based on available funding. The AWS Program provides funding of up to 40 percent of a project's construction cost. Since 1997, the District, in cooperation with the state, approved $178.8 million for construction of 437 AWS projects Districtwide. From FY 2006 to FY 2009,

the program created 400 MGD of additional water supply capacity. Through the WaterSIP, the District provides matching funds up to $50,000 to water providers and users for non-capital water efficiency improvement projects. Since its inception in 2003, the WaterSIP has provided $3.8 million in support to nearly 130 local water conservation projects Districtwide. The date, the program is credited with saving an estimated 2.3 billion gallons of water per year.

A table summarizing the implementation schedule and costs for Districtwide water resource development projects through FY 2014 is included in **Chapter 5**. The 20 multi-phased PWS facility projects proposed for FY 2010 through FY 2030 (**Chapter 6**) will potentially create 93 MGD of additional water supply, which is sufficient to meet future projected demands.

The District's planning process is closely coordinated and linked to the water supply planning of local governments and utilities. In the UEC Planning Area, eight local government utilities and nine private utilities serve 12 local governments. A Utility Summary is included at the end of **Chapter 6** for each PWS utility supplying 0.1 MGD or greater to its service area. These summaries provide population and demand projections, proposed water sources, and specific PWS development projects.

Future Directions (Chapter 7)

The future direction for the UEC Planning Area includes further diversification of water sources to meet the needs of all water users, as well as water conservation, coordination, and monitoring to respond to climate change and rising sea levels. The District's guidance concerning water source options includes:

- Gaining a greater understanding of the impact of long-term, sustained withdrawals from the Floridan aquifer. The District intends to use the East Coast Floridan Aquifer System Model, which is currently being peer-reviewed, for predictive analysis for the next UEC plan update.
- Promoting the increased use of reclaimed water in the future to further reduce dependence on freshwater sources. Local governments are encouraged to consider requiring installation of reclaimed water infrastructure and reclaimed water use (where and when available) in new property developments.
- Continuing a strong emphasis on water conservation. The District suggests implementing user-specific water conservation plans and two-day-per-week irrigation ordinances where feasible.
- Regularly reviewing saltwater intrusion monitoring and revising monitoring regimes to address and respond to the effects of climate change.

The District concludes that with continued diversification of water supply source options, future water demands can be met through the 20-year planning horizon. Successful implementation of this 2011 UEC Plan Update requires coordination with other regional and local government planning efforts and continued public participation in guiding the implementation.

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Acronyms and Abbreviations

AFSIRS	Agricultural Field Scale Irrigation Requirements Simulation
AGR	Agricultural Self-Supply
ASR	Aquifer Storage and Recovery
AWS	alternative water supply
BEBR	Bureau of Economic and Business Research
BMP	best management practice
CERP	Comprehensive Everglades Restoration Plan
CFCA	Central Florida Coordination Area
cfs	cubic feet per second
CFWC	Conserve Florida Water Clearinghouse
CWCP	Comprehensive Water Conservation Program
DBHYDRO	District's corporate environmental database
District	South Florida Water Management District
DSS	Domestic Self-Supply
ECFAS	East Coast Floridan Aquifer System Model
ED	electrodialysis
EDR	electrodialysis reversal
EQIP	Environmental Quality Improvement Program
ET	evapotranspiration
ETp	potential evapotranspiration
F.A.C.	Florida Administrative Code
FAS	Floridan aquifer system
FAWN	Florida Automated Weather Network
FDACS	Florida Department of Agriculture and Consumer Services
FDCA	Florida Department of Community Affairs
FDEP	Florida Department of Environmental Protection
FGCSA	Florida Golf Course Superintendents Association
FKAA	Florida Keys Aqueduct Authority
FPL	Florida Power & Light

FRESP	Florida Ranchlands Environmental Services Project
FPUA	Fort Pierce Utilities Authority
F.S.	Florida Statutes
FY	Fiscal Year
GPCD	gallons per capita per day
GPD	gallons per day
ICI	Industrial/Commercial/Institutional Self-Supply
IQ	Irrigation Quality
KB	Kissimmee Basin
LEC	Lower East Coast
LECsR	Lower East Coast Subregional Model
LFA	Lower Floridan aquifer
LOWCP	Lake Okeechobee Watershed Construction Project
LWC	Lower West Coast
MDWASD	Miami-Dade Water and Sewer Department
MFL	minimum flow and level
MGD	million gallons per day
mg/L	milligrams per liter
MGY	million gallons per year
MIL	Mobile Irrigation Laboratory
MWRF	FPUA Mainland Water Reclamation Facility
NEEPP	Northern Everglades and Estuaries Protection Program
NE-PES	Northern Everlgades Payment for Environmental Services Program
NF	nanofiltration
PCUR	per capita use rate
PWR	Power Generation Self-Supply
PUD	Planned Urban Development
PWS	Public Water Supply
REC	Recreational/Landscape Self-Supply
RO	reverse osmosis
SAS	surficial aquifer system
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SLRWPP	St. Lucie River Watershed Protection Plan

STA	stormwater treatment area
SWFWMD	Southwest Florida Water Management District
TAZ	traffic analysis zone
TCEC	Treasure Coast Energy Center
UEC	Upper East Coast
UFA	Upper Floridan aquifer
UF/IFAS	University of Florida/Institute of Food and Agricultural Sciences
ULV	ultralow volume
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDA–NASS	USDA – National Agricultural Statistics Service
USDA-NRCS	USDA – Natural Resources Conservation Service
USGS	U.S. Geological Survey
Water CHAMP	Water Conservation Hotel and Motel Program
WaterSIP	Water Savings Incentive Program
WRAC	Water Resources Advisory Commission
WRDA	Water Resources Development Act

1 Introduction

The South Florida Water Management District (SFWMD or District) updates regional water supply plans to provide for current and future water needs, while protecting south Florida's water resources. This *2011 Upper East Coast Water Supply Plan Update* (2011 UEC Plan Update) assesses existing and projected water needs and water sources to meet those needs over a 20-year planning horizon from 2010 to 2030 for the Upper East (UEC) Planning Area. The 2011 UEC Plan Update presents current population, water demands, water resource and water supply development projects, and related water supply planning information. This five-year Plan Update follows publication of the *2004 Upper East Coast Water Supply Plan Update* (2004 UEC Plan Update) and *2006 Upper East Coast Water Supply Plan Amendment* (2006 UEC Plan Amendment), the plan updates to the *1998 Upper East Coast Water Supply Plan* (1998 UEC Plan).

TOPICS

- Population and Water Demands
- 2011 UEC Plan Update
- Legal Authority
- Water Supply Planning
- The UEC Planning Area
- Progress in the UEC
- Climate Change
- Planning for the Next 20 Years

POPULATION PROJECTIONS AND WATER DEMANDS

Both the 2004 UEC Plan Update and 2006 UEC Plan Amendment used 2000 baseline data for estimates and projections through 2025. The 2011 UEC Plan Update uses newer 2005 baseline data, which were established to determine estimates and projections for the UEC through 2030.

According to the 2005 baseline data developed for the 2011 UEC Plan Update, the planning area population is expected to increase to approximately 792,000 by 2030. The 2000 baseline data used in the previous plan updates projected the planning area's population would increase to 486,500 (2004 UEC Plan Update) or 585,000 (2006 UEC Plan Amendment) by 2025.

NAVIGATE

The 2011 UEC Plan Update consists of this Planning Document, an Appendices volume, and the *2011–2012 Water Supply Plan Support Document* (SFWMD 2011b). These documents are available from the District's Water Supply website: http://www.sfwmd.gov/watersupply.

The Agricultural Self-Supply water use category's gross demands within the UEC Planning Area are projected to decline from the 2005 baseline projection of 159 million gallons of water per day (MGD) to a range of 117–137 MGD by 2030. Despite this reduction in demand, agriculture is expected to remain the largest use category in the UEC Planning Area.

2011 UEC PLAN UPDATE


Urban Development in the UEC

Over the last five years, considerable fluctuations in the economy, residential and commercial development, and agricultural commodity markets affected the region. The 2011 UEC Plan Update reflects the influence of these factors on water users and the projected water needs of the UEC Planning Area. **Chapter 2** of this 2011 UEC Plan Update estimates and projects the gross and net water demands by water use category; **Chapter 3** discusses the water resources available and issues facing the region; **Chapter 4** evaluates the planning area's various water source options; **Chapter 5** identifies water resource development projects; **Chapter 6** identifies water supply development projects; and **Chapter 7** provides future guidance and direction.

LEGAL AUTHORITY AND REQUIREMENTS

The legal authority and requirements for water supply planning are included in Chapters 373, 403, and 187 of the Florida Statutes (F.S.). In accordance with Florida's Water Protection and Sustainability Program, regional water supply plans and local government comprehensive plans must ensure that adequate potable water facilities are constructed and concurrently available with new development. The alternative water supply portion of this program reduces competition for available water between users and natural systems by encouraging the development of new water supplies.

LAW / CODE

Subsection 373.709(1), Florida Statutes (F.S.):

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, F.S., 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.

In addition to water supply planning, the District uses three primary mechanisms to protect water resources: consumptive use permitting, Restricted Allocation Areas, and Water Reservations.

Consumptive Use Permitting

The District's Consumptive Use Permitting Program minimizes contention for water resources and plays an important role in resource protection. Consumptive use permitting protects the supply and quality of groundwater and surface water resources by ensuring that water use is reasonable-beneficial, consistent with the public interest, and that it does not interfere with existing legal uses [see Chapter 40E-2, Florida Administrative Code (F.A.C.), and Section 373.223, F.S.].

GOAL

The District's strategic goal for all of its water supply planning 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. Specifically, the goals of the 2011 UEC Plan Update are to identify enough sources of water to meet the needs of all reasonable-beneficial uses within the UEC Planning Area through 2030 during a 1-in-10 year drought event (a drought expected to have a return frequency of once in 10 years), and to sustain the region's water resources and natural systems.

Restricted Allocation Areas

Eagle in Nest on Lake Okeechobee Dike

Restricted Allocation Area rules limit specific water resources from further allocation in various geographic areas. In October 2008, the District adopted Restricted Allocation Area criteria for the Lake Okeechobee Service Area (Section 3.2.1 of the *Basis of Review for Water Use Permit Applications within the South Florida Water Management District*, SFWMD 2010). This rule is a component of the recovery strategy for the MFL for Lake Okeechobee. It limits surface water withdrawals from Lake Okeechobee and all surface water hydraulically connected to the lake. By connection to the lake, the St. Lucie Canal and the Caloosahatchee River are subject to this rule. By limiting the availability of surface water for new consumptive use allocations, this rule protects the rights of existing legal users, as well as the region's water resources.

Restricted Allocation Area criteria also apply to withdrawals from the C-23, C-24, and -C-25 canals and any connected canal systems that derive water supply from these canals, restricting additional surface water use above historic allocations (see *The Upper East Coast Planning Area* section of this chapter for a general description and location of these systems).

Water Reservations

Water Reservations are a legal mechanism to set aside water for the protection of fish and wildlife or public health and safety. A Water Reservation for the North Fork of the St. Lucie River became effective March 18, 2010. This reservation sets aside water for the natural system (Section 40E-10.051, F.A.C.) and protects water provided by the Comprehensive Everglades Restoration Plan (CERP) Indian River Lagoon – South Project by restricting allocation of surface water from the future C-23/C-24 North and South reservoirs and stormwater treatment areas (STAs).

NEED FOR ALTERNATIVE WATER SOURCES

The collective result of the economic, commercial and residential development, and market changes in the UEC Planning Area reinforces the need to develop alternative water supply sources to ensure adequate future water supplies. As stated in the 2004 UEC Plan Update and subsequent plan amendment, traditional fresh groundwater and surface water supplies are not expected to be adequate to meet projected new water demands for the region. Meeting water supply demand projections over the 20-year planning horizon requires a continued focus on water conservation and nontraditional water supply solutions.

As part of the 2006 UEC planning effort, local governments and water suppliers in the UEC Planning Area worked closely with the SFWMD to identify and develop potable water supply projects to meet projected water needs. Proposed projects were subsequently included in local government comprehensive plans. Since the 2006 UEC Plan Amendment, the SFWMD continued working closely with staff from Public Water Supply utilities to identify water supply development projects for this 2011 UEC Plan Update. **Chapter 6** of this Plan Update includes a list of the existing and new water supply development projects for the UEC Planning Area.

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.

WATER SUPPLY PLANNING

The 2011 UEC Plan Update describes how anticipated water supply needs will be met in the UEC Planning Area for the 20-year planning horizon (through 2030). The Plan Update also describes and meets existing statutory requirements, including listing proposed water supply projects and regional project implementation strategies for planners, policy makers,

and utility directors. The 2011 UEC Plan Update contains a list of water supply projects for Fiscal Year (FY) 2010 through FY 2030. The majority of new water needs will be met through the development of alternative water supplies. Some traditional water supply development may be possible where appropriate local hydrologic conditions are present and regulatory requirements are met.

Consistent with the state's statutory requirements, as long as funding is available, the alternative water supply projects listed in this Plan Update are eligible for cost-sharing consideration through a separate annual funding process established by the District's Governing Board.

PLANNING PROCESS

1	2	3	4
Planning and Assessment	**Data Collection of Population, Finished Water and Planned Projects, Analysis, and Issue Identification**	**Evaluation of Water Source Options**	**Water Supply Development**
The process for development of the 2011 UEC Plan Update incorporated extensive public participation, including four public workshops, and 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 2006 UEC Plan Amendment and the 2004 UEC Plan Update were key starting points of this process. Planning integrated development of Year 2030 demand projections, assessment of existing and projected resource conditions, and formulation of strategies to meet urban, agricultural, and environmental water needs.	Using the 2006 UEC Plan Amendment and 2004 UEC Plan Update 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 of previously identified issues and helped identify new issues.	The next phase of the planning process involves reviewing existing solutions or developing new solutions to address the identified issues. In areas where projected demands exceed available supplies, solutions include alternative water supplies and water conservation. Source options are evaluated, and appropriate responsibilities are identified.	Water supply projects intended to meet water needs for the next 20 years are identified, compiled, and evaluated by the District with input from stakeholders and other agencies. This information is used to create **Chapter 6**: Water Supply Development Projects, which evaluates existing and proposed supplies relative to projected future water demand.

Regional Water Supply Plans

The SFWMD prepares regional water supply plans for each of the four planning areas in its jurisdiction (Kissimmee Basin, Upper East Coast, Lower West Coast, and Lower East Coast) to effectively support planning initiatives and address local issues. Updated every five years, each regional water supply plan encompasses a 20-year planning horizon. All local governments within each planning area are required to update their 10-Year Water Supply Facilities Work Plans (which identifies water supply projects). Revisions to local government comprehensive plans must be adopted within 18 months following the approval of this Plan Update.

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
- Recommendations for meeting projected demands for the region

This 2011 UEC Plan Update also includes a discussion of Minimum Flows and Levels (MFLs) established within the planning area; MFL recovery and prevention strategies where appropriate; Water Reservations adopted by rule; technical data; and supporting information.

Public Participation

The SFWMD established the Water Resources Advisory Commission (WRAC) to serve as an advisory body to the Governing Board. The WRAC is the primary forum for conducting public 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 water supply planning areas within the SFWMD's jurisdiction.

The SFWMD held WRAC Issue Workshops throughout the water supply planning process. Stakeholders representing a cross-section of interests in the region—agricultural, industrial, environmental protection, utilities, local government planning departments, and state and federal agencies—were invited to attend the workshops. During the workshops, participants reviewed and provided comments regarding projected demands compiled by SFWMD staff. Individual meetings with local government planning departments, utilities, other planning agencies, and agricultural industry representatives, reviewed water demand projections and coordinated planning processes.

2011 UEC Plan Update Objectives

Modified 2004 UEC Plan Update objectives are included in the 2011 UEC Plan Update. The following seven objectives for this Plan Update provide an overall framework for the planning process:

1. **Water supply** Identify sufficient sources of water to meet reasonable-beneficial consumptive uses projected through 2030 during a 1-in-10 year drought event, without causing harm to the natural resources.
2. **Natural systems** Enhance and protect wetland systems and water resources from harm due to water use, including drawdowns and the harmful movement of saline water.
3. **Estuarine and riverine systems** Protect and enhance estuarine and riverine systems through effective water deliveries and management of water resources.
4. **Water conservation and alternative water source development** Encourage water conservation measures to improve the efficiency of water use, and support and promote the development of alternative water sources.
5. **Linkage with local governments** Provide linkage between the UEC Plan Update and local government water supply-related elements.
6. **Compatibility and linkage with other entities** Achieve compatibility with other related planning activities within the region and with adjacent water management districts.
7. **Floridan aquifer system** Continue to encourage development of the Floridan aquifer system (FAS) as an option for water sources that depend on local rainfall for recharge. Continue the monitoring program to enhance the understanding of the relationship between water use, water levels, and water quality.

INFO

A **1-in-10 year drought** is of such intensity that it is expected to happen only once in 10 years. A drought of this magnitude results in an increase in water demand that would have a 10 percent probability of being exceeded during any given year.

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

A **wetland** is an area inundated or saturated by surface water or groundwater with vegetation adapted for life under those soil conditions (e.g., swamps, bogs, marshes).

THE UPPER EAST COAST PLANNING AREA

The UEC Planning Area (**Figure 1**) includes all of Martin and St. Lucie counties and the eastern portion of Okeechobee County. The region extends approximately 1,230 square miles, generally reflecting the watersheds of the C-23, C-24, C-25, and C-44 canals. Natural

systems in the UEC Planning Area include Lake Okeechobee, the Indian River Lagoon, the St. Lucie River and Estuary, and portions of the Loxahatchee River. The St. Lucie River Watershed encompasses an area of approximately 780 square miles, and the UEC region's wetlands are estimated to be more than 145,000 acres. Wetlands in the UEC Planning Area include Allapattah Flats, Cane Slough, DuPuis Reserve, Pal-Mar, and the Savannas. The Savannas ecosystem is one of the most endangered natural systems in south Florida.

The following descriptions highlight characteristics of the UEC Planning Area. Additional information about the UEC Planning Area is provided in the *2011–2012 Water Supply Plan Support Document* (Support Document) (SFWMD 2011b).

- The UEC population is expected to increase from the 2005 baseline estimate of 382,324 to 791,861 by 2030.
- Most, if not all, of the planning area's 42 MGD net demand for Public Water Supply will be met using alternative water sources including water conservation.
- Although citrus production has declined, it remains the dominant crop, and agriculture continues as the largest water user in the UEC Planning Area. Overall, gross water use for agriculture is projected to range from 117 MGD to 137 MGD through 2030.
- The region's traditional water sources include fresh groundwater from the surficial aquifer system and surface water, primarily from the C-23, C-24, C-25, and C-44 canals.
- Upper East Coast alternative water sources include brackish groundwater from the Floridan aquifer, reclaimed water, and excess storm water captured during the rainy season for reasonable-beneficial use. About 41 percent of the wastewater flow in the area is currently reused. More than 62 percent of the planning area's Public Water Supply treatment capacity is reverse osmosis (RO) using the Floridan aquifer system.

Savannas Preserve State Park

The Allapattah Flats and the C-23 Canal

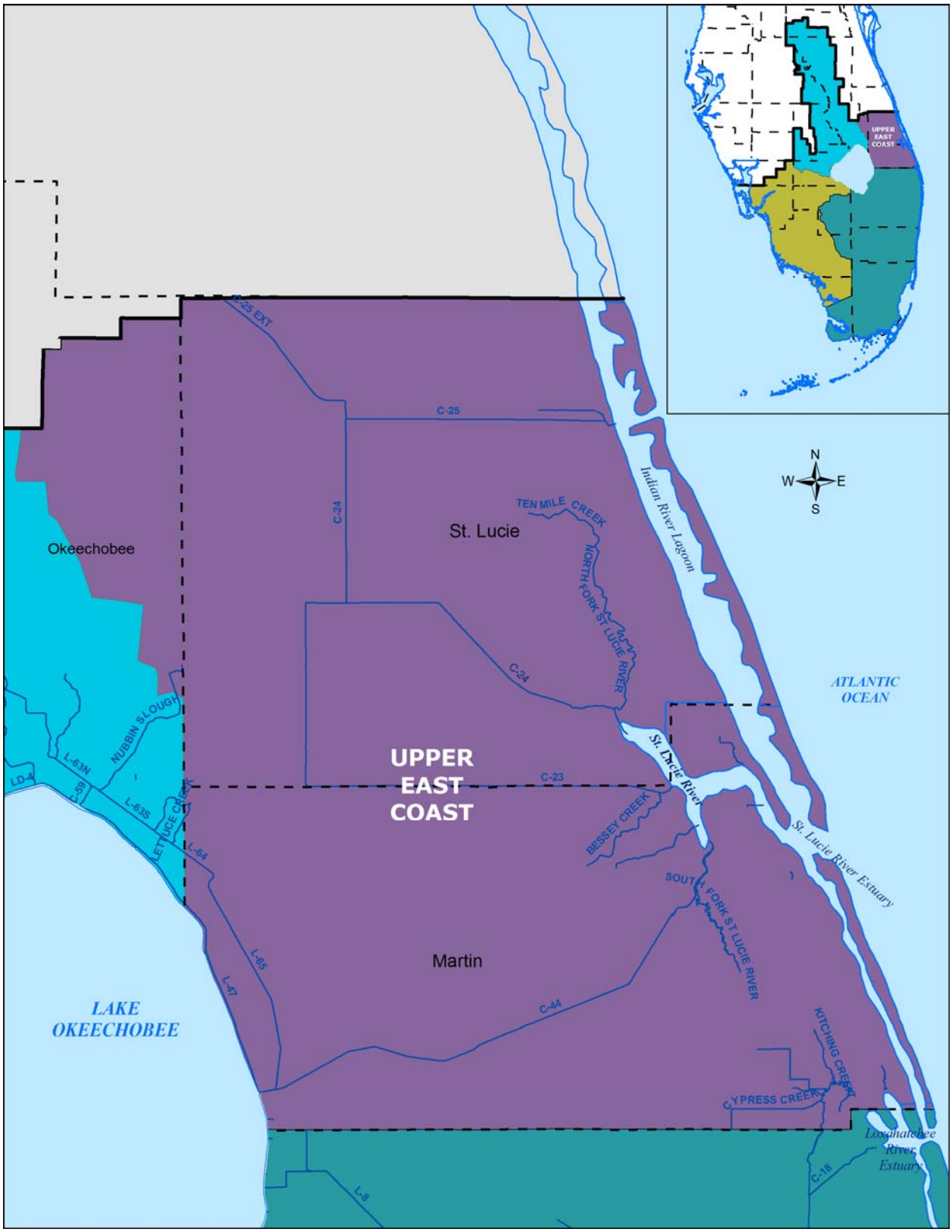


Figure 1. Upper East Coast Water Supply Planning Area.

Overview of UEC Water Resources

Water for urban and agricultural uses originates from groundwater and surface water throughout the UEC Planning Area. Determining the availability of water needed to meet projected demands (**Chapter 2**) requires consideration of the area's water resources. In addition to this overview, extensive information related to the UEC Planning Area and its water resources is contained in the Support Document (SFWMD 2011b).

Groundwater Sources

The UEC Planning Area uses water from the surficial aquifer system (SAS) and Floridan aquifer system (FAS), which includes the Upper Floridan aquifer (UFA) (see **Figure 2**).

Surficial Aquifer System

The surficial aquifer system is the traditional source of water, including potable water, for urban uses within the UEC Planning Area. The SAS includes the Water table aquifer and ranges in thickness from 50 feet to 250 feet in the UEC (Brown and Reece 1979). Productivity and water quality in the SAS tend to improve from north to south and west to east.

Floridan Aquifer System

Composed of the Lower Floridan aquifer (LFA) and the Upper Floridan aquifer, the FAS contains brackish water in south Florida. The productivity of the UFA is considerably greater than that of the SAS throughout most of the planning area, and as the area continues to grow, use of the UFA to augment urban supply is expected to increase. The UFA's chlorides are within a reasonable range for desalination blending in potable water systems and blending for citrus irrigation. Where chlorides are sufficiently low, UFA water can be blended with SAS water for use by public water supplies. A number of utilities in Martin and St. Lucie counties are using or have immediate plans to use desalinated UFA water to supply their service areas.

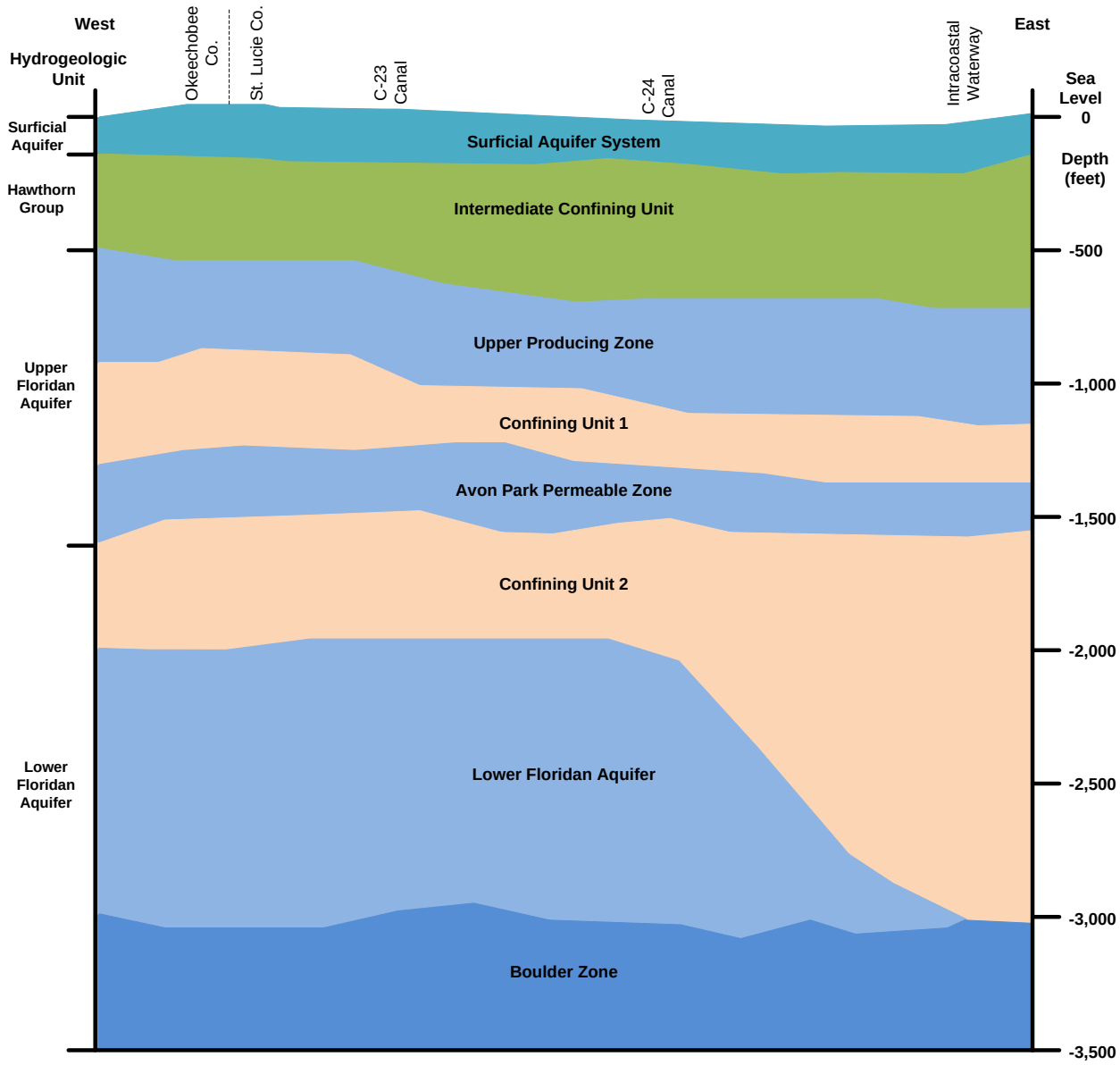


Figure 2. Generalized hydrogeologic cross-section of the UEC Planning Area.

Surface Water Sources

C-23 Canal and Citrus Groves

As part of the Central and Southern Florida Flood Control Project, the C-23, C-24, C-25, and C-44 canals are important sources of irrigation water within their respective drainage basins. The canals in the UEC Planning Area are the traditional source of water for agricultural water users under average rainfall conditions. During the wet season, the canals function primarily as aquifer drains. The C-44 Canal, constructed as a navigable flood control outlet for Lake Okeechobee, is the only one of the planning area's four canals that receives inflow from outside its drainage basin. The C-23, C-24, and C-25 canals are primarily dependent on rainfall as a source of inflow.

Surface water systems in the UEC Planning Area include Lake Okeechobee, the Indian River Lagoon, St. Lucie River and Estuary, and portions of the Loxahatchee River.

- **Lake Okeechobee** is a key component of the south Florida hydrologic system. The 2008 Lake Okeechobee Regulation Schedule (LORS) (USACE 2007) keeps Lake Okeechobee water levels one foot lower than the previous schedule to attain a water level of 12.5 to 15.5 feet National Geodetic Vertical Datum of 1929. Chapter 4 of the Support Document provides additional information about the 2008 LORS. Lake Okeechobee has many functions, including flood protection, urban and agricultural water supply, navigation, fisheries, and wildlife habitat. The lake is critical for flood control during wet seasons and water supply during dry seasons. Outflows from the lake are received by the St. Lucie River, Caloosahatchee River, Everglades Agricultural Area, and Water Conservation Areas.
- The **Indian River Lagoon** is a water body composed of three distinct, but interconnected estuarine systems. The Indian River Lagoon features the greatest species diversity of any estuary in North America.
- The **St. Lucie River and Estuary** is a primary tributary of the southern Indian River Lagoon, which is part of the larger Indian River Lagoon system. The St. Lucie River Watershed covers an area of approximately 780 square miles and includes the North Fork and South Fork of the St. Lucie River, several major drainage and irrigation canals, the surrounding watershed, and the St. Lucie Estuary.
- A portion of the **Loxahatchee River** is designated as an Aquatic Preserve by the State of Florida. The river has three major tributaries: the Northwest Fork, the North Fork, and the Southwest Fork. A portion of the Northwest Fork of the Loxahatchee River was designated by the federal government as a Wild and Scenic River, the first in Florida. The 2011 UEC Plan Update contains

information about this system relative to water supply and projects within the UEC Planning Area. See also the *2012 Lower East Coast Water Supply Plan Update* (SFWMD in process) for information about the Loxahatchee River relative to water supply and projects within the Lower East Coast Planning Area.

Wetlands

There are more than 145,000 acres of wetlands in the UEC Planning Area (USFWS 2010). Key wetlands in the UEC Planning Area include Allapattah Flats, the Atlantic Coastal Ridge, Cane Slough, DuPuis Reserve, Jonathan Dickinson State Park, the Savannas, and Pal-Mar.

PROGRESS IN THE UEC SINCE 2004

The 1998 UEC Plan and the 2004 UEC Plan Update identified several main regional issues concerning water conservation, groundwater resources, reclaimed water, seawater, storage, surface water, and related implementation strategies. The 2004 UEC Plan Update included 26 recommendations. The Five-Year Water Resource Development Work Program, contained in the District's *South Florida Environmental Report* (SFWMD 2011a), annually summarizes the progress of these recommendations.

Since the 2004 UEC Plan Update, the following activities and programs implemented in the UEC Planning Area are enhancing the region's water resources, water supply, and natural systems:

Water Conservation

1. In September 2008, the SFWMD adopted a Comprehensive Water Conservation Program to establish a proactive Districtwide water conservation program (see also **Chapter 4**).
2. The Martin County Urban Mobile Irrigation Lab (MIL) and the St. Lucie County Urban MIL were in operation until FY 2008. The 360 audits conducted in FY 2008 identified potential water savings of 96.85 million gallons per year (MGY), or 0.27 MGD.
3. The St. Lucie Agricultural MIL services the UEC Planning Area. The MIL is managed and administered by the St. Lucie Soil and Water Conservation District with funds traditionally provided by the Florida Department of Agriculture and Consumer Services (FDACS) and the SFWMD. In FY 2011, funds for the MIL were provided by the FDACS.
4. During FY 2009 and FY 2010, 16 farms covering 9,158 acres and 12 farms encompassing 2,668 acres participated in the Environmental Quality Incentives Program (EQIP), implemented through the U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS). EQIP is a voluntary conservation program that provides financial and technical assistance to farmers and ranchers who face threats to soil, water, air, and related natural resources on their land. The EQIP objective is to optimize environmental

benefits to be achieved through a process that begins with national priorities that address impaired water quality; conservation of ground and surface water resources; improvement of air quality; reduction of soil erosion and sedimentation; and improvement or creation of wildlife habitat for at-risk species.

5. The Districtwide Year-round Landscape Irrigation Conservation Measures Rule became effective in March 2010 (Chapter 40E-24, F.A.C.), consistent with the Comprehensive Water Conservation Program (see also **Chapter 4**).
6. The Water Savings Incentive Program (WaterSIP) provides up to 50-50 cost-sharing funds to utilities, municipalities, property owner associations, and large water users, for non-capital projects, specifically the purchase and installation of high-efficiency indoor plumbing fixtures and outdoor irrigation retrofits. From FY 2005–FY 2009, the District allocated $248,512 for 12 UEC Planning Area WaterSIP projects, representing an estimated potential water savings of 221 MGY (see also **Chapter 4**).

Modeling and Studies

7. The SFWMD drilled three Floridan aquifer system (FAS) exploratory and monitor wells at the C-23 Canal site in north-central Martin County. The results of the District investigation are contained in the completed study, *Hydrogeologic Investigation of the Floridan Aquifer System C-23 Canal Site Martin County, Florida* (SFWMD 2008). In addition, the wells are integrated into the District's long-term monitoring program in the UEC Planning Area.
8. A local FAS groundwater level and water quality monitoring network was established in the UEC Planning Area from 1996–2007. This local network fed into the District's regional network, which involves cooperative agreements with agricultural owners to include agricultural well sites. These data are intended to be used for modeling. The regional network was expanded from 2007 to 2009 to include additional well sites. Three sites were co-located with the local governments of Fort Pierce, Port St. Lucie, and Martin County, along with multiple wells at the District's C-23 site. Continuous water level recorders have been installed at these sites, and periodic water quality assessments are conducted (see also **Chapter 5**).
9. The East Coast Floridan Aquifer System (ECFAS) Model was completed in October 2008 (Golder Associates 2008). An independent peer review of the model is scheduled in FY 2011. The model is designed to evaluate future effects of proposed use of the Floridan aquifer in the UEC (see also **Chapter 3**).
10. A study of the development and application of water quality modeling components that could be applied to the SFWMD Regional Simulation Model was completed in FY 2009. As a result of this study, a spatially distributed water quality model for phosphorus transport and cycling in wetlands was developed for application throughout the District (USGS 2008) (see also **Chapter 5**).
11. The District funded several feasibility studies, including the *St. Lucie and Indian River Counties Water Resources Study* (HDR Engineering and HSW 2009); the *Water Desalination Concentrate Management and Piloting Study* (Carollo Engineers, Inc. 2009); and water reuse pilot projects partnering with the City of

Plantation and the City of Sunrise as separate initiatives (MWH 2008; Hazen and Sawyer 2008) (see also **Chapter 5**).

12. The District completed the Subregional Feasibility Study of Water Supply Integration for St. Lucie County Area. This effort comprised two phases. Phase I summarized the existing and planned water resources projects within St. Lucie County. Phase II consisted of a conceptual master plan for water systems integration and evaluation of institutional frameworks for providing water and wastewater services in northern St. Lucie County. The study concluded that existing agreements and service provisions are adequate (Metcalf & Eddy/AECOM 2006, 2007).

Regulatory Protection and Water Quality Efforts

13. The Florida Ranchlands Environmental Services Project (FRESP) is a diverse coalition collaborating to solve environmental challenges. As part of this initiative, the partners have developed a Northern Everglades Payment for Environmental Services Program whereby the District pays ranchers to provide services such as water retention and reduced phosphorus loading on private ranchlands. In 2005, a pilot program of eight projects was initiated, with the Alderman-Deloney Ranch in the UEC as a participating ranch.

14. In October 2008, the District adopted Restricted Allocation Area criteria for the Lake Okeechobee Service Area (see the *Restricted Allocation Areas* section near the beginning of this chapter and **Chapter 5**).

15. The Water Reservation for the North Fork of the St. Lucie River became effective in March 2010 (see the *Water Reservations* section near the beginning of this chapter and **Chapter 5**).

16. The *St. Lucie River Watershed Protection Plan* (SLRWPP) (SFWMD, FDEP, and FDACS 2009) was submitted to the Florida legislature on January 1, 2009. The plan identified three major concerns that affect the estuary's ecological health. The three main components of the SLRWPP are: 1) a Watershed Construction Project; 2) a Watershed Pollutant Control Program; and 3) a Watershed Research and Water Quality Monitoring Program.

Water Storage

17. The *Water Resources Development Act of 2007* authorized the CERP Indian River Lagoon – South Project to reduce harmful freshwater inflows and generate habitat and water quality improvements in the St. Lucie Estuary and the Indian River Lagoon (see also **Chapter 3**).

    a. Approximately half of the land needed to restore the Allapattah Natural Storage Area component of the Indian River Lagoon – South Project to its pre-drainage condition has been acquired by the SFWMD. Some contracts for ditch filling and structure upgrades have been completed and additional restoration work will be necessary. The property is open to the public for passive recreational use. Contract work will continue with berming, ditch filling, and structure upgrades.

b. The SFWMD has acquired all of the approximately 11,000 acres of land and completed final design of the C-44 (St. Lucie Canal) Reservoir and Stormwater Treatment Area (STA) Project, located in southern Martin County adjacent to the C-44 Canal. This project, also a component of the CERP Indian River Lagoon – South Project, will consist of a 3,400-acre above-ground reservoir approximately 15 feet deep (50,600 acre-feet of storage) to capture local C-44 Basin runoff, and a 6,300-acre STA. Reservoir test cells are complete and preliminary construction of this project has begun. Federal and state monies are funding this project.

c. About 83 percent of the land needed for the C-23/C-24 reservoirs has been acquired by the SFWMD. The reservoirs will capture water from the C-23 and C-24 canals, thereby reducing the extreme peaks of freshwater discharge to the estuary and delivering water to meet fish and wildlife needs.

18. Construction was completed on the Ten Mile Creek Reservoir/STA Project in June 2006. During the processes that occur in preparation to transfer the project from the U.S. Army Corps of Engineers (USACE) to the sponsor (SFWMD) for full operations, concerns were raised about some aspects of the project. In September 2007, the USACE and the SFWMD identified the issues and planned a course of action toward remediation and the delivery of a quality project. This process identified additional project needs and their associated costs. As holder of the Florida Department of Environmental Protection (FDEP) permit for construction, the USACE is responsible for the facility. The USACE has placed the facility in a passive operating state while funding authorization is obtained to complete a post-authorization change report to identify remediation options and to fund maintenance and upkeep of the facility until 2013.

Water Supply Development Projects

19. Through the Alternative Water Supply (AWS) Funding Program, the District assisted water users in the development of AWS projects including reclaimed water and the use of the Floridan aquifer and RO treatment. In the UEC Planning Area, from FY 2006 to FY 2009, completed AWS projects created 71 MGD of new water capacity (see also **Chapter 4** and **Chapter 6**).

20. Martin County Utilities completed the Tropical Farms Water Treatment Facility expansion and RO Membrane Cleaning System (2006–2009) and Tropical Farms and North Wastewater Treatment Facility expansions (2006–2008) (see also **Chapter 6**).

21. Indiantown Company completed the Indiantown Wastewater Treatment Reclaimed Water Production Facility; Water Main to Cogeneration Power Plant; and Reuse Upgrades (2007–2008) (see also **Chapter 6**).

22. South Martin Regional Utility completed Wastewater Treatment Facility Irrigation Quality Water Improvement Program Phases (2006–2009) (see also **Chapter 6**).

23. The City of Port St. Lucie Utility Systems Department completed Brackish Water Projects (2006–2008), and Reclaimed Water Projects including Glades and Westport Wastewater Treatment Facilities expansions and Veranda Planned Urban Development Irrigation Quality (PUD IQ) Mains Master Irrigation (2006–2009) (see also **Chapter 6**).

OUTLOOK ON CLIMATE CHANGE

Although climate change is occurring across the globe, the impact to individual regions varies, and the degree of the change remains undetermined. Long-term data show changes in parameters, such as temperature and sea level. Despite the uncertainties, climate change and its related effect on hydrogeologic conditions must be included as a consideration in water supply planning.

In the UEC Planning Area, the anticipated rise of the sea level may increase the intrusion of salt water into groundwater. Analysis is needed to identify the impact of sea level rise and the risk of saltwater intrusion on utility wellfields. In addition, comprehensive monitoring is required to understand and measure aquifer conditions and saltwater movement.

Other changes, such as increased evapotranspiration (ET), and changes in rainfall and tropical storms, are less predictable. If the temperatures and ET increase as many experts expect, both Public Water Supply and Agricultural Self-Supply water demands may increase. More frequent, intense rainfall events with longer interim dry periods could increase total annual rainfall, but decrease effective rainfall, as more water may be lost to runoff or tide.

WATER SUPPLY PLANNING FOR THE NEXT 20 YEARS

The stronger legislative link between local governments' comprehensive plans and the District's regional water supply plans, data sharing, and collaborative planning, are all credited with improving the water supply planning process. Moreover, the District's Consumptive Use Permitting Program is a key component of this planning process. Updates to local governments' 10-Year Water Supply Facilities Work Plans and the District's five-year update of the 2011 UEC Plan Update will continue to reflect 20-year demand estimates and projections.

Chapter 2 presents the demand estimates and projections for the UEC Planning Area by water use category.

Roseate Spoonbills and Wood Storks –
Savannas Preserve State Park

2

Demand Estimates and Projections

This chapter discusses water demand estimates and projections for the UEC Planning Area. The development of water demand projections is a complex process and is accomplished in coordination with staff from local governments, utilities, other agencies, and stakeholder groups. Data collection and analysis to support the projections included in this plan began in the summer of 2009.

Since publication of the 2006 UEC Plan Amendment, population growth in the UEC Planning Area has increased, leading to an increase in future urban water demands. However, cultivated agriculture in this area has declined since 2006, and it is anticipated to slightly increase over the 20-year planning horizon.

In this chapter, the water demands for the water use categories established by the Florida Department of Environmental Protection (FDEP) are projected for the 20-year planning horizon of 2010 to 2030. Water demands are described in two ways, gross and net. Both gross water demands and net water demands are calculated in million gallons per day (MGD). Gross water demand is also commonly termed raw water demand. Gross or raw water demand is the amount of water withdrawn from the water source to meet a particular need of a water user or customer. Gross demand is the amount of water allocated in a consumptive use permit. Net demand is the volume of water needed by an end user or customer to meet their needs, after deducting treatment and process water losses, and system inefficiencies. Gross demands are usually higher than net demands as most uses lose water through the treatment or transport of the water, in system inefficiencies, or in irrigation delivery.

TOPICS

- Water Use Categories
- Net Water Demands
- Gross Water Demands
- Demand Projections in Perspective

In the Public Water Supply (PWS) sector, net demands are commonly called finished water demands. One example to demonstrate the difference between net and gross water demands can be seen in a PWS that uses brackish water as one of its sources and employs reverse osmosis (RO) treatment. While the customer need or demand for finished water may be 10 MGD of

NAVIGATE

Appendix A 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.

finished water (net demand) to supply customers, 13.5 MGD of raw water (gross demand) must be withdrawn from the water source to account for water losses in the treatment process. A 75 percent efficiency factor is assumed, because typically for every 100 gallons pumped and treated with RO, the process results in 75 gallons of finished water and 25 gallons of reject water, as well as water lost in transit.

This chapter provides demand projections in terms of average rainfall conditions and anticipated growth in the UEC Planning Area through 2030. As water demands may be significantly impacted by weather, particularly rainfall, gross and net demands for 1-in-10 year drought conditions are estimated and projected in **Appendix A**.

LAW / CODE

A 1-in-10 year drought event is a rainfall deficit that would have a 10 percent probability of occurring during any given year. Paragraph 373.709(2)(a), Florida Statutes (F.S.), states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event. Droughts generally create an increased water demand.

Demand projections in the 2004 UEC Plan Update and 2006 UEC Plan Amendment were determined using Year 2000 baseline data. For this 2011 UEC Plan Update, a new baseline incorporating Year 2005 data was established to estimate demand projections. The 2005 baseline was developed from a variety of data sources including permanent population estimations, land use, crop production, irrigation systems, historical water use, and climatic conditions. Data from 2005 were also used to develop water use factors, such as finished-water per capita use rates by utility, and irrigation system efficiency by crop type. These factors, along with projected variables, such as population and irrigated acres, were used to project future water demands for the 2010 to 2030 planning horizon.

Appendix A provides both gross and net water demand projections for average-year and 1-in-10 year drought conditions, as well as additional information about water demand within each water use category. For agriculture, irrigated acreage and demands by crop type are included. For public water supplies, permanent 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.

DESCRIPTIONS OF WATER USE CATEGORIES

Gross and net water demands for 2005 baseline year and projections through 2030 are estimated in five-year increments for each of the six water supply categories established by the FDEP (see **Appendix A**):

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

Urban demands are the combined total of Public Water Supply; Domestic Self-Supply; Industrial/Commercial/Institutional Self-Supply; Recreational/Landscape Self-Supply; and Power Generation Self-Supply user demands. By 2030, these use categories are expected to account for 65–69 percent of the UEC Planning Area's total net water demands, with Public Water Supply net demands expected to increase by 43 MGD (89%) from 2010 to 2030.

Agricultural water use is projected to remain the UEC Planning Area's single largest use category. Estimates indicate Agricultural Self-Supply gross water demand will represent 37–40 percent of the UEC Planning Area's total gross demands by 2030.

The *Net Water Demands* section discusses the average-year net demand projections for Public Water Supply and Domestic Self-Supply. The *Gross Water Demands* section discusses the average-year gross demand projections for Agricultural Self-Supply; Industrial/Commercial/Institutional Self-Supply; Recreational/Landscape Self-Supply; and Power Generation Self-Supply. The water supply development projects proposed to help meet UEC Planning Area demands are included in **Chapter 6**.

Population and Water Use Trends

Population estimates for the UEC Planning Area include permanent populations of Martin and St. Lucie counties and the eastern portion of Okeechobee County. The UEC Planning Area's population is expected to increase by 107 percent from the 2005 baseline year to 2030. St. Lucie County will experience the region's greatest growth, as population is

projected to increase by 148 percent. Martin County's population will increase by approximately 38 percent, and the portion of eastern Okeechobee County in the UEC Planning Area will increase by approximately 28 percent. Overall, population is expected to grow significantly and at a greater rate than projected in the 2006 UEC Plan Amendment (**Figure 3**). Public Water Supply customer demands grow through the projection period because of the associated population growth. The distribution of population estimates to individual utilities is based on historical data and projected distributions of population to traffic analysis zones and utility service areas.

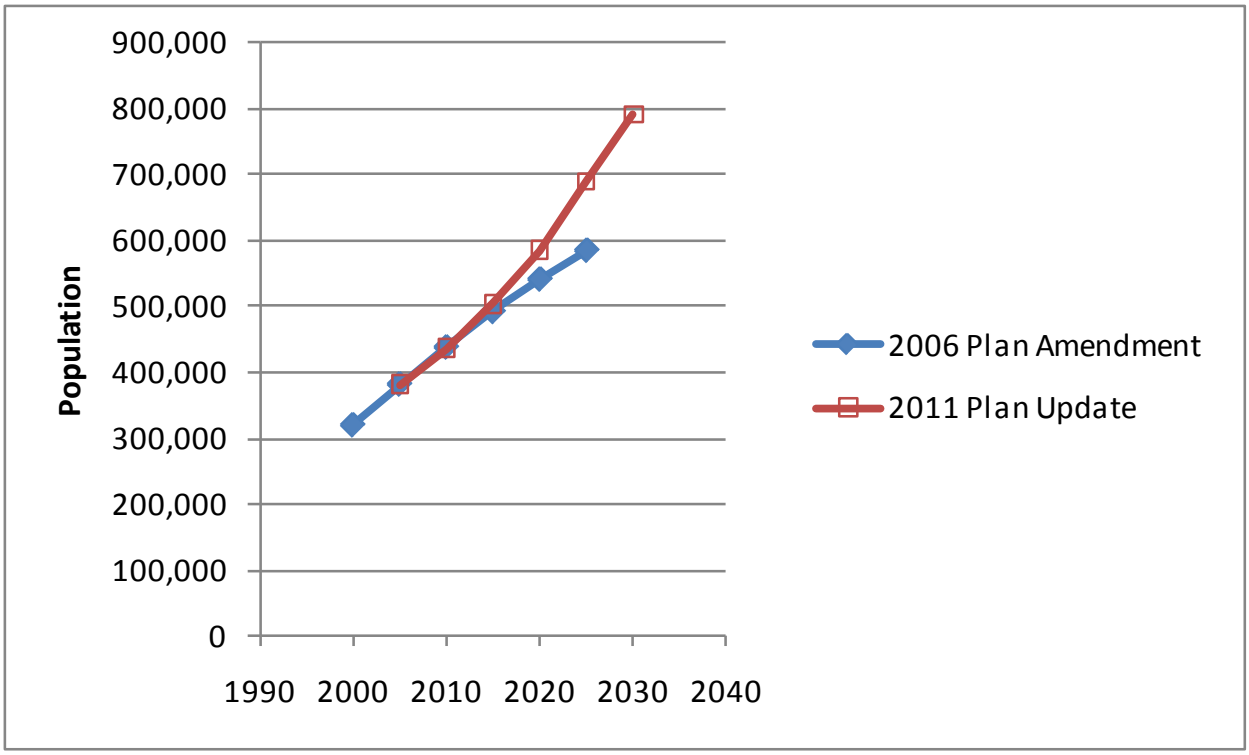


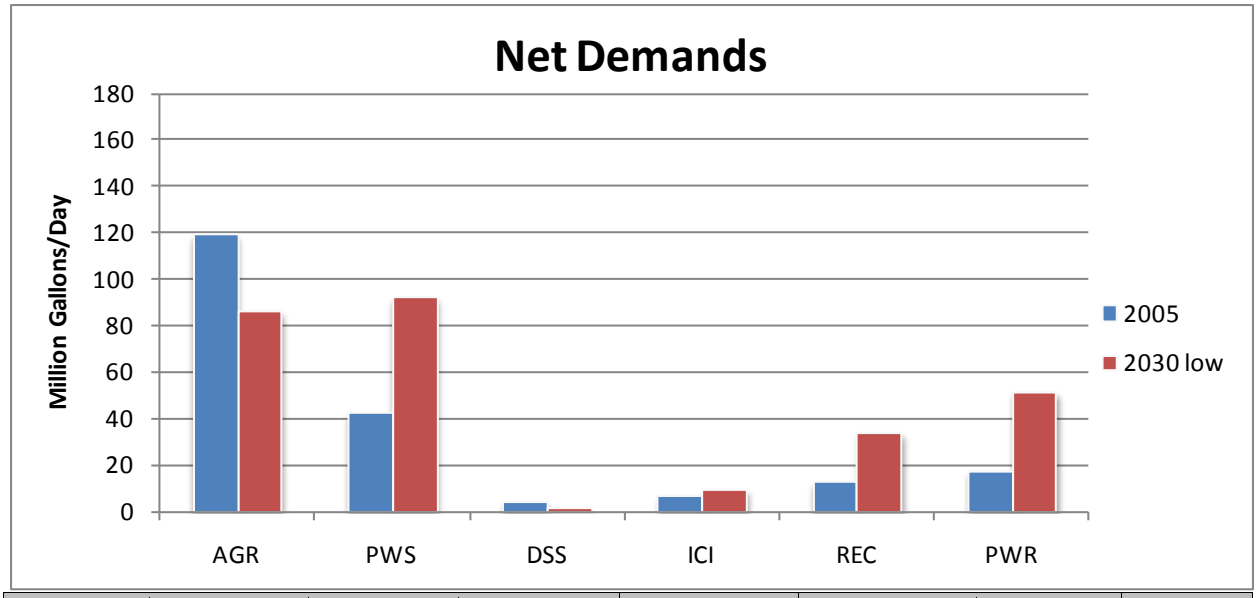
Figure 3. Population projections, 2006 UEC Plan Amendment versus 2011 UEC Plan Update.

NET WATER DEMANDS

INFO

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

Public Water Supply and Domestic Self-Supply are discussed in net water terms because the PWS is generally focused on finished (treated) water. The use of net or finished water demands allows utilities to compare actual water delivered from the plant even as they change source waters, requiring different treatment processes. By using net demands for PWS, water losses occurring during water treatment and transport are also eliminated from demand estimates. The change in net demands for the 20-year planning horizon for all water use categories is presented in **Figure 4**.



	Agricultural Self-Supply[a]	Public Water Supply	Domestic Self-Supply	Industrial/ Commercial/ Institutional Self-Supply	Recreational/ Landscape Self-Supply	Power Generation Self-Supply	Total
Baseline 2005 MGD	119	42	4	7	13	17	202
Projected 2030 MGD	86–101	92	1	9	34	51	273–288
% Change	(28)–(15)%	118%	(84)%	40%	163%	195%	32–42%

Note: The bar chart compares demands by use category in MGD, and the table shows the percentage of growth in each. Perceived discrepancies in totals are due to rounding.

a. Agricultural demand projections do not include approximately 49,000 acres of District-acquired lands that will come out of irrigated citrus production with the implementation of Comprehensive Everglades Restoration Program (CERP) projects.

Figure 4. Estimated average-year net demands by water use category for 2005 and 2030.

Public Water Supply and Domestic Self-Supply

Public Water Supply is the water supplied by water treatment facilities for potable use (drinking quality) to users such as homes, office and retail facilities, and schools and institutions. Utilities with projected average pumpages of 0.1 MGD or greater through 2030 compose the Public Water Supply. Water used by households or facilities served by small utilities (less than 0.1 MGD) or private wells are categorized as Domestic Self-Supply.

Development of the water demand projections for the UEC Planning Area was a multi-step process. Throughout the process, draft projections were discussed with each utility and local government planning department to coordinate final projections.

The SFWMD permanent resident population projections for this planning area are higher than the medium population projections from the Bureau of Economic and Business

Research (BEBR 2009). As part of the population analysis process, a thorough review of data and current trends was conducted. Source data included:

- Martin and St. Lucie Metropolitan Planning Organization traffic analysis zones
- Adopted 10-Year Water Supply Facilities Work Plans approved by the Florida Department of Community Affairs (FDCA)
- SFWMD consumptive use permits
- Local governments' comprehensive plans and evaluation and appraisal reports
- Development of Regional Impact orders

This review demonstrated the appropriateness of using Martin County and St. Lucie County population projections, which are higher than the medium population projections from the BEBR. However, population projections for eastern Okeechobee County relied on medium BEBR population projections for DSS projections.

For Martin and St. Lucie counties, the distribution of population relied primarily on traffic analysis zone projections used for transportation planning within each county. The resulting projections were compared with utilities' projections, and some adjustments were made, such as increasing growth for the City of Port St. Lucie.

Estimates of PWS and DSS use were made based on 2005 per capita use rates by utility and the distribution of the county-level population estimates and projections in utility service areas. Water conservation measures were not factored into the demand projections used in this chapter. Rather, water conservation is considered a water source option (see **Chapter 4**).

St. Lucie West Services District Water Treatment Facility

The population of St. Lucie County is projected to increase by 148 percent over the next two decades. The projections also indicate Martin County's population will increase by approximately 38 percent during the same period, and the eastern portion of Okeechobee County, which is mostly agricultural and rural, will increase by approximately 28 percent (**Table 1**). Public Water Supply demands increase significantly through the 2030 projection period, primarily due to anticipated population increases. Domestic Self-Supply demand declines substantially, as most new potable water demand will be served by public water systems.

Table 1 provides a summary of the population estimates for the counties or portions of counties located in the UEC Planning Area, and **Table 2** lists the projected net water demands from the 2005 baseline year through 2030.

Table 1. Projections of permanent population in the UEC Planning Area, 2005–2030.

County Area	2005[a]			2030[b]		
	Estimated Population	Public Water Supply	Domestic Self-Supply	Projected Population	Public Water Supply	Domestic Self-Supply
St. Lucie	240,039	234,405	5,634	595,063	594,037	1,026
Martin	140,983	117,524	23,459	195,138	191,756	3,382
Eastern Okeechobee[c]	1,302	0	1,302	1,660	0	1,662
UEC Total	382,324	351,929	30,395	791,861	785,793	6,070

a. Bureau Economic and Business Research, University of Florida, 2006.
b. SFWMD population methodology.
c. Portion in the SFWMD.

Table 2. Net PWS and DSS water demands in the UEC Planning Area, 2005–2030.

Upper East Coast Water Demands Summary (in MGD)						
Net Water Demands	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
Public Water Supply	42	49	57	67	80	92
Domestic Self-Supply	4	4	3	2	1	1
UEC Total	46	53	60	69	81	93

GROSS WATER DEMANDS

Gross water demand is the amount of raw water needed for a specific use. Gross water demand differs from net water demand in that water lost during treatment, transport, or irrigation delivery is included in gross water demand values, but not in net water demand values. This section reviews the gross water demands of Agricultural Self-Supply; Industrial/Commercial/Institutional Self-Supply; Recreational/Landscape Self-Supply; and Power Generation Self-Supply. (Public Water Supply and Domestic Self-Supply are discussed in the *Net Water Demands* section of this chapter.)

INFO

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

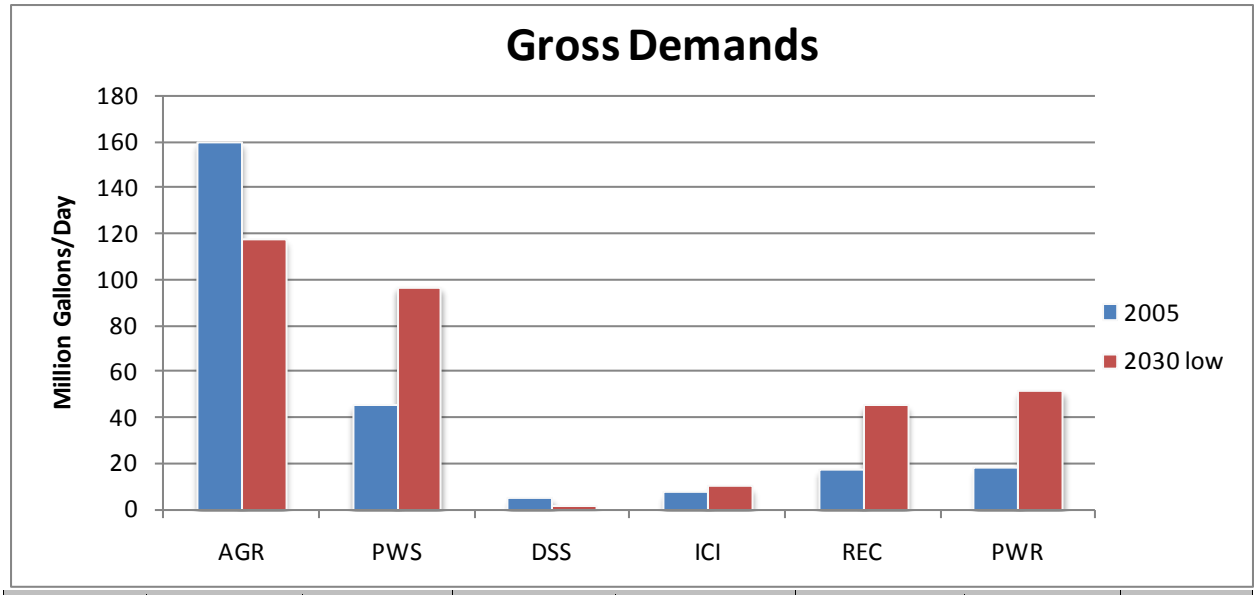
As mentioned earlier, there is generally a difference between gross and net water demands. Variations in treatment, distribution, and irrigation methods can increase or decrease the gross demand. The difference between gross and net demands can be reduced through water conservation practices that, in turn, reduce demands on the water resource.

In 2005, annual average gross water demands for all categories in the UEC Planning Area totaled 250 MGD. By 2030, the projected annual average gross water demands are estimated to total between 320 MGD and 340 MGD, an increase of 25–36 percent (**Figure 5**).

Annual average estimates are used to demonstrate general projected trends, including these key highlights:

- Agricultural Self-Supply gross demands within the UEC Planning Area are projected to decline from the 2005 baseline of 159 MGD to 117–137 MGD by 2030. Despite this reduction, agriculture is expected to remain the largest water use category in the UEC Planning Area.
- Public Water Supply gross demands are expected to increase by 115 percent, from the 2005 baseline of 45 MGD to 96 MGD by 2030. Public Water Supply represents the second-largest water use category in the UEC Planning Area (see the *Net Water Demands* section of this chapter).
- Industrial/Commercial/Institutional Self-Supply gross demand is anticipated to remain unchanged.
- Recreational/Landscape Self-Supply gross demands are projected to increase by 165 percent, from the 2005 baseline of 17 MGD to 45 MGD in 2030. The permitting of large-scale landscaped areas and the region's population growth (**Table 1**) are contributing factors for this significant increase.
- Power Generation Self-Supply gross demand is expected to increase by 195 percent, from the 2005 baseline of 17 MGD to 51 MGD by 2030, largely due to new power generation facilities planned by Florida Power & Light (FPL).

Figure 5 shows the 2005 baseline gross demands and projected 2030 gross demands for all water use categories.



	Agricultural Self-Supply[a]	Public Water Supply	Domestic Self-Supply	Industrial/ Commercial/ Institutional Self-Supply	Recreational/ Landscape Self-Supply	Power Generation Self-Supply	Total
Baseline 2005 MGD	159	45	5	7	17	17	250
Projected 2030 MGD	117–137	96	1	9	45	51	320–340
% Change	(26)–(14)%	115%	(85)%	40%	165%	195%	25–36%

Note: The bar chart compares demands by use category in MGD, and the table shows the percentage of growth in each. Perceived discrepancies in totals are due to rounding.

a. Agricultural demand projections do not include approximately 49,000 acres of District-acquired lands that will come out of irrigated citrus production with the implementation of Comprehensive Everglades Restoration Program (CERP) projects.

Figure 5. Estimated average-year gross demands by water use category for 2005 and 2030.

Agricultural Self-Supply

Agricultural Self-Supply includes water used for commercial crop irrigation, livestock watering, and aquaculture. Agriculture is a large, key industry in the UEC Planning Area and is expected to remain the dominant land use in the region, despite economic challenges and damage from hurricanes and diseases, such as citrus canker and greening. The UEC Planning Area encompasses a portion of the Indian River Citrus District, known globally for its Indian River grapefruit. Agricultural acreage and associated water demands are challenging to project because of the various economic, weather, and disease issues that impact production. In addition, market-driven factors affect the crops grown and subsequent volume of water used. To estimate future gross water demand, it was deemed appropriate to use ranges for future acreage and water demand projections. Gross irrigation requirements are the amount of water that must be withdrawn from the source in order to be delivered to the plant root zone. The volumes listed in **Table 3** account for soil type and irrigation system efficiency. Net demands reflect an estimate of the amount of water

farmers need to place into the root zones of crops. **Appendix A** presents both net and gross irrigation demands by crop type under average-year and 1-in-10 year drought conditions from the 2005 baseline through 2030.

For the years 2005 and 2010, estimates of active cultivated acreage with irrigation are based on various industry statistical surveys, including the U. S. Department of Agriculture (USDA) citrus industries and other information from the following sources:

- University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS)
- USDA – National Agricultural Statistics Service (USDA–NASS)
- Florida Farm Bureau and other SFWMD agricultural stakeholders
- Florida Department of Agriculture and Consumer Services (FDACS)
- Local agricultural extension offices
- The SFWMD Water Use Regulatory Database
- The SFWMD acreage estimates developed as part of GIS agricultural land use/crop type analysis (1999 and 2004)

The 2010 cultivated and irrigated acreage is less than the 2005 acreage. Projections of acreage by crop are shown for each county in **Appendix A**.


Citrus in the UEC Planning Area

The UEC Planning Area experienced the loss of about 35,000 acres of citrus from 2004 to 2009 due to damage done by hurricanes and the proliferation of canker and greening diseases. In addition, approximately 11,000 acres of citrus were permanently taken out of production for construction of the C-44 Reservoir and Stormwater Treatment Area Project, a component of the CERP Indian River Lagoon – South Project. Despite recent acreage losses, citrus production is expected to increase as new rootstock and production techniques become available. Research is under way evaluating options to manage the occurrence of disease, develop disease-resistant rootstock, and establish production practices, such as the Advanced Production/Open Hydroponic Systems. While efforts to develop new rootstock and cures for the diseases are being conducted in several countries, the USDA Horticulture Research Laboratory in Fort Pierce is working with local citrus growers and has a number of studies under way. The outcome of this research will help determine whether some land will continue to be farmed in citrus or will transition to another crop.

The total agricultural acres listed in the 2004 UEC Plan Update showed a continuing decline in the region's active citrus acres. The peak year for citrus production (acreage) in both

Martin and St. Lucie counties was 1994. As a result of the challenges occurring in the citrus industry, the USDA is preparing annual citrus inventories to monitor the growth of the industry. The citrus acres included in this 2011 UEC Plan Update are based on the 2005 and 2009 USDA data, as well as input from citrus stakeholders. In the UEC Planning Area, total irrigated active citrus acreage is expected to range from 74,962 acres to 92,046 acres in 2030.

Since the 2004 Plan Update, acreage for vegetables, sod, and greenhouses/nurseries has increased, while sugarcane acreage has remained stable. The improved pasture acreage in this region is projected to increase from approximately 19,000 acres to 45,000 acres. It is likely that much of this increase will be due to citrus land conversion. Recent permit modifications indicate that some citrus lands will be transitioning to different crop types. Because the population is expected to steadily increase, influencing a need for more housing, sod acreage and future gross water demand are projected using ranges.

Although gross water demand in this category is projected to decline, from 159 MGD in 2005 to 117–137 MGD in 2030, agriculture is expected to remain the largest use category in the region, with citrus representing greater than 75 percent of all crops grown.

Agricultural water demand reflects projected irrigated acreage, crops, soil types, growing seasons, and irrigation system types and strategies. Agricultural Self-Supply demand calculations for the 2011 UEC Plan Update applied results from the Agricultural Field Scale Irrigation Requirements Simulation (AFSIRS) Model, which uses data from the 1965–2000 time frame. These modeling results were also used in the 2004 UEC Plan Update.

Estimated agricultural cultivated acreages and average-year gross demands by crop type for 2010 and 2030 are presented in **Table 3**.

Table 3. Estimated irrigated agricultural acreages and average-year gross demands by crop type for 2010 and 2030.

Category	2010 Acres	2010 Demand (MGD)	2030 Acres	2030 Demand (MGD)
Citrus	69,629	74	74,962–92,046	79–95
Sugarcane	10,379	16	10,379	16
Vegetables, Melons & Berries	7,839	10	6,189	8
Sod	5,211	13	4,114–5,211	10–13
Greenhouse/Nursery	1,943	4	1,943	4
Other Fruits and Nuts	115	0	115	0
Total	95,116	117	97,702–115,883	117–136

Industrial / Commercial / Institutional Self-Supply

Industrial/Commercial/Institutional Self-Supply demands are projected to increase slightly more than 2 MGD from 2005 to 2030. This self-supplied use category includes large plant facilities for production processing, manufacturing, and technical needs, such as concrete, agricultural citrus processing, and biotech. Many industrial, commercial, and institutional facilities receive their water from Public Water Supply utilities and their needs are included under the PWS use category. Information from the SFWMD Water Use Regulatory Database was used to calculate the demands, along with population growth rates for each county.

Recreational / Landscape Self-Supply

Golf Course along the St. Lucie River in Martin County

Gross demand for Recreational/ Landscape Self-Supply is projected to increase by 165 percent from the 2005 baseline of 17 MGD to 45 MGD in 2030. Recreational/Landscape demands supplied by PWS utilities are included in the PWS demands. Recreational/ Landscape Self-Supply water use projections include landscape and golf course irrigation demands, as well as water needs for parks; communities and homeowners associations with large common areas and consolidated irrigation systems; and areas with large green spaces, such as ball fields, stadiums, and cemeteries. These uses are typically identified through consumptive use permits.

Estimated landscape and golf course acreage for 2005 was based on the total number of landscape and golf course permits from the SFWMD Water Use Regulatory Database, including individual, major, and minor general permits. Future year demands were projected using county population growth rates, information provided by local planning officials, and golf course publications. Based on input received from golf course stakeholders and planning staff, a slower growth rate was assumed for golf courses.

Power Generation Self-Supply

Currently, two power generation plants in the UEC Planning Area are permitted to withdraw water: FPL Martin Power Plant near Indiantown and Treasure Coast Energy Center (TCEC) in Fort Pierce. The FPL Martin site withdraws water from the Martin County Reservoir for cooling purposes, and the TCEC uses water from the Floridan aquifer. The TCEC plans to use reclaimed water for part of their user needs in the future as reclaimed water becomes available. Neither of these facilities used reclaimed water in 2005.

In addition, the FPL St. Lucie Nuclear Plant uses ocean water, which is not required to have a consumptive use permit and, therefore, not addressed in this water supply plan update. In addition, the Indiantown Cogeneration Plan, which sells power to FPL, is not included in this Plan Update because it withdraws water from Taylor Creek/Nubbin Slough in the SFWMD's adjacent Kissimmee Basin Planning Area.

The need for additional power supplies is expected to increase as the population in the UEC Planning Area and other portions of south Florida grows. The area's major power supplier, FPL, expects that much of the region's future power generating capacity will use fresh or alternative (brackish or reclaimed) water sources, and cooling tower technology as a heat rejection method. The Martin facility uses cooling pond and cooling tower technology that varies by unit. Use of the cooling pond and cooling tower technology significantly decreases overall water supply demands at the Martin facility because the cooling pond is the supply source and release point. The Martin Plant reuses effluent from its on-site package sewage plant by discharging it to the cooling pond. Florida Power & Light has future power generation plants planned for this area in 2020 and 2030. Power Generation demands are expected to increase by 200 percent from the 2005 baseline of 17.4 MGD to 51.3 MGD by 2030.

DEMAND PROJECTIONS IN PERSPECTIVE

The demand projections presented in this 2011 UEC Plan Update are based on the best information available. However, these projections reflect trends, circumstances, and industry intentions that change over time. For example, this Plan Update expects greater population growth than was anticipated in the 2004 UEC Plan Update and the 2006 UEC Plan Amendment. This anticipated growth is included in the local government comprehensive plans and has been approved by the FDCA. The estimated growth is large enough to require infill and development of existing urban areas, as well as development outside of current urban service boundaries to accommodate this growth. The location of new development and the extent to which such growth may include historically rural portions of the UEC Planning Area are important planning considerations. The District will continue to work closely with local governments and 10-Year Water Supply Facilities Work Plans to monitor growth decisions in these areas.

Table 4 shows the 2025 gross demands projected in the 2006 UEC Plan Amendment compared to the lower 2030 demands projected in this Plan Update.

Table 4. Gross demands projected in the 2006 UEC Plan Amendment versus this 2011 UEC Plan Update.

Water Use Category	Projected 2025 Demand from 2006 Plan Amendment (MGD)	Projected 2030 Demand (MGD)
Agricultural Self-Supply	197	117–137
Public Water Supply	102	96
Domestic Self-Supply	3	1
Industrial/Commercial/Institutional Self-Supply	5	9
Recreation/Landscape Self-Supply	24	45
Power Generation Self-Supply	48	51
Gross Demands Total	379	320–340

Note: Perceived discrepancies in totals are due to rounding.

There is uncertainty associated with the agricultural land use projections. Citrus, the dominant agricultural crop for this area, has declined due to citrus canker and greening, damage from hurricanes, economic fluctuations, removal of lands from agriculture for ecosystem restoration efforts, and pressures from urban development. As the future of citrus in the UEC Planning Area depends on disease-resistant citrus trees and alternative production methods, the citrus industry intends to deal with these issues and increase production.

In summary, the overall projected gross demands for 2030 (**Table 4**) have decreased compared to the 2025 projections due to the decrease in Agricultural Self-Supply demands.

The UEC Planning Area's total population growth of approximately 409,000 residents from the 2005 baseline (382,324) through 2030 (791,861) is significantly higher than the population growth projection of 584,927 residents from 2000 to 2025 in the 2006 UEC Plan Amendment.

City of Stuart

Projected 2030 urban gross water demands (for all water uses except agricultural) for this Plan Update are 203 MGD. Urban demand estimate and projection highlights for the UEC Planning Area include some of the following:

- The region's greatest growth will be in St. Lucie County, where the population is projected to increase from the 2005 baseline of about 240,000 to approximately 595,000 in 2030.

- Year 2030 Public Water Supply gross demands are expected to more than double the 2005 baseline of 45 MGD to 96 MGD by Year 2030. Most, if not all, of this increase will be met using alternative water supply sources.
- Year 2030 Recreational/Landscape Self-Supply gross demands are projected to increase to 45 MGD from the 2005 baseline of 17 MGD.
- Power Generation Self-Supply demands are expected to increase from the 2005 baseline of 17 MGD to 51 MGD by 2030.

Analyses, strategies, options, and development projects to meet these water demand estimates and projections are described in following chapters.

For the 20-year planning horizon of 2010 to 2030 in this 2011 UEC Plan Update, Public Water Supply demands are to be met by the proposed water supply development projects identified in **Chapter 6**.

Citrus Farming in the UEC Planning Area

3

Issues and Evaluation

This chapter reviews previous and ongoing water resource evaluations that support the water supply planning strategies outlined in this 2011 UEC Plan Update. The evaluations are discussed in the context of water resource condition-related issues. The issues identified in this chapter potentially affect the use of existing water resources and development of new supplies to meet projected water demands for 2030 in the UEC Planning Area. A brief summary of the resource protection tools available under Florida law is also provided.

TOPICS

- Water Supply Issues
- Resource Protection
- Evaluation and Analysis
- Resource Sustainability
- Additional UEC Efforts
- Summary

Many of the planning activities, water supply development projects, and water resource development projects completed or currently under way to meet the region's future water needs are summarized in **Chapters 4**, **5**, and **6**, and address the issues identified in this chapter.

METHODOLOGY

No additional groundwater modeling was conducted for this Plan Update. Sources and methods for the water resource issue identification and evaluations used for the formulation of this Plan Update include review of:

- Input from the public
- Analysis and results from previous UEC Water Supply Plan evaluations and implementations
- Consumptive use permitting activities and related data available since the 2004 UEC Plan Update
- Revised water supply demand projections through 2030

- Local and regional projects and studies completed since approval of the 2004 UEC Plan Update (see **Chapter 1**)
- Data from the Comprehensive Everglades Restoration Plan (CERP) Indian River Lagoon – South Project

SUMMARY OF 2011 UEC PLAN ISSUES IDENTIFIED FOR 2030

Primary historical freshwater sources of water in the UEC Planning Area may not be sufficient to meet 2030 projected water user demands. The water supply issues continuing to influence water supply planning efforts to meet 2030 projected water needs in the UEC Planning Area are:

1. Increased withdrawals from the surficial aquifer system (SAS) are limited due to potential impacts on wetlands, as well as increased potential for saltwater intrusion into freshwater wells and groundwater.
2. Additional surface water will not be allocated from the SFWMD C-23, C-24, and C-25 canals, or any connected canal systems that derive water supply from these District canals, over and above existing allocations.
3. Extreme freshwater discharges are affecting the health of the St. Lucie River and Estuary and southern Indian River Lagoon.

Past analyses indicate that the SAS in the coastal areas and surface water in the western portions of the region are not adequate to meet the growing needs of the UEC Planning Area during a 1-in-10 year drought condition. In past analyses, potential impacts on wetlands and the potential for saltwater intrusion into freshwater supplies increased using projected demands. These findings are consistent with results in the District's consumptive use permitting process. Few applicants seeking increased SAS allocations have been able to meet the District's resource protection criteria. The volume of SAS use in this area has declined with increased use of brackish water from the Floridan aquifer system (FAS) and reclaimed water.

INFO

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 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.

Previous water supply plans have identified several strategies, including development of alternative water supplies, to avoid these potential issues. Implementation of past recommendations is well under way to meet the water needs of the UEC Planning Area, including increasing water conservation efforts, development, and use of alternative water supplies, and surface water storage and management.

RESOURCE PROTECTION OVERVIEW

To ensure the sustainability of Florida's water resources, Section 373.701, F.S., provides the District with several tools that have varying levels of resource protection standards. Resource protection programs include, but are not limited to, consumptive use permitting, Minimum Flows and Levels (MFLs), Water Reservations, and water shortage practices.

- The consumptive use permitting process is intended to balance the needs of the water users with the public's interest in protecting the resource for many other uses.
- Minimum Flow and Level criteria provide a basis for defining the point at which additional withdrawals will result in significant harm to the water resources or ecology of an area.
- A Water Reservation is a legal mechanism to set aside water for the protection of fish and wildlife or public health and safety so that the water cannot be allocated for consumptive use permitting.
- Water shortage rules are used to restrict water use when there is temporarily insufficient groundwater or surface water available to meet user needs or when conditions require temporary reduction in use to prevent harm to the water resources.

The *Basis of Review for Water Use Permit Applications within the South Florida Water Management District* (Basis of Review) (SFWMD 2010) also provides wetland protection criteria, saltwater intrusion criteria, and Restricted Allocation Area rules for the District's four planning areas.

UEC WATER SUPPLY ISSUES

The SFWMD and stakeholders find that the issues identified in the 1998 UEC Plan, 2004 UEC Plan Update, and related evaluations and recommendations remain valid for this 2011 UEC Plan Update. Previous UEC water supply planning evaluations are consistent with the conditions forecast through 2030 in this Plan Update.

Increased Withdrawals from the Surficial Aquifer System are Limited

Past and present analyses of the SAS indicate it is a limited water resource in the UEC Planning Area. Although the SAS has historically served as the primary source of water for urban demands in the UEC Planning Area, previous analyses demonstrated that the SAS could not support projected urban water demands much beyond the 1990 base-year demand levels for PWS and landscape irrigation (Recreational/Landscape Self-Supply). Expansion of SAS withdrawals continues to be limited due to potential impacts to wetlands, as well as the increased potential for saltwater intrusion. New or increased allocations of water from the SAS in coastal areas beyond those currently permitted require evaluation on a permit-by-permit basis.

Most of the PWS utilities in the region have added the FAS as a source for potable water and currently use treated water from the FAS to provide drinking water for all or a portion of their demands. Supplementing SAS water supplies with other water supply sources allows the 2030 PWS water use needs to be met without causing harm to the water resources or impacting other existing legal users. Furthermore, withdrawals from the SAS combined with reclaimed water supplies can meet 2030 Recreational/Landscape Self-Supply demands. An overview of harm standards is provided in the *Resource Protection Tools* section of this chapter.

Currently, the SAS supplies approximately 38 percent of the region's Public Water Supply. By 2030, with increased use of alternative water sources, such as brackish groundwater (FAS) and reclaimed water, the percentage of SAS use for PWS is projected to decrease approximately 10 percent. Over the next 20 years, further reliance on the FAS to meet future water demands in the UEC Planning Area is anticipated.

Additional development of the SAS may be accomplished through modifications to wellfield configurations and pumping regimes that demonstrate no negative impact to wetlands and the saltwater interface, as well as meeting all other criteria for permit issuance. Increases in the use of reclaimed water are expected as the region continues to be developed.

Saltwater intrusion into coastal wellfields is expected to occur as a result of sea level rise. The SFWMD requires coastal utilities to monitor the movement of the saltwater front to prevent contamination of individual wells as a condition of their water use permits.

C-23, C-24, and C-25 Canal Surface Water Availability is Insufficient

Traditionally, surface water has been a primary source of water supply for the UEC Planning Area's agricultural industry. Surface water budget analyses completed for earlier water supply planning efforts verified that surface water availability from the existing canal and storage network alone is insufficient to meet existing and future agricultural water user demands during 1-in-10 year drought conditions. However, past analyses also concluded that the historical practice of supplementing surface water supplies with groundwater from the FAS during dry periods meets existing and 2030 demands in the UEC Planning Area.


C-24 Canal and S-49 Structure

The C-44 Reservoir component of the CERP Indian River Lagoon – South Project is intended to capture water from the C-44 Canal to reduce extreme peaks of freshwater discharges to the St. Lucie Estuary. Construction of the reservoir is currently under way and the District will evaluate water availability upon completion of the

construction and operational testing phases associated with the reservoir. The District's Governing Board may certify that additional water from the C-44 Reservoir is available for allocation for consumptive use as required by District rules [Subsection 3.2.1(G), Basis of Review, SFWMD 2010].

Freshwater Discharges to Coastal Resources are Problematic

As stated in the 2004 UEC Plan Update, existing freshwater flows affect the health of the St. Lucie River and Estuary and southern Indian River Lagoon. Due to a lack of water storage in the watershed, freshwater inflows to area coastal resources are primarily rainfall and surface water runoff. Significant water inflows often occur over short periods of time during rainfall events. Conversely, during seasonal dry periods and droughts, the UEC Planning Area's coastal resources receive little inflow.

The St. Lucie Estuary and its watershed have become highly altered within the last 75 years to accommodate growth and development in the area. As a result, the timing and volume of freshwater flows to the St. Lucie River and Estuary have dramatically changed from historical conditions. The combination of drainage modifications, along with land use development in the watershed, has dramatically increased wet-season flows to the estuary and reduced dry-season flows. These activities affect habitats and organisms dependent on brackish or freshwater areas during their life cycle. In addition, high-volume stormwater discharges produce rapid salinity fluctuation as well as sedimentation. The increase in nutrient and sediment loading has contributed to the build-up of fine-grained muck and elevated nutrients in the estuary. The resultant changes in the health of the estuary are shown through a reduction in oysters and other beneficial benthic organisms.

A MFL has been established for the North Fork of the St. Lucie River and Estuary. The MFL includes a prevention strategy to prevent existing flows or levels from falling below the established MFL. This prevention strategy has been reviewed and revised as part of this update, and is described in the *Prevention Strategy for the North Fork of the St. Lucie River* section of this chapter. The MFL is not sufficient to maintain a sustainable resource during the broad range of water conditions occurring in the managed system. A Water Reservation was adopted in 2010 for the North Fork of the St. Lucie River that will reserve water to be made available by some of the components of the CERP Indian River Lagoon – South Project for the protection of fish and wildlife. See the *Resource Protection Tools* section of this chapter for overview descriptions of MFLs and Water Reservations. In addition, various projects are proposed as part of the CERP Indian River Lagoon – South Project to increase storage, redistribute flows, maintain salinities within an acceptable range, and reduce the amount of excess runoff discharged to the estuary.

RESOURCE PROTECTION TOOLS

This section provides a framework for understanding the different levels of harm and the SFWMD resource protection tools and programs discussed in this chapter.

A stated goal of the Florida Statutes is to ensure the sustainability of Florida's water resources (Section 373.701, F.S.). There are various water resource protection standards to accomplish this goal. The levels of harm—harm, significant harm, and serious harm—are relative resource protection terms, each playing a role in the ultimate goal of achieving a sustainable water resource. For instance, programs regulating surface water management and consumptive use permitting must prevent harm to the water resource. The conceptual relationship among harm, significant harm, and serious harm standards and associated conditions and water shortage severity can be represented as shown in **Figure 6**.

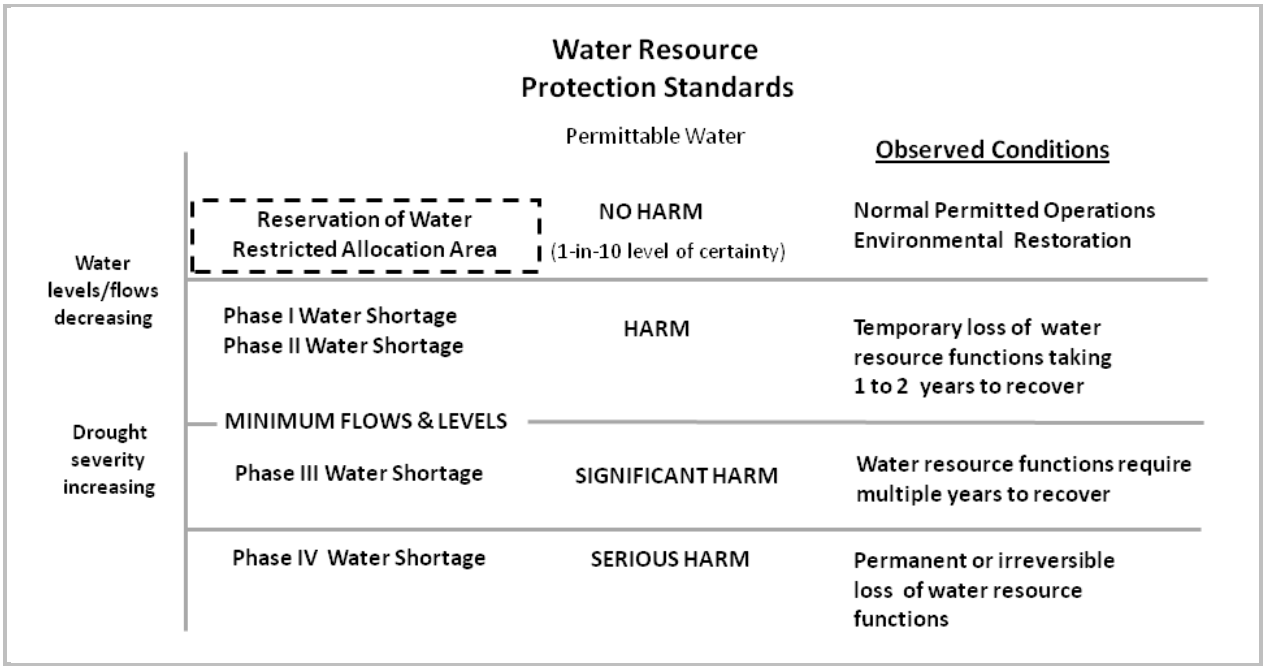


Figure 6. Conceptual relationship among the harm, significant harm, and serious harm water resource protection standards.

Resource protection tools include, but are not limited to, consumptive use permitting regulations, MFLs, Water Reservations, Restricted Allocation Areas, and the District's Water Shortage Plan. Rules relating to these resource protection tools in the SFWMD are found in:

- Chapter 40E-8, F.A.C. (MFLs)
- Chapter 40E-10, F.A.C. (Water Reservations)
- Chapter 40E-21, F.A.C. and Chapter 40E-22, F.A.C. (Water Shortage Plan)
- Basis of Review (SFWMD 2010)

Table 5 summarizes the resource protection tools and definitions in use in the UEC Planning Area. Additional information about resource protection is included in the *2011–2012 Water Supply Plan Support Document* (Support Document) (SFWMD 2011b).

To protect water resources from adverse impacts of consumptive water uses, pumps on flowing Floridan wells in Martin and St. Lucie counties have been designated as Restricted Allocation Areas. In addition, the Lake Okeechobee Basin has been designated as a Restricted Allocation Area, which limits increased use of surface water from Lake Okeechobee and hydraulically connected canals, such as the St. Lucie Canal (C-44) to existing users. In the 1980s, the C-23, C-24, and C-25 canals were also designated as Restricted Allocation Areas to address water availability and structural stability concerns. Accordingly, no additional water will be allocated from these areas over historic allocations. Furthermore, the North Fork of the St. Lucie River and Estuary is protected by a MFL and a Water Reservation.

Table 5. Summary of resource protection tools and definitions.

Resource Protection Tools and Definitions	Description
Consumptive Use Permitting	The right to use water is granted by permit. Consumptive use permitting 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. The specific conditions of issuance for consumptive use permitting are described in Section 373.223, F.S., and Chapter 40E-2, F.A.C., which incorporates the District's Basis of Review (SFWMD 2010) by reference. Technical criteria (Chapter 40E-2 and Chapter 40E-20, F.A.C.) are used to evaluate the purpose, quantity, and source of proposed water to be used and include: • Saltwater intrusion • Wetland impacts • Pollution • Impacts to offsite land uses • Interference with existing legal users • Harm to fish and wildlife Permits are usually issued with conditions that may limit the withdrawal quantity or shorten permit duration. Once permitted, the permittee becomes an existing legal user with protection from competing uses for the duration of the permit.

Resource Protection Tools and Definitions	Description
Harm Standards	The District's Basis of Review (SFWMD 2010) 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 Sections 40E-2.301 and 40E-20.301, F.A.C. If a proposed use meets the criteria, the District determines the applicant has provided reasonable assurances that the use will not cause harm to the resource. Conditions for issuance of permits, outlined in Chapters 40E-2 and 40E-20, F.A.C., 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. Harm is 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 (Section 40E-8.021, F.A.C.). Significant harm is the temporary loss of water resource functions that result from a change in surface water or groundwater hydrology, and take more than two years to recover (Section 40E-8.021, F.A.C.). 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 (Section 40E-8.021, F.A.C.).
Level of Certainty	Existing legal uses of water must meet the conditions for issuance of a permit during a 1-in-10 year drought condition; this is referred to as the level of certainty. The level of certainty is a concept providing a probability of certainty that given a specific drought event, demands for reasonable-beneficial uses of water will be fully met. Certainty also means that the water resource from which the water is withdrawn will be evaluated to ensure no harm will occur during this drought event. The result is not a guarantee that droughts will not occur, but rather that the water resource will be available and the resource protected from harm under drought conditions expected to be experienced once every 10 years. The level of certainty planning criteria have been incorporated into the consumptive water use process and the Florida Statutes. The level of certainty planning goal established by the Florida legislature is the 1-in-10 year drought event provided in Paragraph 373.709(2)(a)1, F.S.

Resource Protection Tools and Definitions	Description
Minimum Flows and Levels	Minimum Flows and Levels (MFLs) provide technical criteria that are important management tools used by the District to protect major water bodies from significant harm due to reduction in water levels or flows. These criteria provide a basis for defining the point at which additional withdrawals will result in significant harm to water resources. If water flows or levels are presently below the MFL, or water flows or levels will exceed the established MFL criteria within the next 20 years, the water management district must develop and implement a suitable recovery or prevention strategy [Subsection 373.0421(2), F.S.]. These measures may include, among other things, construction of new or improved water storage facilities, or development of additional water supplies and implementation of water conservation. The strategy is to be developed in concert with the water supply planning process and should coincide with the 20-year planning horizon for the area. A MFL has been adopted for the North Fork of the St. Lucie River and Estuary.
Restricted Allocation Areas	A Restricted Allocation Area is a regulatory mechanism for protecting water resources from adverse impacts due to consumptive uses of water, as defined in Subsection 373.223(1), F.S., and outlined in Section 3.2.1 of the Basis of Review (SFWMD 2010). According to SFWMD Restricted Allocation Area rules, surface water from the C-23, C-24, and C-25 canal systems and their interconnected canals cannot be allocated for any use above historically existing allocations. Pumps on Floridan wells in Martin and St. Lucie counties are also restricted, except under certain conditions, as outlined in the Basis of Review. In addition, Restricted Allocation Area criteria for the Lake Okeechobee Service Area limit surface water withdrawals from Lake Okeechobee and hydraulically connected canals, such as the St. Lucie Canal (C-44).

Resource Protection Tools and Definitions	Description
Water Reservations	A Water Reservation is a legal mechanism to set aside water for the protection of fish and wildlife or public health and safety. When water is reserved, it is not available to be allocated for use under a consumptive use permit. Water Reservations are developed based on an evaluation of existing water availability and consideration of future water that may be made available by water resource projects. Water management districts develop Water Reservations to ensure a healthy and sustainable native fish and wildlife community that can remain through natural cycles of drought, flood, and population variation. Water provided by federally funded restoration projects under the Water Resources Development Act (2000, as reauthorized 2007) requires the SFWMD to identify the amount of water to be reserved or allocated for the natural system and will not be permitted for consumptive use. In the UEC Planning Area, the District adopted a Water Reservation for the North Fork of the St. Lucie River. This reservation supports the CERP Indian River Lagoon – South Project.
Water Shortage Plan and Rules	Pursuant to Sections 373.246 and 373.175, F.S., water shortage declarations are designed to prevent harm, significant harm, and serious harm from occurring to water resources (see the Harm Standards section at the beginning of this table for definitions). Declarations of water shortages by the District's Governing Board can be used as a tool to prevent harm, significant harm, and serious harm. The District's Water Shortage Plan and rules, contained in Chapters 40E-21 and 40E-22, F.A.C., are used when there is insufficient groundwater or surface water available to meet users' present and anticipated needs or when conditions require temporary reduction in use in the area to protect the water resources. The goal is to protect the remaining supply and ensure a fair distribution of this supply.

EVALUATION AND ANALYSIS

Previous water supply plans incorporated regional groundwater modeling as part of the analysis process. The demand projections, assumptions, and resource protection criteria used in those analyses were reviewed and compared to current information.

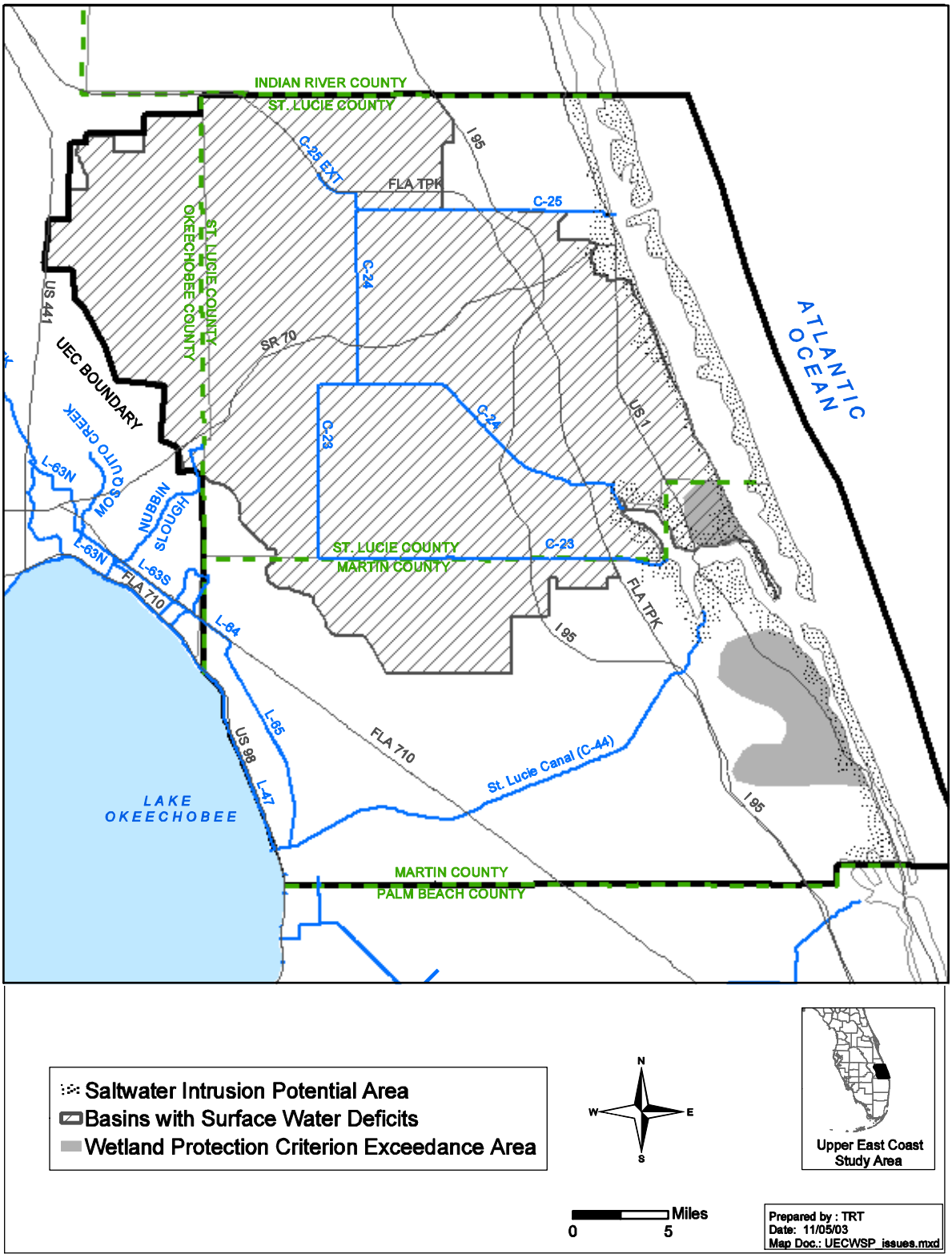
District staff and stakeholders recognized the findings and conclusions of the 1998 UEC Plan and 2004 UEC Plan Update as still representative of the issues in meeting the UEC Planning Area 2030 projected water demands, and that they should be considered in the development of this 2011 UEC Plan Update. It was concluded that previous modeling assumptions are consistent with the 2030 scenario for the 2011 UEC Plan Update. No additional groundwater modeling was conducted as part of this update.

Overview of Previous Analyses

This section of the chapter provides an overview and summary of previous analyses. For further information, refer to the 1998 UEC Plan and the 2004 UEC Plan Update.

The District analyzed the ability of traditional water sources to supply future water demands. A simulation of SAS withdrawals and associated drawdowns examined conservatively high estimates of future water use under drought conditions. Resource protection criteria were applied to predict the location of areas with wetland impacts and saltwater intrusion. Wetland impacts and saltwater intrusion were predicted to occur at the locations shown in **Figure 7**.

The resource protection criteria used to simulate wetland impacts and saltwater intrusion potential were intended to represent conditions that might occur when issuing consumptive uses for withdrawals of groundwater. Based on these analyses, regulatory strategies were subsequently implemented to prevent these impacts from occurring in the potential problem areas. In the UEC Planning Area, the SAS is identified as a source of limited availability, which subjects consumptive use permittees to additional technical scrutiny and shortened permit durations.



Note: This map does not include the Lake Okeechobee Service Area boundary. (See Figure 24 in the *2011–2012 Water Supply Plan Support Document*.)

Figure 7. Year 2020 generalized base-case potential supply issues from previous analysis. Source: *2004 Upper East Coast Water Supply Plan Update* (SFWMD 2004).

The availability of surface water in the C-23, C-24, and C-25 basins was also analyzed. As previous analyses have indicated, surface water supplies are inadequate to meet existing and future agricultural irrigation demands. Most Agricultural Self-Supply in Martin and St. Lucie counties uses surface water for irrigation, blending groundwater, particularly Floridan water, when surface water becomes limited. Plans and projects that increase basin storage are under way, such as the CERP Indian River Lagoon – South Project and the St. Lucie River Watershed Protection Plan. Although additional surface water may be available in the future from CERP reservoir construction projects, it is premature to identify potential volumes of water anticipated to be available until construction is complete and projects are operational.

The analysis considered impacts to the FAS flows and levels. In the simulation, no impacts to the FAS were found to occur at high levels of projected water demand. In addition, the simulation found no impacts to occur when existing Public Water Supply SAS withdrawals were transferred to the FAS. As discussed in **Chapter 4**, the FAS continues to be one of several viable alternative sources of water for development in lieu of new SAS withdrawals in the target areas.

The analysis did not include consideration of extreme high or low freshwater flows to the St. Lucie River or Indian River Lagoon. The impact of freshwater flows on estuarine biota was not sufficiently understood at the time of the analysis. Subsequent study of these natural resources has led to rule adoption of criteria that ensure a minimum flow of fresh water to protect estuarine functions.

General information about resource protection tools and criteria can be found in Chapters 3 and 4 of the Support Document (SFWMD 2011b).

Overview of Analytical Tools and Criteria

For this Plan Update, the demand projections, assumptions, and resource protection criteria used as part of earlier analyses were reviewed and compared to current information. Analytical tools used in the previous water supply planning analyses included surface water budgets, numerical groundwater models, and vulnerability mapping. **Figure 8** shows a process diagram of the analytical tools used in prior UEC water supply planning efforts.

Surface water budgets were used to approximate surface water availability in each of the major surface water basins to quantify the demands that could not be satisfied by surface water.

The groundwater models were used to identify potential impacts of water use on the environment and groundwater resources. Three regional groundwater models were used to simulate the potential impacts of water use in the UEC Planning Area (**Figure 9**): 1) the Martin County Surficial Aquifer System (SAS) Model; 2) the St. Lucie County SAS Model; and 3) the Floridan Aquifer System (FAS) Model, which encompasses the entire UEC Planning Area. Additional analysis was required for three areas in the SAS (Jensen Beach, Martin Coastal Area, and Fort Pierce).

Vulnerability mapping was used to identify areas where there is the potential for future saltwater intrusion in the SAS.

District staff and stakeholders determined the resource protection criteria, assumptions, and conclusions of previous UEC water supply plan evaluations concerning regional groundwater modeling are applicable for this 2011 UEC Plan Update and 20-year planning horizon (through 2030).

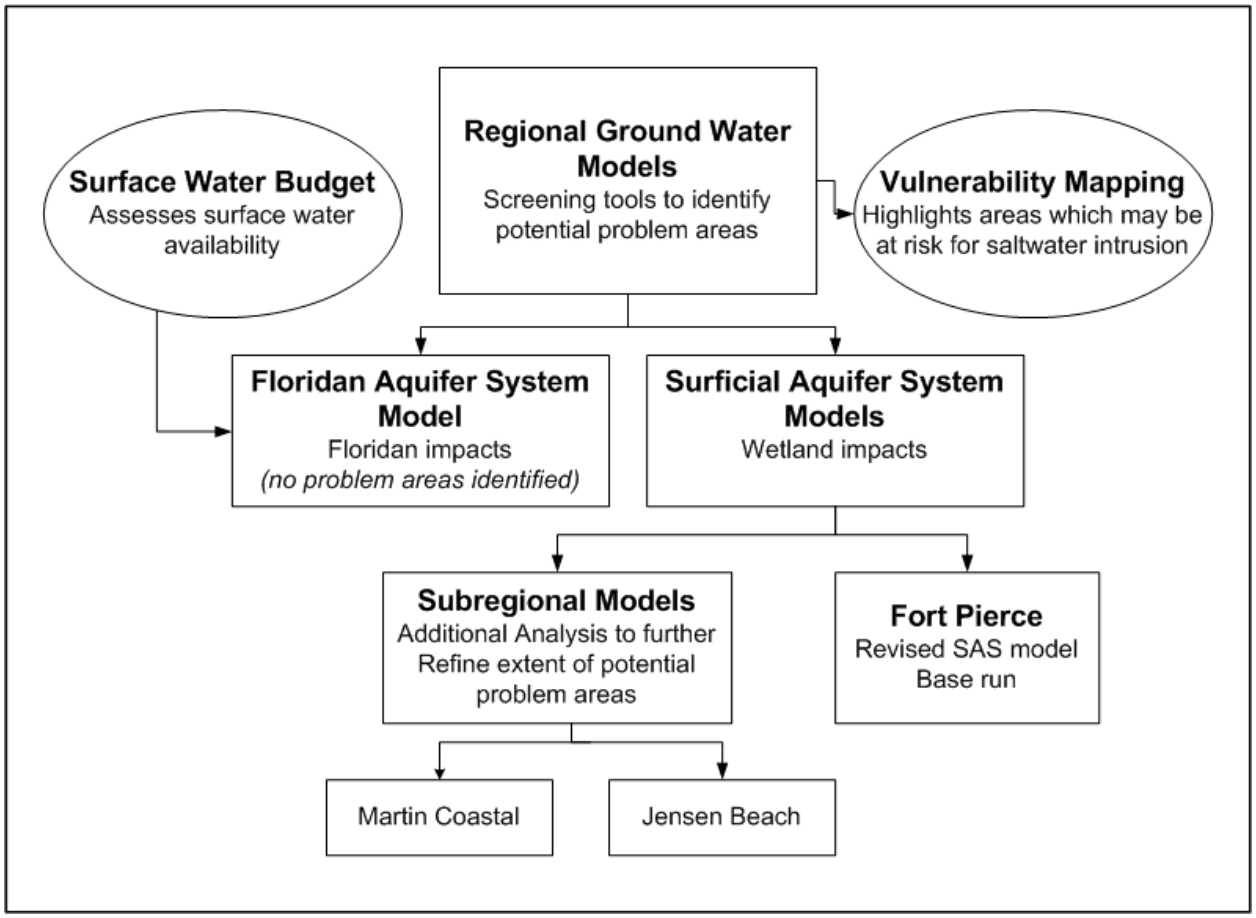


Figure 8. UEC Water Supply Plan modeling process diagram.

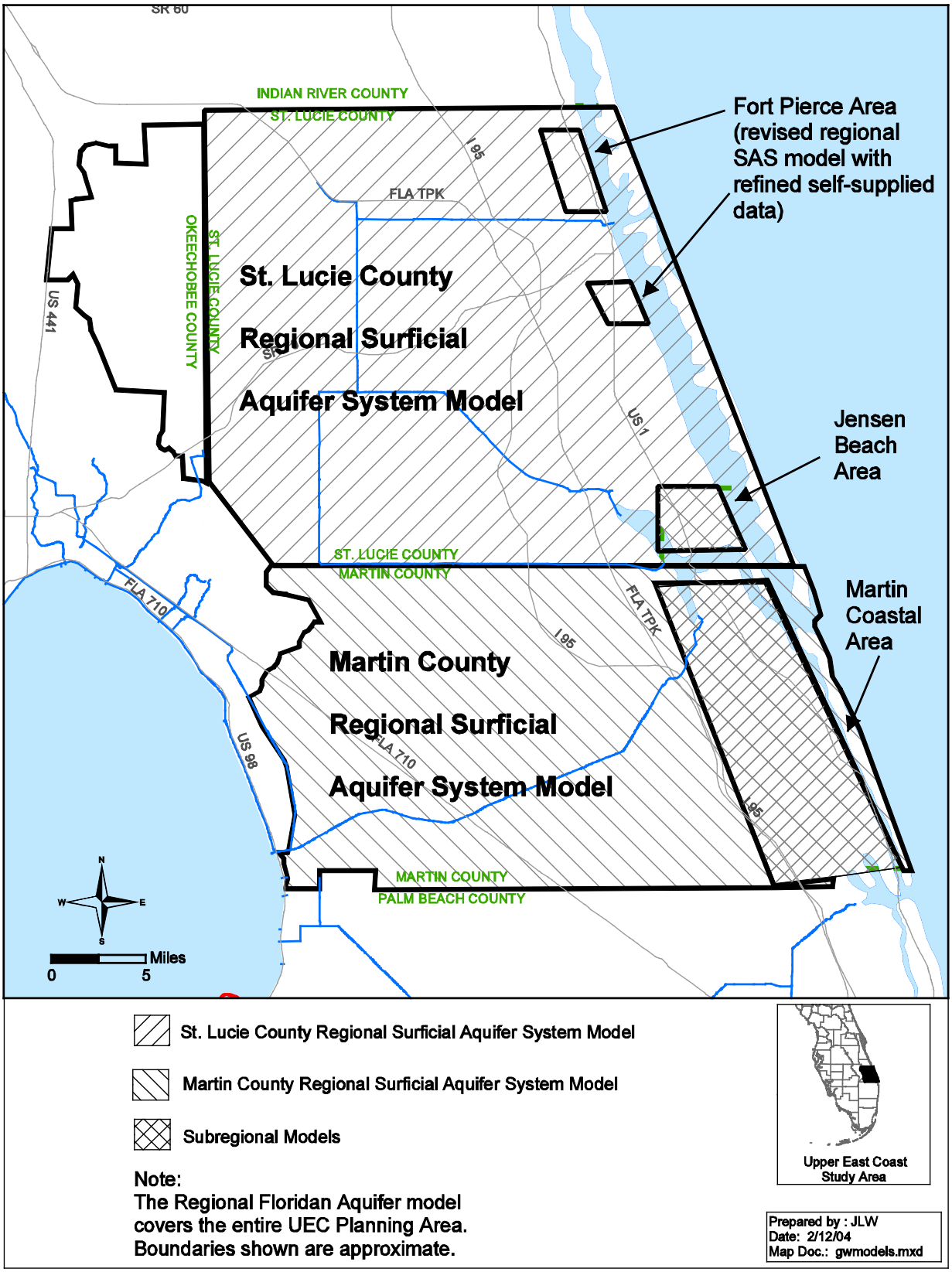


Figure 9. Regional groundwater modeling and subregional areas.

Summary of Previous Plan Modeling Results

As reported in the 2004 UEC Plan Update, previous UEC modeling results indicated that historically used water sources (primarily fresh groundwater from the SAS and surface water from the C-23, C-24, and C-25 canals) are not adequate to meet the UEC Planning Area's growing water needs through 2025 during a 1-in-10 year drought condition. The 1998 UEC Plan and 2004 UEC Plan Update conclusions recommended exploring and using new sources of water to supplement traditional water resources and reduce the potential for harm to wetlands. Sufficient sources of water to meet projected water demands were successfully identified. The plans advocated supplementing SAS water withdrawals with water from the FAS, increasing use of reclaimed water, and increasing water conservation and research to meet the UEC Planning Area's projected water demands.

A detailed review of the modeling efforts conducted by the SFWMD for the UEC Planning Area can be found in the 1998 UEC Plan and 2004 UEC Plan Update.

Summary of Previous Plan Recommendations

The 1998 UEC Plan and 2004 UEC Plan Update recommended new sources of water be identified and used to reduce the potential for harm to the water resources. These sources of water include the FAS, use of reclaimed water, increased water conservation, and research to meet future water needs. Several of those recommendations have either been implemented or are in the process of being implemented.

Existing Conditions and Implementation of Previous UEC Water Supply Plan Recommendations

This section summarizes the progress of implementing existing recommendations provided in the previous UEC Water Supply Plans. Since the 1998 UEC Plan and 2004 UEC Plan Update were published, increased use of the FAS and reclaimed water have reduced dependence on the SAS by enabling more diversification of the region's water supply sources. The District's ongoing monitoring of SAS and FAS chloride levels are included in this implementation review.

Surficial Aquifer System Chloride Levels in the Saltwater Intrusion Potential Area

The District continues to regulate withdrawals from the SAS to prevent saltwater intrusion. Water level and chloride concentration data through January 2010 from the Saltwater Intrusion Potential Area of the SAS confirm that chloride concentrations remain stable. **Figure 10** and **Figure 11** show data for the monitor wells selected as representative of the entire Saltwater Intrusion Potential Area.

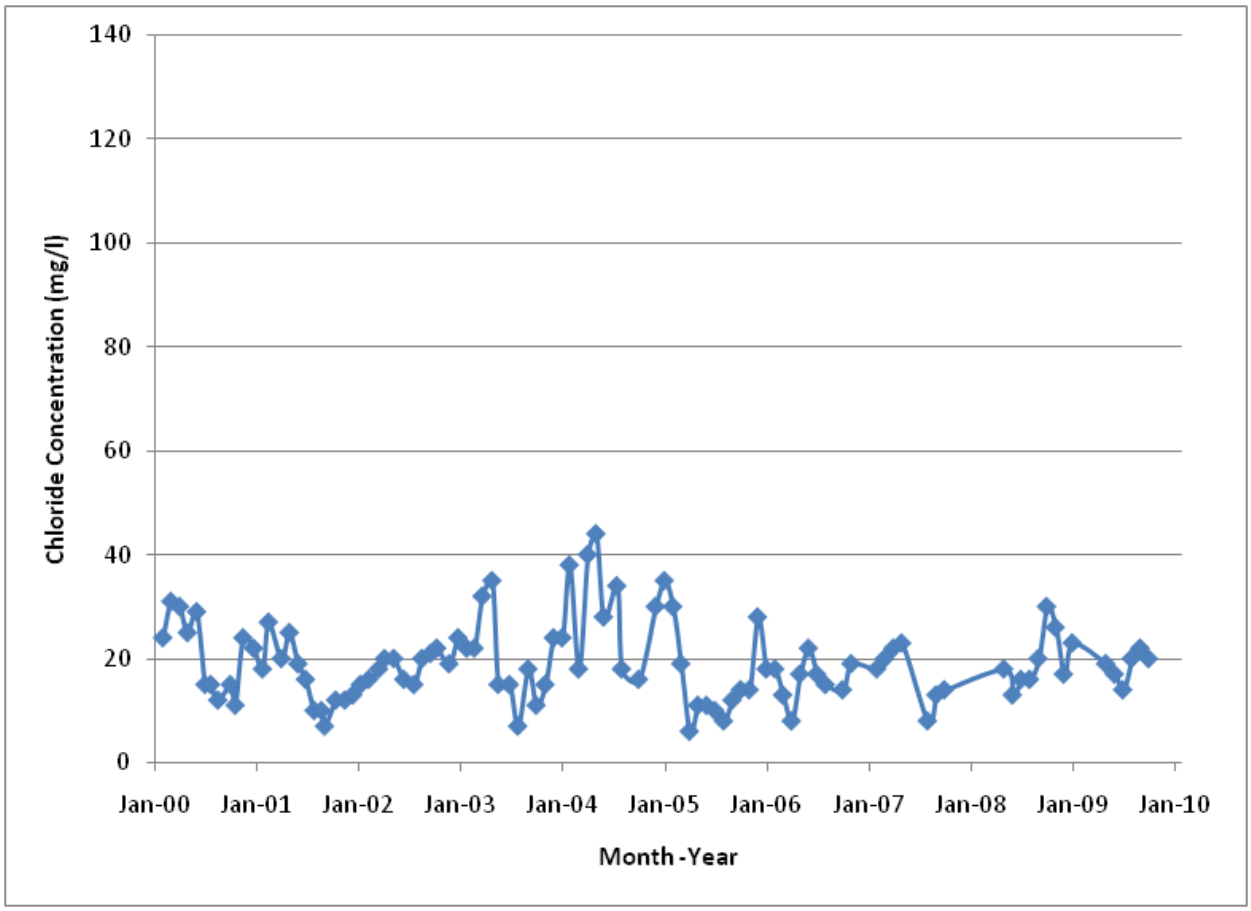


Figure 10. SAS chloride levels in the Saltwater Intrusion Potential Area (Fort Pierce Utilities Authority Monitor Well-4 chloride concentration).

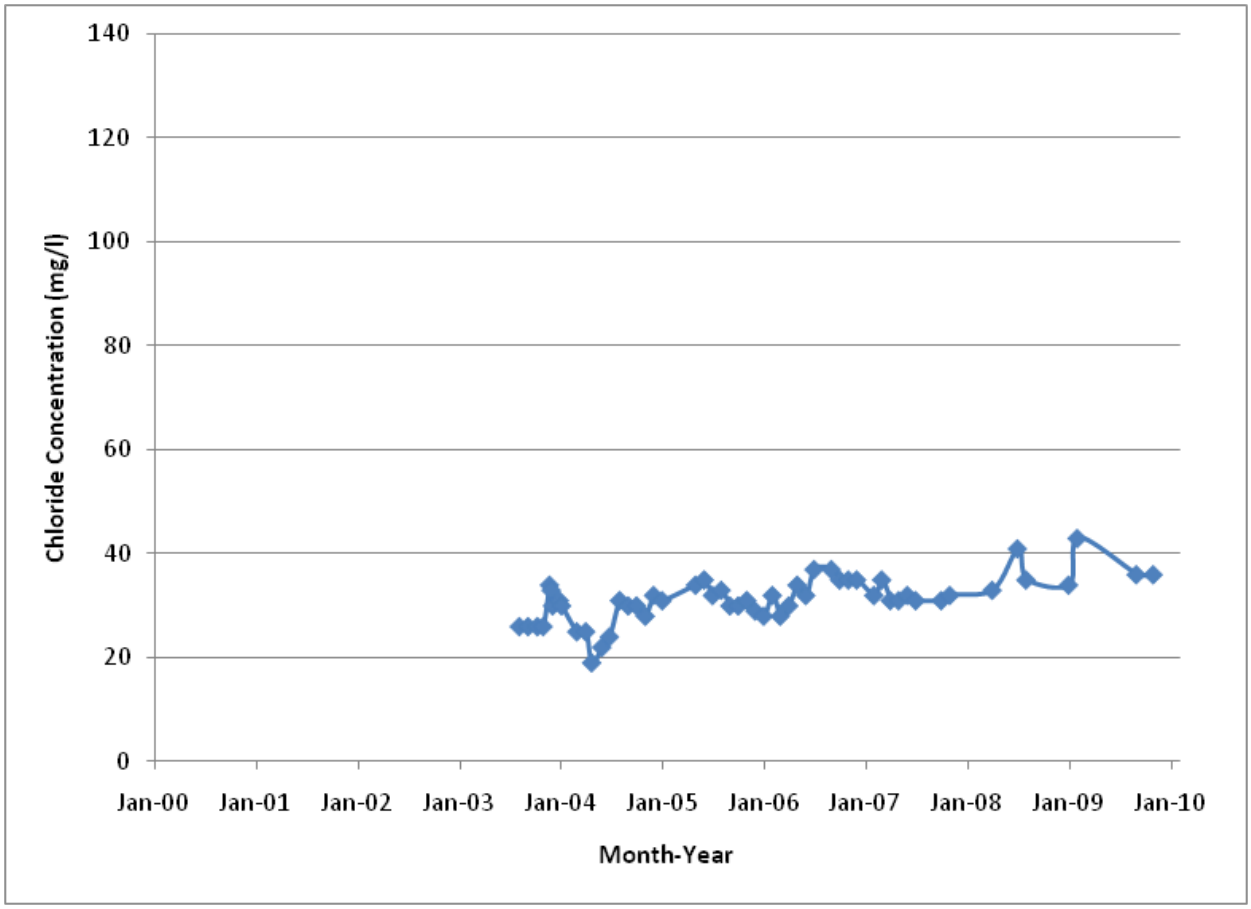


Figure 11. SAS chloride levels in the Saltwater Intrusion Potential Area (South Martin Regional Utility Monitor Well-10S chloride concentration).

Floridan Aquifer System Use

Over the last decade, South Martin Regional Utility, Martin County Utilities–North, Martin County Utilities–Tropical Farms, the City of Port St. Lucie Utility Systems Department, and the Fort Pierce Utilities Authority have begun using the FAS as a water source to meet a portion of existing and future PWS demands. In addition, citrus growers continue to rely on the FAS as a supplemental water supply for crop irrigation.

As **Table 6** shows, use of the FAS is increasing by PWS utilities in both Martin and St. Lucie counties. The projected 2010 use of the FAS by utilities was 22.80 million gallons of water per day (MGD), which accounts for 45 percent of the utilities' total withdrawals in the UEC Planning Area. This is an increase of 17.71 MGD from the 1998 usage level of 5.09 MGD. The SFWMD anticipates this trend will continue as most of the utilities in the UEC Planning Area intend to use the FAS for future water supplies. In comparison, use of the SAS increased slightly, from 27.28 MGD in 1998 to 27.85 MGD in projected 2010. However, with increased development of the FAS, the percentage of overall SAS use decreased from 84 percent to 55 percent. The projected 2010 SAS usage level is almost 7.00 MGD less than what was pumped in 2000. For more information, see **Appendix D**.

Table 6. Public Water Supply water sources and use (MGD) 1998–2010.

Aquifer	1998	1999	2000	2005	2010
FAS					
Total	5.09	6.57	8.48	16.47	22.80
% of Total	16%	18%	20%	37%	45%
SAS					
Total	27.28	30.52	34.72	27.68	27.85
% of Total	84%	82%	80%	63%	55%
Total Use	32.37	37.09	43.20	44.15	50.65

Sources: USGS and FDEP.

Figure 12 shows that FAS chloride values from samples at the District's SLF-76 monitor well have been relatively stable over a 10-year period, varying between 1,300 and 1,400 milligrams per liter (mg/L).

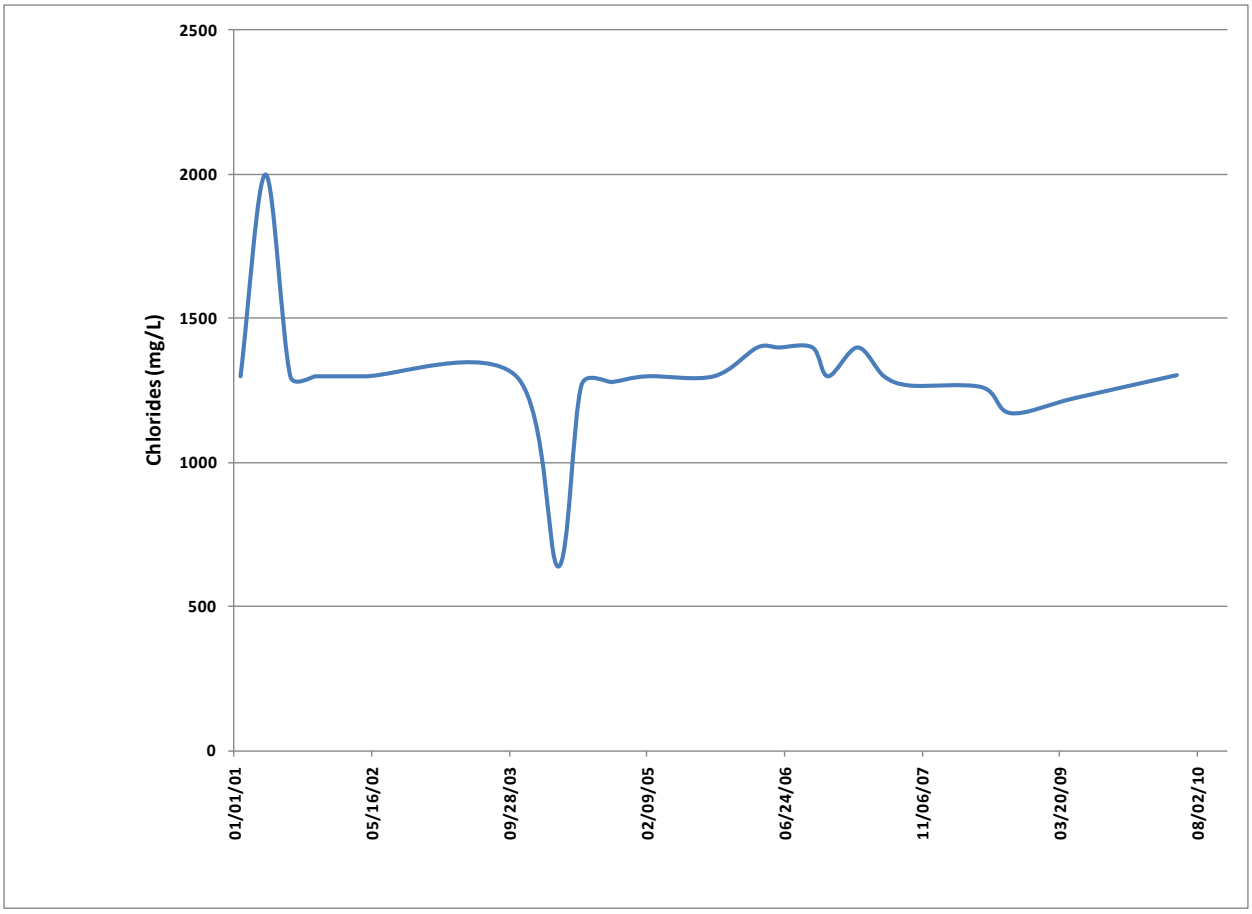


Figure 12. FAS chloride levels in the C-24 Basin (Monitor Well SLF-76).

Figure 13 shows FAS chloride data from two monitor wells collected by the City of Port St. Lucie Utility Systems Department. A slight upward trend in chloride concentration can be seen for both wells, which may be due to upconing from deeper layers in the Floridan aquifer.

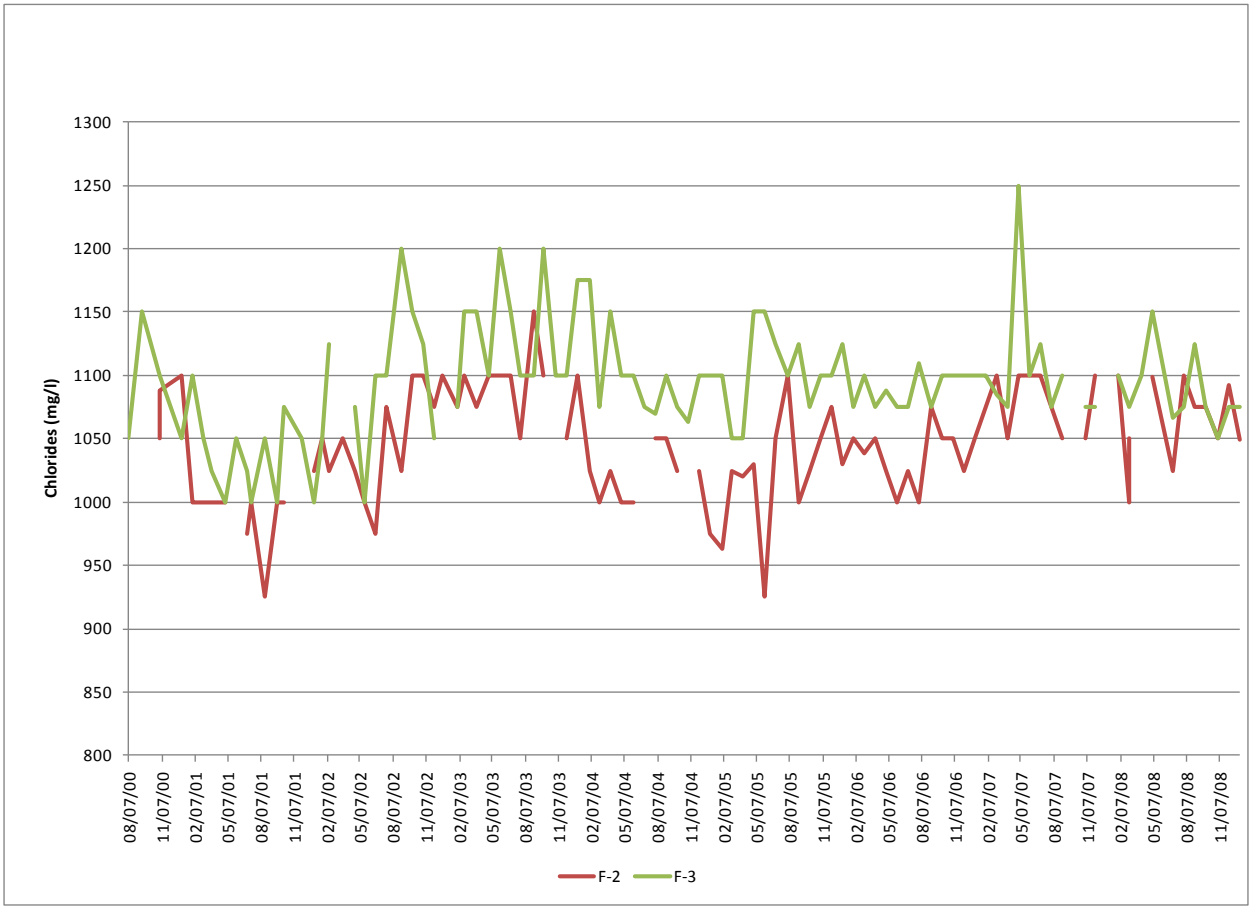


Figure 13. FAS chloride levels from the City of Port St. Lucie Utilities Department data (Monitor Wells F-2 and F-3).

Floridan Aquifer System Monitoring Network

A local FAS groundwater level and water quality monitoring network was established in the UEC Planning Area from 1996–2007. This local network feeds into the District's regional network, which involves cooperative agreements with agricultural owners and PWS utilities. These data are intended to evaluate current conditions and allow for calibration of an updated numerical model of the FAS in the area (Golder Associates 2008). The regional network was expanded from 2007 to 2009 to include additional well sites. Three sites were co-located with the local governments of Fort Pierce, Port St. Lucie, and Martin County, along with multiple wells at the District's G23 site. Continuous water level recorders were installed at these sites, and periodic water quality assessments are conducted.

Potentiometric Surface of the Floridan Aquifer System

Previous analyses of projected FAS demands predicted that no long-term impacts would be anticipated. Water level data for the FAS from 2010 confirm no discernible trends to the contrary. **Figure 14** represents water level data from an Upper Floridan aquifer monitor well at a location and depth typical for agricultural withdrawals in the C-24 Basin from 2002 to 2009. These data show seasonal variations and drought periods; however, water levels tend to return to long-term averages over time. Following a drought, pumping of the FAS is restricted to limited conditions according to Subsection 3.2.1(D) of the Basis of Review (SFWMD 2010).

As of 2010, aquifer levels appear to recover to normal levels following droughts. New pumps on flowing FAS wells in Martin and St. Lucie counties are limited by rule [Subsection 3.2.1(D), Basis of Review; SFWMD 2010].

Hydrographs show that the CERP Indian River Lagoon – South Project C-44 Reservoir component may make surface water available for future consumptive use. The Governing Board may certify that additional water from the C-44 Reservoir is available for allocation prior to issuance of consumptive use permits as required by District rules [Subsection 3.2.1(G), Basis of Review; SFWMD 2010].

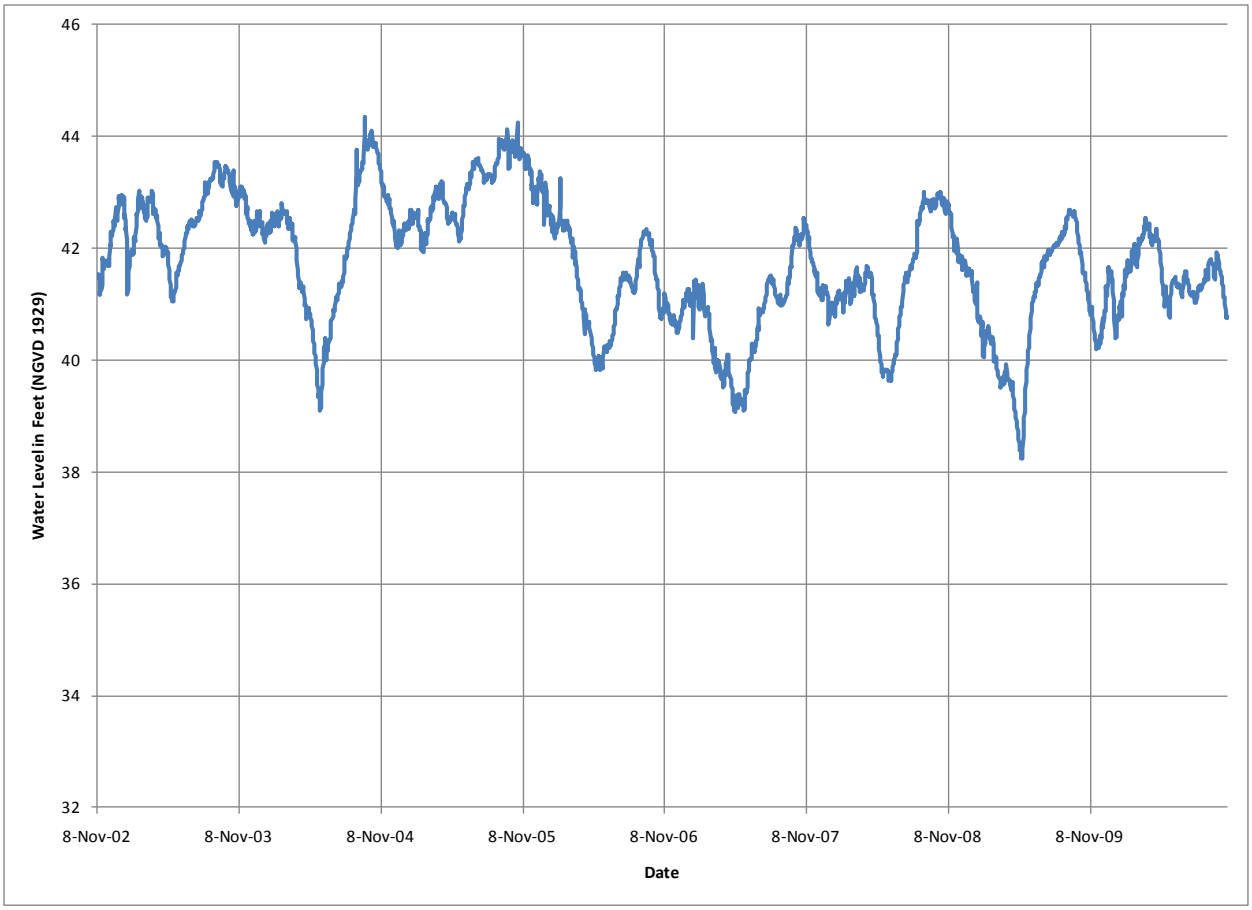


Figure 14. FAS water levels in the C-24 Basin (Monitor Well SLF-76).

East Coast Floridan Aquifer System Model

The 2004 UEC Plan Update recommended the development of a groundwater model to conduct analysis of future increased withdrawals from the FAS in the Upper East Coast. To address this recommendation, the Lower East Coast (LEC) Floridan Model (HydroGeologic, Inc. 2006) was expanded to include the UEC Planning Area. The model was recalibrated with additional data that were not available when the original LEC Floridan Model was developed. This combined LEC/UEC Model, referred to as the East Coast Floridan Aquifer System Model (ECFAS), was completed in October 2008 (Golder Associates 2008) (see **Figure 15** for model boundary). An independent peer review of the model is budgeted and scheduled for FY 2011. This model is designed to provide simulations of the regional groundwater flow and water quality changes (primarily total dissolved solids and chlorides) in the FAS in response to withdrawals, and is expected to be available for future UEC water supply plan updates.

Surface Water Basin Deficits

Recent droughts have confirmed the conclusion of the previous analyses that surface water sources for agricultural irrigation are inadequate to supply the existing demands identified in **Chapter 2**. As previously mentioned, due to concerns regarding water availability and canal structural stability, the C-23, C-24, and C-25 canal system was designated as a Restricted Allocation Area in the 1980s, where no additional surface water is to be allocated over historic allocations (Section 3.2.1, Basis of Review, SFWMD 2010).

Reclaimed Water

South Martin Regional Utility
Reclaimed Water Treatment Facility

Since 1994, the volume of reclaimed water used for beneficial purposes has almost doubled in the region. In 2009, use of reclaimed water in the UEC Planning Area increased to 10.4 MGD (FDEP 2010b). Most new large irrigation demands are being met with reclaimed water where it is available. Water supply development projects (see **Chapter 6**) under way or proposed by utilities serving the UEC Planning Area will continue this trend. **Table 7** includes water reuse volumes from 1994 to 2009. The volume of reclaimed water used varies from year to year based on several factors including rainfall and volume of wastewater treated. In addition, there has been some regionalization in the UEC Planning Area. Some flows from smaller facilities have been diverted to larger regional water treatment facilities. As a result, water reuse flows at these regional facilities may decrease until new reclaimed water distribution systems are established.

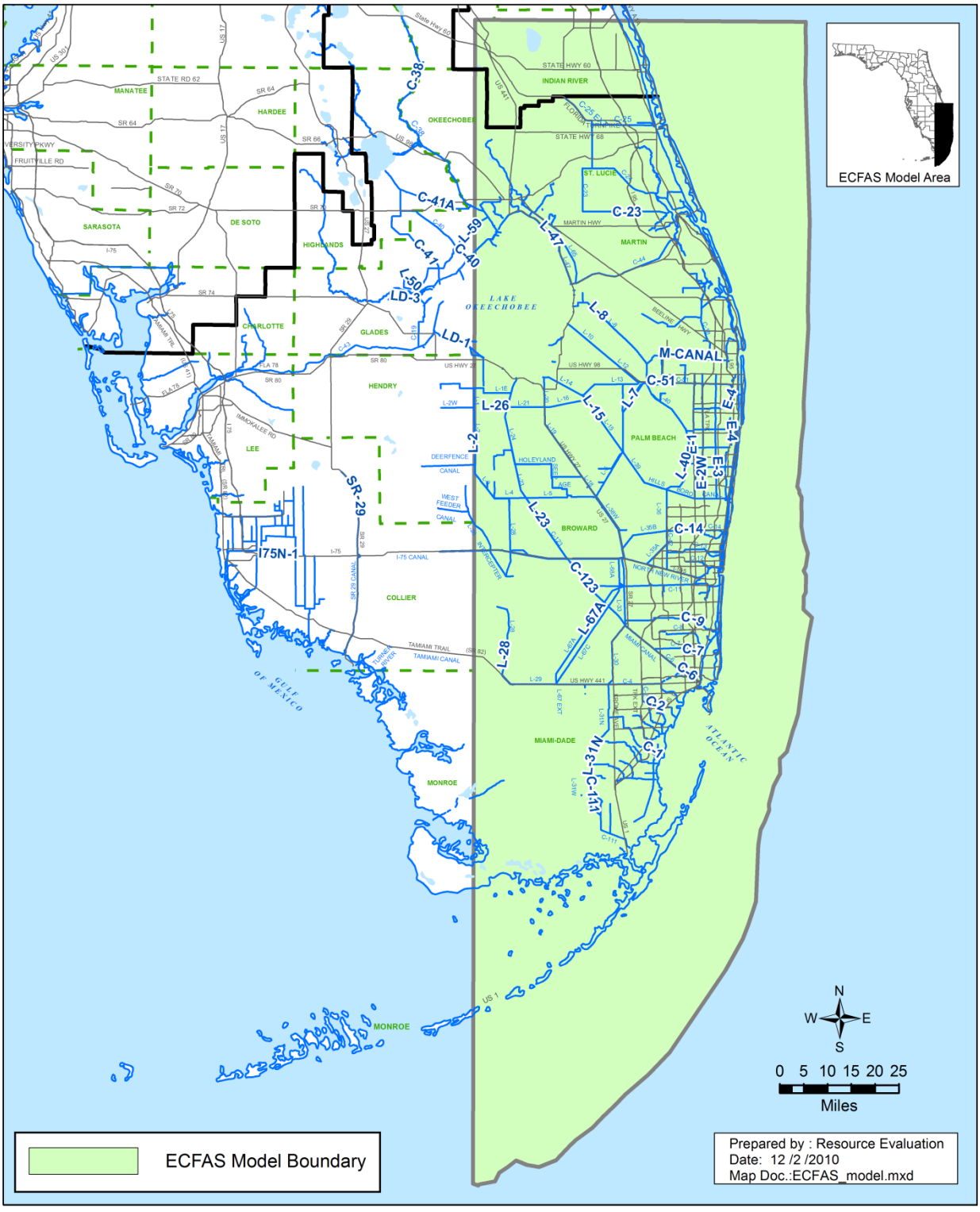


Figure 15. East Coast Floridan Aquifer System Model study area.

Table 7. Water reuse in the UEC Planning Area (MGD) 1994–2009.

Year	1994	1996	1998	2000	2002	2004	2006	2008	2009
MGD	5.23	5.60	8.17	6.53	9.39	11.16	11.00	9.76	10.40

Source: *2009 Reuse Inventory* (FDEP 2010b).

Water Use Permitting

The 1998 UEC Water Supply Plan recommended incorporation of resource protection criteria, level of certainty, special designations, and permit durations into the Basis of Review (SFWMD 2010). A series of rulemaking efforts was completed in September 2003 and resulted in amendments to Chapters 40E-1, 40E-2, 40E-5, 40E-8, 40E-20, and 40E-21, Florida Administrative Code (F.A.C.), and the Basis of Review. Among the most significant changes were the amendments to permit duration, permit renewal, wetland protection, supplemental irrigation requirements, saltwater intrusion, Aquifer Storage and Recovery, and model evaluation criteria.

The renewal process for irrigation-class water use permits in the UEC Planning Area began in 2003 and was completed in 2005. All new irrigation-class water use permit applications and renewals are subject to the terms of the current Basis of Review (SFWMD 2010), which includes rules enacted after 2003. Many of the permits for public water suppliers have been renewed since 2003 with 20-year durations.

SFWMD Funding Programs

The SFWMD provides funding assistance to water users for development of alternative water supplies and water conservation through two cost-share programs, the Alternative Water Supply (AWS) Funding Program and the Water Savings Incentive Program (WaterSIP). For detailed information about the AWS Funding Program and WaterSIP, see **Chapter 4** of this document.

Water Conservation

Several water conservation programs were initiated by the SFWMD since publication of the 2004 UEC Plan Update, including development of a Comprehensive Water Conservation Program (CWCP) and adoption of the Districtwide Year-round Landscape Irrigation Conservation Measures Rule (Year-round Irrigation Rule). More information about these programs is provided in **Chapter 4**.

The CWCP, approved by the District's Governing Board in 2008, is designed to build on and complement successful water conservation initiatives. It contains a series of implementation strategies designed to bring about a permanent reduction in individual water use. The program is organized into 1) regulatory, 2) voluntary and incentive-based, and 3) education and marketing initiatives.

The Year-round Irrigation Rule went into effect on March 15, 2010. This rule limits irrigation of existing landscapes to two days per week Districtwide, with no sprinkler irrigation allowed between 10 a.m. and 4 p.m. and a provision for three-day-per-week irrigation in counties wholly located within the jurisdictional boundaries of the SFWMD, including Martin and St. Lucie. In August 2010, the City of Stuart adopted two-day-per-week irrigation limits within its jurisdictional boundaries. Properties in the remaining portions of incorporated and unincorporated Martin and St. Lucie counties could be irrigated up to three times per week, in accordance with the Year-round Irrigation Rule.

The District has also observed reductions in the finished water regional utility base year per capita water usage since 1998 (**Table 8**). **Chapter 4** of this planning document and Chapter 5 in the Support Document (SFWMD 2011b) provide additional information about the District's water conservation programs.

The base year regional utility per capita use rates in the 1998, 2004, and 2011 UEC water supply plans have decreased from a high in the 1998 UEC Water Supply Plan of 186 gallons per day per person to a low of 123 gallons per person per day in this 2011 UEC Plan Update. These values use utility finished water demands divided by the estimated permanent population connected in the service area for that year.

Table 8. Regional utility per capita use rates in the UEC Planning Area (using overall finished water).

UEC Water Supply Plan Year (base year used)	Per Capita (gallons per day per person)
1998 (1990)	186
2004 (2000)	167
2011 (2005)	123

Surface Water Storage

Two Everglades restoration projects, the CERP Indian River Lagoon – South Project and the Ten Mile Creek Reservoir and Stormwater Treatment Area Project, are planned to create additional regional surface water storage for the UEC Planning Area. See the *Prevention Strategy for the North Fork of the St. Lucie River* section of this chapter for details.

RESOURCE SUSTAINABILITY

As part of the comprehensive water resources management approach, resource protection criteria, such as MFLs, Water Reservations, and consumptive use permit criteria, are developed to ensure the sustainability of water resources. The sustainability of water resources must be assessed for reasonable-beneficial future needs.

Minimum Flow and Level Recovery or Prevention Strategy

Section 373.709, F.S., requires each regional water supply plan to be based on at least a 20-year planning horizon and include: a) water supply and water resource development components; b) a funding strategy for water resource development projects; c) MFLs established within the planning region; d) the MFL recovery or prevention strategy developed for each established MFL; and e) technical data and information supporting the plan.

A MFL has been adopted for Lake Okeechobee, the Everglades, and Biscayne Bay. The recovery strategy for the Lake Okeechobee MFL includes Restricted Allocation Area criteria for the Lake Okeechobee Service Area, limiting surface water withdrawals from the lake and connected surface waters. The MFL for Lake Okeechobee, the Everglades, and Biscayne Bay is addressed in the *2012 Lower East Coast Water Supply Plan Update* (SFWMD in process).

A MFL has been established for the Northwest Fork of the Loxahatchee River, which partially flows into Martin County. This MFL and recovery strategy will also be addressed in the 2012 LEC Plan Update.

A MFL has been established for the North Fork of the St. Lucie River and Estuary in the UEC Planning Area. A violation of this MFL is unlikely to occur in the future and a prevention strategy was adopted to ensure that operations of future structures do not change this outcome. No additional MFLs are scheduled to be adopted in the UEC Planning Area in the next five years.

PROTECTION

MFL Recovery or Prevention Strategy

Section 373.0421, F.S., requires that once a minimum flow or level is established, the District shall implement a recovery or prevention strategy. A prevention strategy is needed when the MFL criteria are projected to be exceeded within the 20-year planning time frame, if prevention strategies are not implemented. The goal is to prevent the existing flow or level from falling below the established minimum flow or level. A recovery strategy is needed for water bodies currently exceeding the MFL criteria. The goal for achieving the established minimum flow or level is as soon as practicable. The recovery or prevention strategy must include phasing or a timetable for the provision of sufficient water supplies for all reasonable-beneficial uses. This includes development of additional water supplies and implementation of water conservation and other efficiency measures consistent with the provisions in Sections 373.0421 and 373.709, F.S.

North Fork of the St. Lucie River Minimum Flow and Level Criteria

North Fork of the St. Lucie River

Established minimum flow criteria for the North Fork of the St. Lucie River and Estuary are linked to the concept of protecting valued ecosystem components from significant harm. The specific valued ecosystem components to be protected within the North Fork of St. Lucie River and Estuary are the organisms (phytoplankton, zooplankton, benthic invertebrates, and larval and juvenile fishes) that inhabit the oligohaline (low salinity) zone. The MFL criteria were based on the determination that significant harm occurs to the oligohaline zone when freshwater deliveries to the North Fork of the St. Lucie River fall below a mean monthly flow of 28 cubic feet per second (cfs) as measured at the Gordy Road Structure for a period of two consecutive months, for two or more years in succession. Maintaining mean monthly flows greater than 28 cfs from the Gordy Road Structure represents the amount of fresh water needed to maintain salinities within the North Fork of the St. Lucie River that will protect oligohaline organisms during extreme dry periods. Minimum flow criteria are exceeded and harm occurs to the estuarine resources if flows fall below 28 cfs for two consecutive months. If harm, as defined previously, occurs during two consecutive years, significant harm and a violation of the MFL criteria occurs (SFWMD 2002).

The North Fork of the St. Lucie River currently receives surface water runoff from the Ten Mile Creek, the Tidal North Fork, and C-23 Basin. Inflows to the North Fork are monitored at the Gordy Road Structure. Several miles downstream of this structure, Five Mile Creek contributes relatively limited inflows. The North Fork also receives runoff from many small urban drainage areas. Farther downstream, the C-24 Basin and the S-49 Structure discharge to the southern portion of the St. Lucie River. Immediately downstream of the C-24 Canal, the river broadens dramatically and remains about 4,000 feet wide to the confluence of the North and South Forks of the river located within the estuary at the U.S. 1-Roosevelt Bridge (SFWMD 2009b).

Modeling results indicate that groundwater is not a significant source of water to the North Fork. Review of historical flow data obtained from the North Fork of the St. Lucie River, as shown in **Figure 16** and **Table 9**, indicate that a violation of the MFL has not occurred since rule adoption in 2002, despite periods of drought in basins with surface water deficits.

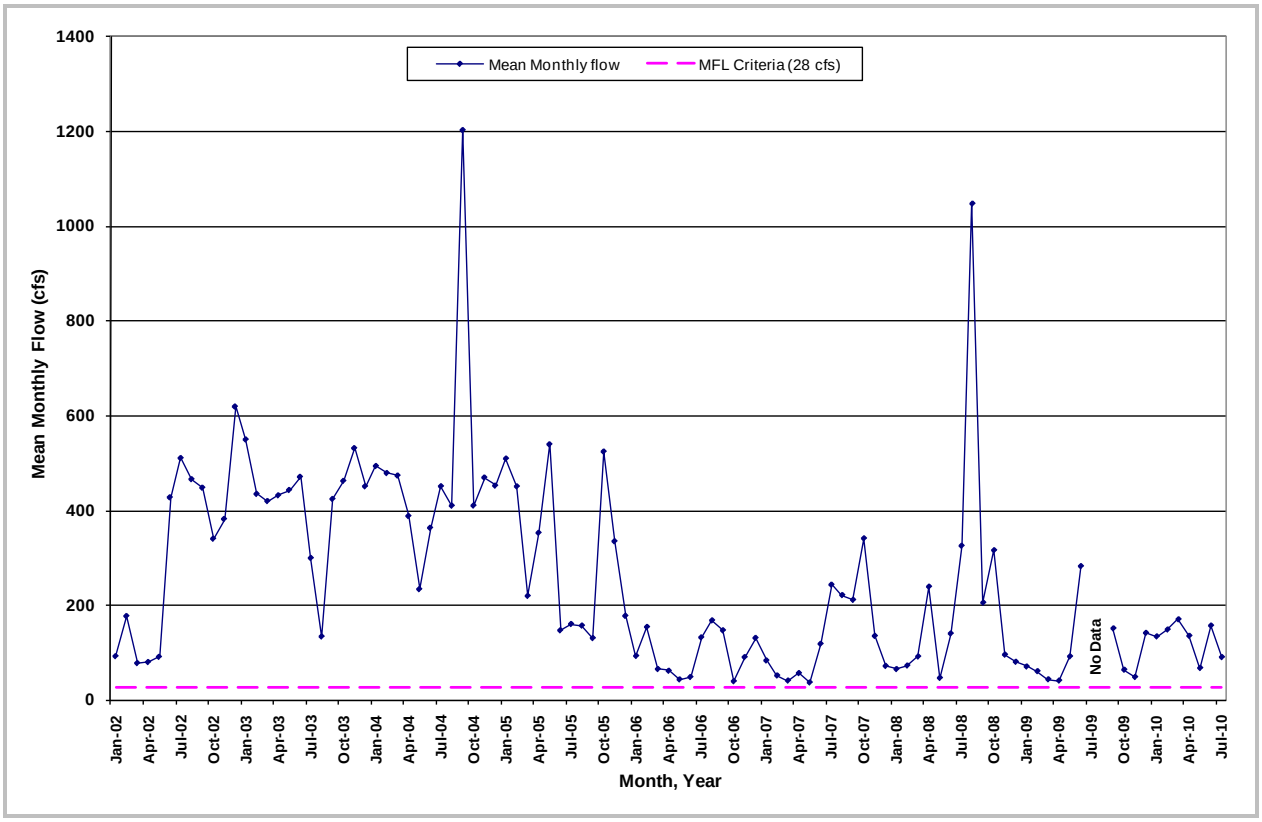


Figure 16. Mean monthly flows and MFL criteria for the North Fork of the St. Lucie River.

Table 9. Mean monthly flow (cubic feet per second) measurements over the Gordy Road Structure.

	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	92.8	550.2	494.2	509.9	93.3	83.7	65.5	70.9	134.4
Feb	177.5	435.3	479.3	451.1	154.5	52.0	73.0	61.1	149.0
Mar	78.2	420.2	474.1	220.0	65.6	41.3	92.0	43.9	170.5
Apr	80.4	432.3	388.7	353.2	62.0	57.0	239.5	41.3	135.7
May	91.4	443.6	234.2	540.0	43.7	37.3	46.9	92.2	67.8
Jun	428.1	471.4	363.8	147.3	48.8	118.8	140.6	282.7	157.3
Jul	511.0	300.0	451.4	160.7	132.4	243.7	325.8	M	90.7
Aug	466.4	134.3	410.4	157.4	168.3	221.7	1,048.0	M	M
Sep	448.5	424.7	1,203.3	130.9	147.3	211.6	205.7	151.4	M
Oct	340.8	462.8	410.7	524.7	39.8	341.4	316.3	64.2	M
Nov	382.4	531.9	469.9	335.3	90.8	135.5	96.0	48.8	M
Dec	619.8	451.3	452.8	177.9	131.3	72.1	80.9	141.9	M

Note: M = Missing data

A description of the North Fork of the St. Lucie River is provided in Chapter 8 of the Support Document (SFWMD 2011b).

Prevention Strategy for the North Fork of the St. Lucie River

A prevention strategy is contained in Section 40E-8.421, F.A.C., for the North Fork of the St. Lucie River to prevent the existing flow or level from falling below the established minimum flow or level (Section 373.0421, F.S). As required by Section 373.709, F.S., the updated prevention strategy has been identified, and consists of the following major components:

- CERP Indian River Lagoon – South Project
- Water Reservation rule for the North Fork of the St. Lucie River
- Restricted Allocation Area rule for the C-23, C-24, and C-25 basins
- Ten Mile Creek Reservoir/Stormwater Treatment Area (STA) (formerly Ten Mile Creek Water Preserve)

CERP Indian River Lagoon – South Project

Indian River Lagoon – South Reservoir Property

Structural changes proposed for the watershed as part of the CERP Indian River Lagoon – South Project Implementation Report (USACE and SFWMD 2004) are designed to provide additional retention basins (above-ground reservoirs), improved water conveyance facilities, and operational strategies within the watershed. These changes are expected to capture, store, and attenuate excess water previously discharged directly to tide and redistribute this water northward via its historical flow pathway to be discharged down the St. Lucie River to the North Fork. The objectives of the retention basins are to help: a) reduce both the volume and frequency of damaging freshwater discharges to the St. Lucie Estuary, and b) restore a more natural volume, timing, and distribution of freshwater flow to the estuary, enhancing the opportunity for recovery of estuarine biota. Delivery of freshwater flows to the estuary are expected to achieve the MFL.

Project Components Contributing to the North Fork of the St. Lucie River

The CERP Indian River Lagoon – South Project Implementation Report details five features and operational modifications that together are expected to achieve its stated objectives. The five features include: 1) reservoirs, 2) stormwater treatment areas, 3) natural storage and treatment areas, including restoration within the North Fork floodplain, 4) diversion, and 5) muck removal and the creation of artificial habitat within the estuary (USACE and SFWMD 2004). The general location of the CERP Indian River Lagoon – South Project and its major components are shown in **Figure 17**. Once constructed and in operation, four of the

project features will convey water to the North Fork of the St. Lucie River to restore more natural volume, timing, and distribution of water, which will help meet the river's MFL criteria. These four components are described as follows:

1. **C-23/C-24 North Reservoir and C-23/C-24 South Reservoir** will capture water from the C-23 and C-24 canals, thereby reducing the extreme peaks of freshwater discharge to the estuary and delivering water to meet fish and wildlife needs. Water stored in the reservoirs would also be potentially available to agriculture, which would reduce dependency on well water from the FAS (USACE and SFWMD 2004).
2. **Stormwater Treatment Areas** A stormwater treatment area (STA) will be built to treat water from the C-23/C-24 North Reservoir and C-23/C-24 South Reservoir. Operation of the C-23/C-24 STA is expected to reduce sediment, phosphorus, and nitrogen deliveries to the estuary and allow for restoration of estuarine water quality. Construction and operation of the STA in conjunction with the reservoirs is essential for delivering water of adequate quality for the restoration of this portion of the Greater Everglades ecosystem.
3. **Diversions** The diversion of existing flows via a canal connection and operating rules on new reservoirs and STAs will reduce the negative impacts of flows to the mid-estuary and provide for a more natural freshwater flow pattern to the North Fork of the St. Lucie River. Discharges from the C-24 outlet (S-49) will shift to the North Fork through the associated C-23/C-24 STA outlet. This northerly diversion will direct approximately 64,500 acre-feet of water from the C-23 and C-24 basins into the North Fork. This redirected water will provide increased dry season flows to the North Fork of the St. Lucie River. Residual C-23 flows greater than natural system flows through Basin 4 will be directed to the C-44 Reservoir, STAs, and canal via the new proposed canal before discharge to the estuary through the S-80 Structure.
4. **Natural Storage and Treatment Areas, North Fork Floodplain Restoration** Approximately 92,130 acres disturbed by previous and current land use practices were identified within the C-23, C-24, and C-44 basins for acquisition and restoration. The planned natural storage and water quality areas include the Pal-Mar Complex, Allapattah Complex, and Cypress Creek/Trail Ridge Complex. By restoring hydrologic conditions through the modification of on-site drainage features, these natural lands are expected to provide approximately 30,000 acre-feet of storage within the watershed through retention in natural wetland systems. These lands are also expected to improve water quality by reducing the amount of nutrient loading currently caused by large amounts of runoff. Additionally, the project includes preserving approximately 3,100 acres of floodplain wetlands and low-salinity habitat within the North Fork of the St. Lucie River. Preserving this portion of the river will provide additional water storage, maintain wading bird habitat, improve water quality, and protect areas that currently serve as a nursery area for larval and juvenile fishes.

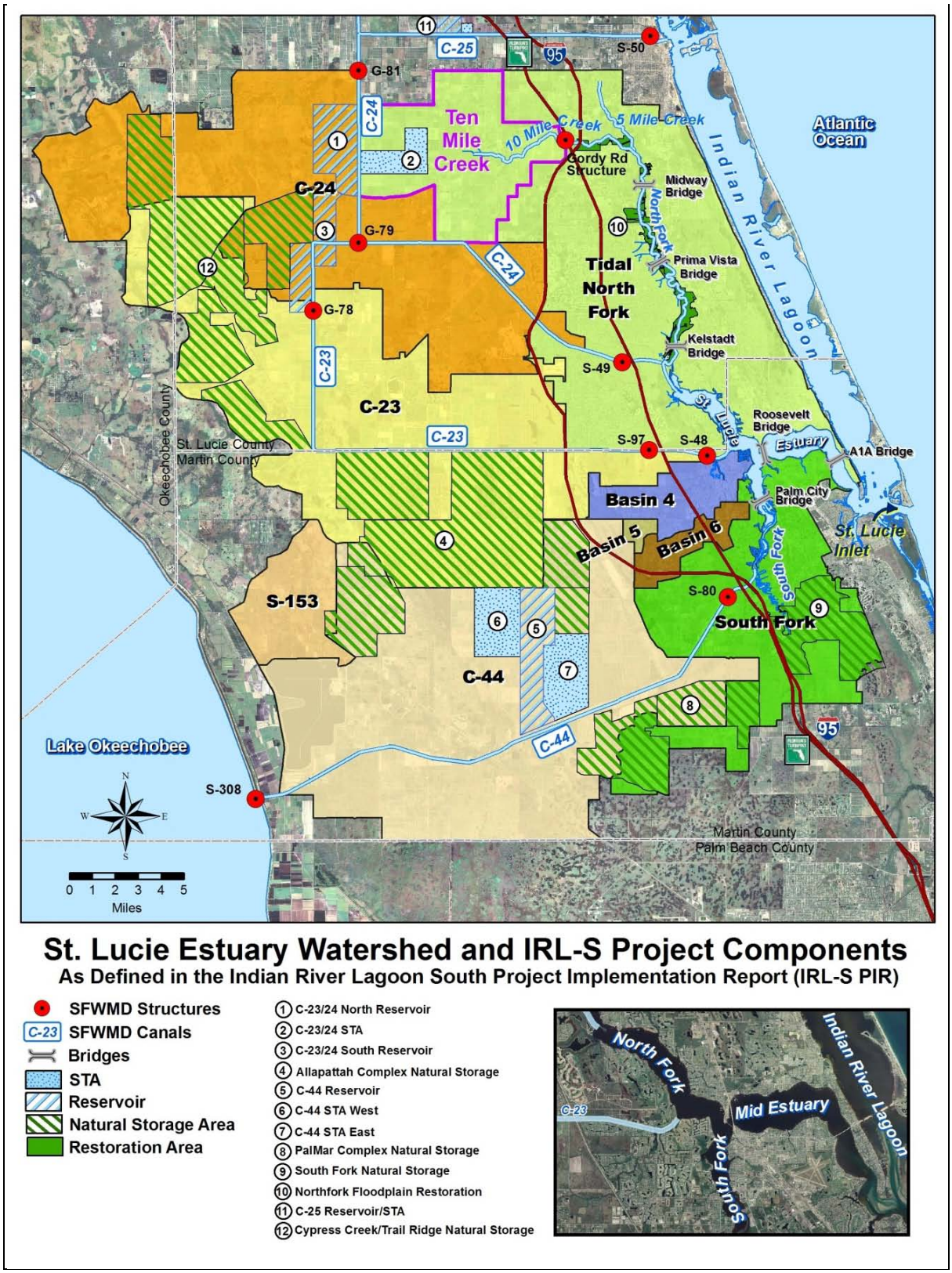


Figure 17. St. Lucie Watershed and proposed Indian River Lagoon – South Project components.

The U.S. Army Corps of Engineers (USACE) and SFWMD jointly implement the CERP, a 50-50 cost share plan, which includes the planning and design of the projects. The CERP Indian River Lagoon – South Project is included in the Integrated Delivery Schedule. Based on the current CERP Integrated Delivery Schedule, the C-23 and C-24 components of the Indian River Lagoon – South Project are scheduled for construction after 2020.

Water Reservation Rule for the North Fork of the St. Lucie River

The CERP Indian River Lagoon – South Project was authorized by Congress in the *Water Resources Development Act* (WRDA) of 2007. To initiate construction of this federal project as part of the Comprehensive Everglades Restoration Plan, the State of Florida is required to reserve or allocate water for the natural systems associated with implementation of the CERP. A Water Reservation rule (Chapter 40E-10, F.A.C.) was adopted in 2010 by the SFWMD to fulfill its commitments to the CERP Indian River Lagoon – South Project.

North Fork of the St. Lucie River

The purpose of the Water Reservation is to ensure that the CERP Indian River Lagoon – South Project provides the intended benefits for the natural system, which requires the identification of water for the natural system, including water to be reserved or allocated. The SFWMD has elected to use its reservation authority [Subsection 373.223(4), F.S.] to protect water available to the natural system prior to project implementation and water made available by the project, undertaking this protection in a single rulemaking process. The Water Reservation will be used by the District's Consumptive Use Permitting Program to evaluate permit applications within the St. Lucie River Watershed. The reservation rule will require applicants to provide reasonable assurances that their proposed use of water will not withdraw water that is reserved for the protection of fish and wildlife. Therefore, the water that is reserved for the protection of fish and wildlife within the North Fork of the St. Lucie River will not be allocated for human use.

The Water Reservation rule was based on information contained within a District technical publication entitled, *Technical Document to Support a Water Reservation Rule for the North Fork of the St. Lucie River* (SFWMD 2009b). This information was used to establish relationships among freshwater flows discharged from the watershed, salinity, and downstream estuarine ecological response. An independent, expert panel reviewed this report and related documents to determine if best available technical information supports the relationship between water supply projections resulting from the completed CERP project and water supply reserved to protect fish and wildlife. The District's technical

report, the peer-review panel's final report, public comments, and a summary of the District's responses are available from http://sfwmd.websitetoolbox.com.

The District used a resource-based approach to develop the Water Reservation rule for the North Fork of the St. Lucie River. Technical evaluations included a summary of the available literature, review of empirical data, and development of watershed and hydrodynamic models that were used to define hydrologic targets for the river, and quantify the volume of available water produced by the project. Results of this process showed that once all the components of the project are constructed, the CERP Indian River Lagoon – South Project has the ability to provide dry season mean monthly flows that equate to 130 cfs discharged over the Gordy Road Structure to the North Fork of the St. Lucie River. This quantity of water will be reserved by the District to protect fish and wildlife within the St. Lucie River under District rules (Chapters 40E-10, F.A.C., Water Reservations; 40E-2, F.A.C., Consumptive Use; and 40E-20, F.A.C., General Water Use Permits).

Restricted Allocation Area Rule for the C-23, C-24, and C-25 Canals

Water will continue to remain available to meet the MFL for the North Fork of the St. Lucie River based on Restricted Allocation Area rules that prohibit use of surface water in the C-23, C-24, and C-25 canals, or any connected canal systems that derive water from these canals above existing allocations. See Subsection 3.2.1(B) of the Basis of Review (SFWMD 2010).

Ten Mile Creek Reservoir / Stormwater Treatment Area

The Ten Mile Creek Reservoir/STA Project, formerly known as the Ten Mile Creek Water Preserve Area, is an off-stream water storage and treatment facility adjacent to Ten Mile Creek, a tributary to the North Fork of the St. Lucie River, which discharges to the Indian River Lagoon. The primary purpose of the project is to control stormwater flow from Ten Mile Creek into the North Fork of the St. Lucie River. Storm water from Ten Mile Creek would be pumped from the creek into the water storage area primarily during the summer rainy season. This water would be released at times favorable to the North Fork, most often in the drier, winter season. The project was initially proposed under the Critical Restoration Project Program established by the *Water Resources Development Act of 1996*. The project consists of a 526-acre water storage area (reservoir) with water depths ranging from 10–15 feet deep. In addition to the water storage area, the project includes a pump station to move water from Ten Mile Creek into the reservoir; a 132-acre treatment wetland cell downstream of the reservoir for additional water quality and habitat benefits; auxiliary pumps; a control structure to move water from the reservoir to the wetland treatment cell; and a discharge control structure returning to Ten Mile Creek via Canal 96.

Construction was completed on the Ten Mile Creek Reservoir/STA Project in June 2006. During the processes that occur in preparation to transfer the project to the sponsor (SFWMD) for full operations, concerns were raised about some aspects of the project. In September 2007, the USACE and the SFWMD identified the issues and planned a course of action toward remediation and the delivery of a quality project. This process identified

additional project needs and their associated costs. As holder of the Florida Department of Environmental Protection (FDEP) permit for construction, the USACE is responsible for the facility. The USACE has placed the facility in a passive operating state while funding authorization is obtained to complete a Post Authorization Change report to identify remediation options and to fund maintenance and upkeep of the facility until 2013.

A cost-share agreement between the SFWMD and the USACE is proposed to be executed in the second quarter of FY 2011. The Post Authorization Change report is proposed to commence shortly after execution of the cost-share agreement and is estimated to take approximately two years to complete. Upon completion of the Post Authorization Change in FY 2013, the USACE will request federal authority and appropriations for design/ construction contracts to start in future fiscal years.

Future Monitoring and Modeling Efforts

Even though freshwater aquifer levels are relatively stable, sea level rise will change the hydrodynamics of the coastal aquifers and the location and shape of the saltwater interface. Additional monitor wells are needed to more accurately characterize the position of the saltwater interface within the SAS.

Previous modeling was able to quantify the unmet needs of agriculture for surface water and identify areas of potential groundwater conflicts based on wetland or saltwater intrusion impacts.

Modeling in future plan updates will depend in part on indications that past assumptions regarding water resources have changed. In addition to analyzing demand projections, the SFWMD is actively involved in evaluating a number of parameters that may trigger the need for future modeling in the UEC Planning Area, including the following:

- Frequency and intensity of drought events
- Changes in aquifer levels and response times
- Movement of the saltwater/freshwater interface (groundwater)
- Salinity levels in estuaries

Future direction for monitoring and modeling efforts is described in **Chapter 7** of this Plan Update.

ADDITIONAL UEC WATER SUPPLY-RELATED EFFORTS

Water supply development and restoration efforts are under way throughout the UEC Planning Area. In addition, some projects outside the boundaries of the UEC Planning Area also impact the region's water supply. The following project descriptions are meant to serve as a brief overview of the additional water supply-related activities in and around the Upper East Coast.

Northern Everglades and Estuaries Protection Program

The Lake Okeechobee Protection Act (LOPA), Section 373.4595, F.S., was passed by the 2000 Florida legislature to establish a restoration and protection program for the lake. In 2007, the Florida legislature authorized the Northern Everglades and Estuaries Protection Program (NEEPP) in Section 373.4595, F.S., expanding the existing LOPA to include the Lake Okeechobee Watershed Protection Program. The NEEPP also added a river watershed protection program, consisting of the Caloosahatchee River Watershed Protection Plan and St. Lucie River Watershed Protection Plan.

Lake Okeechobee Watershed Protection Program

The Lake Okeechobee Watershed Protection Program is a cooperative effort between the District, the FDEP, and the Florida Department of Agriculture and Consumer Services (FDACS). The program includes the Lake Okeechobee Watershed Construction Project (LOWCP) Phase I Plan, which implemented the construction of STAs and pilot projects for sediment removal within the watershed.

The NEEPP also mandated the SFWMD, FDEP, and FDACS to develop a detailed technical plan for the Northern Everglades ecosystem.

Lake Okeechobee Watershed Construction Project Phase II Technical Plan

The LOWCP Phase II Technical Plan (SFWMD, FDEP, and FDACS 2008) identifies construction projects in the Lake Okeechobee Watershed, along with on-site measures that prevent or reduce pollution at its source, such as urban and agricultural best management practices (BMPs) needed to achieve water quality targets for the lake. In addition, it includes water storage projects north of Lake Okeechobee to meet lake water quality targets, improve water-level management, and deliver appropriate freshwater releases from Lake Okeechobee to meet desirable salinity ranges for the St. Lucie and Caloosahatchee estuaries.

Components of the multi-phase plan include:

- Implementing urban and agricultural BMPs, including BMPs on more than 1.7 million acres of farmland
- Adopting new regulations that will reduce the impacts of development on water quality and flow
- Building treatment wetlands to clean water flowing into the lake
- Using other innovative "green" nutrient control technologies to reduce phosphorus loads from the watershed
- Creating between 900,000 acre-feet and 1.3 million acre-feet of water storage north of the lake through a combination of above-ground reservoirs, underground storage, and alternative water storage projects on public and private lands

St. Lucie River Watershed Protection Plan


St. Lucie River

The *St. Lucie River Watershed Protection Plan* (SLRWPP) (SFWMD, FDEP, and FDACS 2009) was submitted to the Florida legislature on January 1, 2009, under the 2007 NEEPP mandate. The plan identified major influences that affect the estuary's ecological health, causing changes in salinity, dissolved oxygen content, turbidity, and other water quality issues within the estuary (SFWMD 2009b). The three main components of the SLRWPP are: 1) a Watershed Construction Project, 2) a Watershed Pollutant Control Program, and 3) a Watershed Research and Water Quality Monitoring Program. The St. Lucie River Watershed Construction Project component of the SLRWPP includes specific CERP Indian River Lagoon – South Project Implementation Report projects, such as:

- The C-44 (St. Lucie Canal) Reservoir and STA (a CERP project, and a component of the Indian River Lagoon – South Project; discussed in the following *Everglades Restoration Projects* section)
- Natural Storage and Water Quality Areas (see the CERP Indian River Lagoon – South Project description provided earlier in this chapter)
- The C-23/C-24 Reservoir/STA (see the CERP Indian River Lagoon – South Project)
- North Fork Floodplain Restoration (see the CERP Indian River Lagoon – South Project)
- Oyster substrate creation in the St. Lucie Estuary
- Muck removal from the St. Lucie Estuary

Everglades Restoration Projects

The SFWMD takes a systemwide approach to protecting and restoring the Northern and Southern Everglades. These inter-dependent ecosystems originate in central Florida near metro Orlando and stretch southward to the coastal estuaries and bays of south Florida. Many of the Everglades restoration projects are mandated by Florida Statutes, and often involve other federal and state partners, such as the USACE, the FDEP, and the FDACS. Everglades restoration projects are designed to address multiple concerns, such as ecosystem health, environmental protection, and water resources for fish and wildlife and consumptive use. Planned and ongoing restoration projects are improving regional water quality, hydrology, and ecology. The latest information about Everglades restoration projects is available from http://www.sfwmd.gov/sferdb. Additional project information is available from http://www.evergladesplan.org and in the *Resource Sustainability* section of this chapter.

Lakeside Ranch Stormwater Treatment Area

Lakeside Ranch STA Project

The Lakeside Ranch STA, a component of the CERP and LOWCP II Technical Plan, involves the construction of a 2,700-acre wetland area adjacent to Lake Okeechobee in western Martin County to treat basin runoff before it enters Lake Okeechobee. The Lakeside Ranch STA is expected to be the largest treatment wetland (more than 2,000 acres) in the Northern Everglades for improving the quality of water that flows into Lake Okeechobee. Phase I of the project consists of a northern STA (925 acres) with a 250-cubic feet per second (cfs) inflow pump station. The second phase of the project will consist of a southern STA and second pump station to manage rim water canal levels in Lake Okeechobee during high water periods. Construction of the Phase I northern STA is expected to be complete by January 2012.

CERP C-44 (St. Lucie Canal) Reservoir / Stormwater Treatment Area

The C-44 (St. Lucie Canal) Reservoir/ STA is a CERP project, as well as a component of the Indian River Lagoon – South Project. This project is intended to capture, store, and treat flood runoff from the C-44 Basin prior to discharge to the St. Lucie Estuary. Implementation of this project is expected to reduce damaging freshwater discharges, decrease nutrient load, and maintain desirable salinity regimes. The SFWMD has acquired land and completed the design for the CERP C-44 (St. Lucie Canal) Reservoir/STA Project, located in southern Martin County adjacent to the C-44 Canal. The project will consist of a 3,400-acre

above-ground reservoir, approximately 15 feet deep (50,600 acre-feet of storage), to capture local C-44 Basin runoff, and a 6,300-acre STA. The reservoir test cells are complete and preliminary construction of this project has begun and is scheduled to continue through 2018. Federal and state funds are used for this project.

Stormwater Management and Water Quality Efforts

The Dispersed Water Management Program

The Dispersed Water Management Program is a collective and collaborative entity effort designed to encourage property owners to retain water on their land rather than drain it, accept regional excess runoff for storage, or both. Managing water on public, private, and tribal lands is a way to reduce the amount of water delivered into Lake Okeechobee and discharged to coastal estuaries for flood protection purposes. This program complements water storage options available through public facilities such as reservoirs, restoration projects, and stormwater treatment areas. The program consists of three approaches: 1) Easements/United States Department of Agriculture (USDA) Wetland Reserve and Reserved Rights Programs, 2) Payment for Environmental Services (Florida Ranchlands Environmental Services Pilot Project), and 3) Cost Share/Water Storage Disposal.

Payment for the Environmental Services Program

The Florida Ranchlands Environmental Services Project (FRESP) is a diverse coalition of stakeholders including cattle ranchers, environmental partners, researchers, academic scientists, and state and federal agencies that collaborate to solve environmental challenges. In 2005, a pilot program was initiated, with the Alderman-Deloney Ranch in northeastern Okeechobee County being one of the eight ranches participating in the project. This 1,358-acre ranch is located within the C-25 Basin of the UEC Planning Area and provides 138 acre-feet of on-site retention, which retains 40 pounds of phosphorus on an annual basis. As part of this initiative, the partners have developed a Northern Everglades Payment for Environmental Services (NE-PES) Program whereby the District pays ranchers to provide services, such as water retention and reduced nutrient loading on private ranchlands. In January 2011, the District released a NE-PES solicitation to request proposals from eligible ranchers. Funding for this program is identified in the *Lake Okeechobee Watershed Protection Plan Update* (SFWMD, FDEP, and FDACS 2011).

Water Farming

To complement FRESP efforts, a pilot project is in the planning phase for intensively managed agricultural lands, including fallow citrus. The SFWMD is collaboratively working with the Indian River Citrus League to determine the cost-effectiveness of "water-farming," which is storing and treating water on fallow citrus lands. Because this project is in the preliminary planning phase, no timelines or funding have been established.

The Indiantown Citrus Growers Association Project

The Indiantown Citrus Growers Association Project is a multi-agency cost-share project located in Martin County. It consists of 1,775 acres of agricultural land, which will provide 3,550 acre-feet of water storage. The project includes rehabilitation and relocation of pump stations, and the widening of ditches to reduce rainfall runoff from the site. It will also use existing facilities to pull excess regulatory releases from the St. Lucie Canal on-site to reduce the volume of freshwater discharges to the St. Lucie Estuary.

Regional Projects

St. Lucie River Issues Team

The St. Lucie River Issues Team Funding Initiative is an example of local partnerships working together to prioritize issues, procure federal and state funding, and implement projects having quantifiable results and a positive effect on the resource. The Issues Team, formed by the South Florida Ecosystem Restoration Working Group in 1998, consists of representatives from federal, state, and local governments, and agricultural, environmental, and research organizations. To date, the Issues Team has received more than $63.7 million from the State of Florida, more than $65.7 million from local partners, and an additional $2 million from the federal government. The program has funded 114 individual projects with a major emphasis on stormwater retrofits and BMPs, habitat preservation and restoration, water storage, and research.

SUMMARY

For the 2011 UEC Plan Update, the demand projections, assumptions, and resource protection criteria used in the previous water supply planning analyses were reviewed and compared with current information.

Water use permits in the UEC Planning Area were renewed within the last five years in accordance with applicable resource protection criteria, most for a 20-year duration. The SFWMD's Consumptive Use Permitting Program resolved several of the potential problems that were identified on a regional scale in the previous analyses. Recent consumptive use permit applications in sensitive areas were approved with modifications to wellfield locations and pumping regimes with respect to wetlands. In other areas, aerial photography spanning several decades was reviewed and did not indicate changes in the size or vegetation of these systems. Surficial aquifer system coastal monitor wells indicate chloride concentrations are remaining stable relative to historic values.

To address these potential issues, water users have diversified their supply sources and reduced their reliance on the SAS, as demonstrated by the following:

- The majority of coastal utilities are using the FAS to meet future water demands.
- Reclaimed water use in the area has increased significantly, lessening dependence on groundwater. Increases in the use of reclaimed water are expected as the region continues to develop.
- Conversion to more efficient irrigation practices and implementation of agricultural BMPs continues.
- Water conservation, now considered a water source option, reduces the need for future expansion of water supplies.

The North Fork of the St. Lucie River and Estuary is protected by MFL and Water Reservation rules.

Overall, use of the FAS will increase despite decreased agricultural use as PWS use will increase. The increased demand on the FAS was previously simulated. The simulated volumes are similar to those projected for 2030. The results of the previous analyses indicated there would be no FAS resource protection criterion exceedances at these demand levels. Furthermore, FAS water level and chloride data were reviewed. Little change has occurred over the last 15 years with increased use. Seasonal cycles and drought extremes are observed, but water levels return to the long-term average.

Based on the evaluation of UEC Planning Area resources described in this chapter, past water supply plan recommendations remain relevant for this UEC Plan Update and the 20-year planning horizon (through 2030).

North Fork of the St. Lucie River

4

Evaluation of Water Source Options

Historically, the UEC Planning Area has relied on water from aquifers, canals, and lakes to meet the region's water supply needs. This chapter presents an evaluation of water supply options and water conservation measures available within the UEC Planning Area through the 2030 planning horizon. To accommodate future urban and agricultural growth while still meeting the needs of the ecosystem, region-specific evaluations were conducted within the context of the issues previously identified in **Chapter 3**.

In the UEC Planning Area, freshwater source options include groundwater from the surficial (shallow) aquifer system and surface water from a regional network—primarily from the C-23, C-24, C-25, C-44, and connected canals. Additional water source options include brackish groundwater from the Floridan (deep) aquifer system; reclaimed water; new storage capacity for surface water or groundwater using reservoirs or Aquifer Storage and Recovery (ASR); seawater; and water conservation.

TOPICS

- Water Sources and Options
- Water Conservation

WATER SOURCES AND OPTIONS

Each water source option presented in this chapter includes a brief discussion about resource sustainability and potential natural systems impacts. Additional information about water source options including water conservation and related costs is provided in Chapter 5 of the *2011–2012 Water Supply Plan Support Document* (Support Document) (SFWMD 2011b). Water treatment technologies and associated costs are presented in Chapter 6 of the Support Document (SFWMD 2011b) and the *Water Supply Cost Estimation Study* (CDM 2007a, 2007b).

Groundwater

Groundwater sources in the UEC Planning Area include fresh groundwater from the surficial aquifer system (SAS) and brackish groundwater from the Floridan aquifer system (FAS). Information about the aquifers and aquifer yield specific to the UEC Planning Area is provided in Chapter 8 of the Support Document (SFWMD 2011b).

Fresh Groundwater

Historically, the SAS has been the primary source of potable water for public consumption and urban irrigation throughout the UEC Planning Area. However, from a regional perspective, the development of the SAS has generally been maximized over time, and potential increases in production are limited, especially in coastal areas. Water availability from this aquifer system is limited by potential impacts to natural resources or other water users. In many areas, additional water supplies from the SAS may only be permitted and developed on a permit-by-permit basis, depending on the quantities required, local resource conditions, and the viability of other supply options.

WATER OPTIONS

Freshwater sources include those sources historically used as the region's primary sources of water. Water quality and availability determine the viability of freshwater sources, and differ from region to region. Where freshwater sources are determined to have limited availability, alternative water sources must be identified and developed.

The SAS is recharged by infiltration from rain or local surface water bodies. Wellfield withdrawals from the SAS are limited by the rate of recharge and water movement in the aquifer, wetland impacts and off-site land use, proximity to contamination sources, saltwater intrusion, and other existing legal users in the area.

In 2010, approximately 55 percent of Public Water Supply (PWS) in this planning area was supplied by the surficial aquifer. However, over the next 20 years, the percentage of SAS use for PWS is projected to decrease as use of other water sources increases.

Brackish Groundwater

The FAS is a vital source of water for both agricultural and PWS use categories. In the UEC Planning Area, FAS water is brackish. Throughout most of the planning area, the FAS is artesian (the wells flow naturally at land surface without the need for a pump). In the UEC region, the productivity of the Upper Floridan aquifer (UFA) is considerably greater than that of the SAS.

WATER OPTIONS

Brackish (saline) groundwater is defined as water with a total dissolved solids concentration greater than 250 milligrams per liter (mg/L) and less than 19,000 mg/L. The terms fresh, brackish, saline, and brine are used to describe the quality of water. Although brackish supplies in the low range of these salinities may be used for some agricultural purposes, this raw water does 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.

The UFA is used extensively by citrus growers in the UEC Planning Area as a supplemental irrigation source when surface water availability is limited. Water from the UFA is generally

blended with surface water or water from the SAS to reduce potential problems associated with salinity. Most growers depend on the artesian flow of the UFA for its use.

Most of the PWS utilities in the region currently use water from the FAS as a source of drinking water for all or a portion of their demands. Because raw water from the FAS is brackish, it requires desalination or blending to meet potable standards. Utilities in the UEC Planning Area drawing on the FAS as a drinking water source typically use reverse osmosis (RO) to remove excess salinity as part of the treatment process. The approximate production efficiency or recovery for brackish water RO plants within the District is between 75 percent and 85 percent (Carollo Engineers, Inc. 2009). To some extent, FAS water can be blended with fresh water and treated with lime softening or nanofiltration technology to meet drinking water standards for chlorides. The ability to use blending depends on the water quality of the FAS water and other treated water produced by the utility. Blending can increase production efficiency.

Currently, approximately 45 percent [23 million gallons of water per day (MGD)] of Public Water Supply in this planning area is from the FAS. The ratio of FAS to SAS use to meet demands has increased significantly since 1998 as indicated in **Figure 18**. Over the 20-year planning horizon, use of the FAS for PWS is expected to increase to accommodate the area's growth. In this 2011 UEC Plan Update, local governments have proposed an additional 58 MGD of brackish water development by 2030.

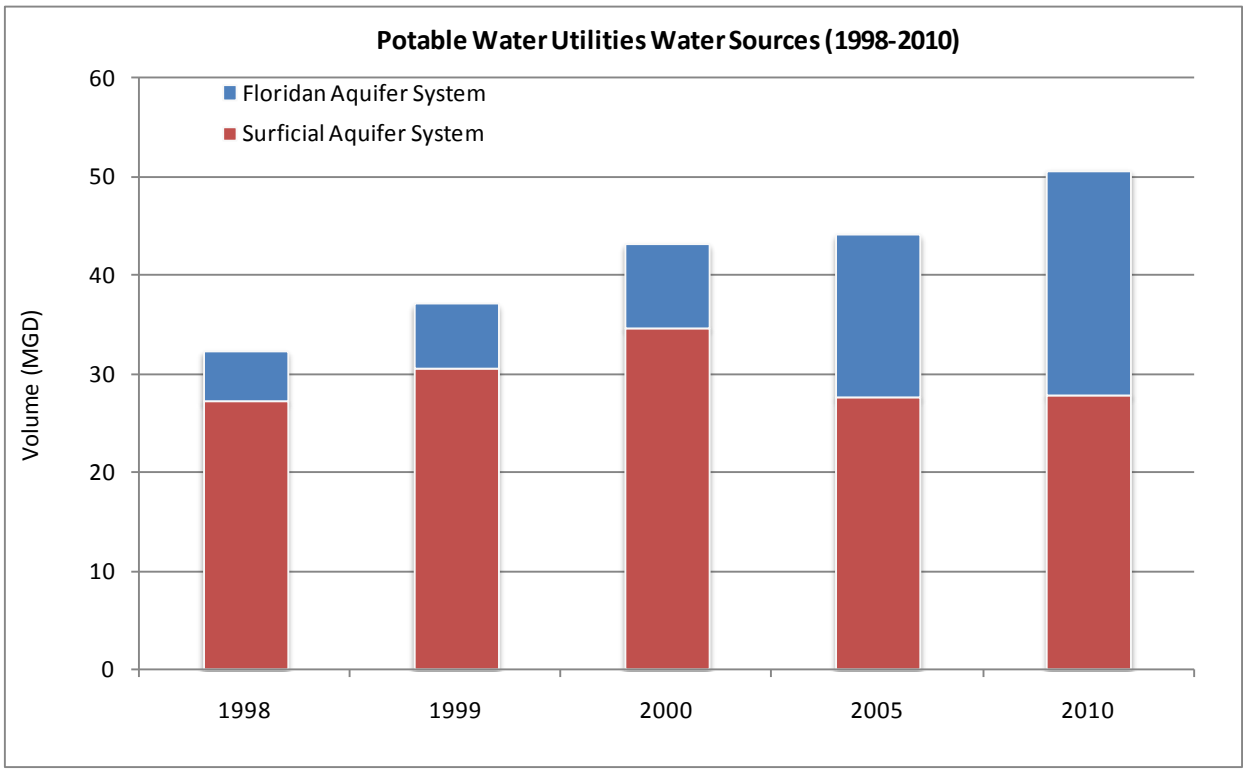


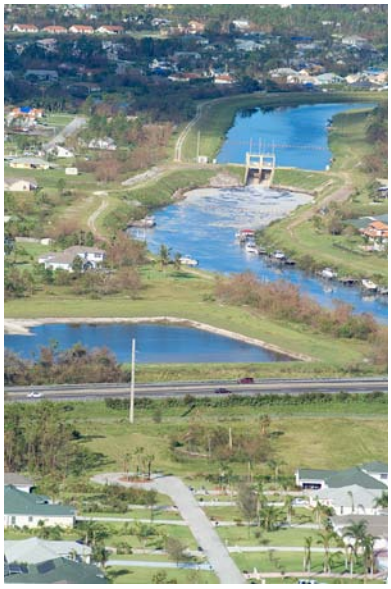
Figure 18. Potable water utilities water sources (1998–2010).

Previous water supply plans indicated a need to better understand the relationship between water levels, water quality, and water use. As discussed in **Chapter 3** and **Chapter 5** of this Plan Update, a Floridan aquifer monitor well network was established in the planning area to monitor water levels and water quality. Previous analyses of projected FAS demands and conclusions did not anticipate major long-term reductions in water levels or reductions in water quality. More recent water level and water quality data from the FAS confirm no discernible trends to the contrary.

Prior water supply planning analyses, in combination with consumptive use permitting activities, indicate the FAS has the potential of supplying sufficient water to meet all PWS demands through the 20-year planning horizon. In addition, the FAS meets the supplemental water needs of agricultural users during a 1-in-10 year drought event without exceeding the resource protection criteria. Much of the FAS monitoring and analysis completed to date in the UEC Planning Area has focused on water levels in the aquifer. A density-dependent numerical model under development is planned to be used as an analysis tool to evaluate the effects of proposed withdrawals on the FAS for the next plan update.

Surface Water

Canals are the surface water bodies used to supplement regional water supplies in the UEC Planning Area, specifically, the C-23, C-24, C-25, and C-44 canals. As discussed in **Chapter 3**, a Restricted Allocation Area rule was established prohibiting additional use of surface water from the C-23, C-24, and C-25 canals, or any connected canal system that derives water from these canals, above historic allocations. In addition, Minimum Flows and Levels (MFLs) were established for the North Fork of the St. Lucie River and Estuary and the Northwest Fork of the Loxahatchee River. A Water Reservation was adopted for the North Fork of the St. Lucie River in March 2010. Minimum Flows and Levels and Water Reservations must be considered when determining surface water availability (see **Chapter 3**).


C-24 Canal and S-49 Structure in St. Lucie County

At this time, no utilities in the UEC Planning Area are using surface water to directly supply potable water. Agricultural Self-Supply is the largest water use category in this region and the primary users of surface water. When surface water availability is limited, it is supplemented with brackish groundwater from the FAS. A surface water budget analysis was conducted to assess surface water availability for water supply in each of the major surface water basins. The analysis included the C-23, C-24, and C-25 canals, but did not include the C-44 Basin. Results of the analysis verified that during a 1-in-10 year drought condition, surface water availability with the existing

canal and storage network is not adequate to support the water supply demands placed on this water source.

Another source option for the UEC Planning Area is to capture, treat, and store seasonally available surface water in reservoirs. Regional storage projects, which are components of the Comprehensive Everglades Restoration Plan (CERP) Indian River Lagoon – South Project, could enhance surface water availability. Opportunities to capture freshwater resources are addressed in the *New Storage Capacity for Surface Water or Groundwater* section of this chapter.

Reclaimed Water

Reclaimed water is a key component of water resource management in south Florida. Potential uses of reclaimed water include landscape irrigation (e.g., medians, residential lots, and golf courses), agricultural irrigation, groundwater recharge, industrial uses, environmental enhancement, and fire protection.

WATER OPTIONS

Reclaimed water has received at least secondary treatment and basic disinfection; it 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.

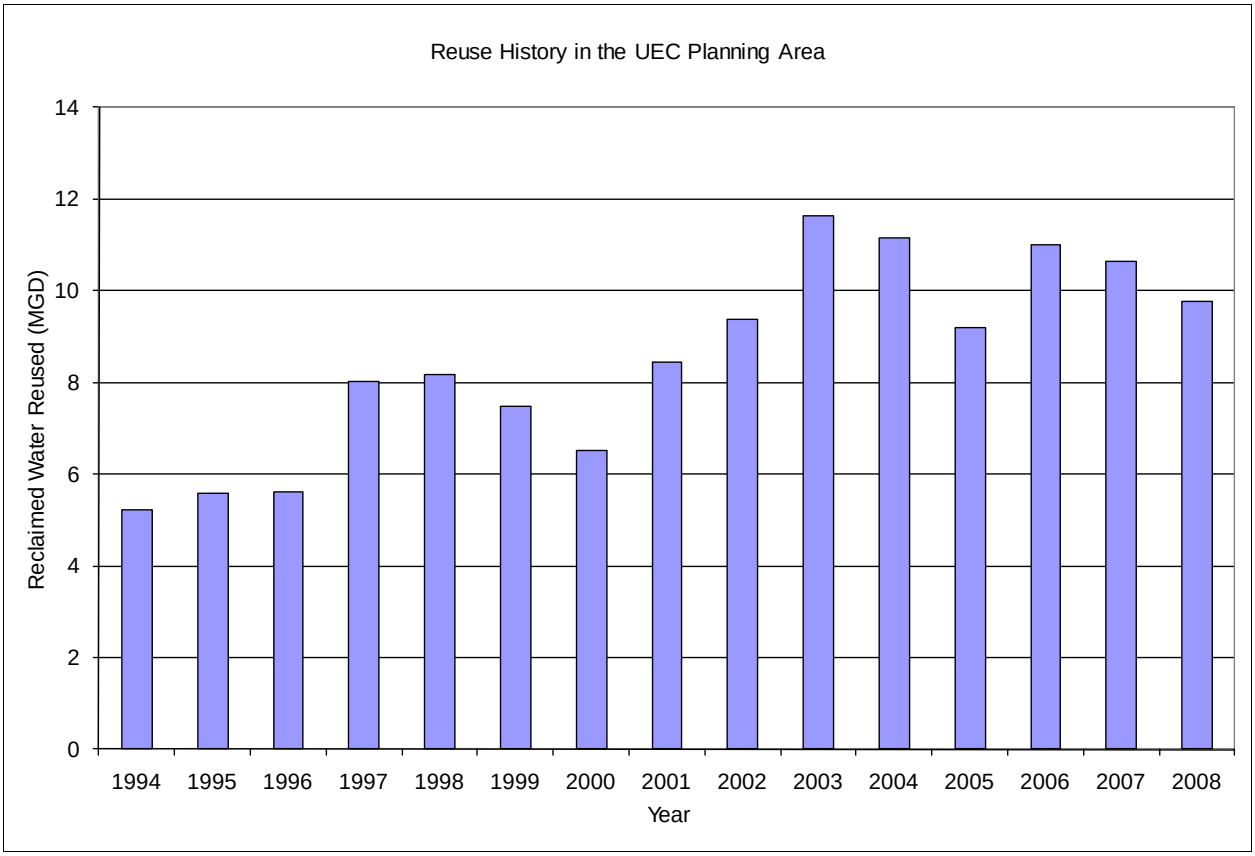
The State of Florida encourages and promotes the use of reclaimed water. The Water Resource Implementation Rule (Chapter 62-40, F.A.C.) requires the Florida Department of Environmental Protection (FDEP) and water management districts to advocate and direct the reuse of reclaimed water as an integral part of water management programs, rules, and plans. The District requires all applicants for water use permits to use reclaimed water unless the applicant demonstrates it is not feasible to do so.

Wastewater reuse conserves resources and is an environmentally sound alternative to traditional disposal methods, such as deep well injection. Although alternative disposal methods will always be needed in wet periods, wastewater reuse minimizes wasteful disposal of needed water resources. In addition, reclaimed water provides additional water supply for uses such as irrigation, which do not require potable-quality water.

The primary use of reclaimed water in the UEC Planning Area is for irrigation of public access areas, including golf courses, residential lots, parks, schools, and other green spaces. Reclaimed water is also used to recharge the groundwater. Use of reclaimed water for industrial cooling is expected to grow as Power Generation demands increase over the 20-year planning horizon (see **Chapter 2**).

Existing Reuse in UEC Planning Area

In the UEC Planning Area, wastewater management has evolved over the last 15 years from package plants and smaller subregional facilities to an integrated system of larger regional facilities and a network of reclaimed water pipelines that carry treated water. The volume of reclaimed water used for a beneficial purpose has increased almost 86 percent from 1994 to 2008 as shown in **Figure 19**. Over this period, the volume of reclaimed water use varied from year to year, depending on the addition of new users and area rainfall. Decreases in reuse volumes were primarily due to interruption of reclaimed water service during the consolidation of facilities by Martin County and the City of Port St. Lucie Utility Systems Department (City of Port St. Lucie).



Sources: SFWMD and *2008 Reuse Inventory* (FDEP 2010a).

Figure 19. Reuse history in the UEC Planning Area.

In 2008, 25 wastewater treatment facilities in the UEC Planning Area had a capacity of 0.1 MGD or greater. These facilities had a total wastewater treatment capacity of 44.4 MGD and treated 23.7 MGD. The 12-MGD City of Port St. Lucie – Glades Wastewater Treatment Facility (WWTF) is the area's largest wastewater treatment plant.

Of the 25 wastewater treatment facilities, 23 facilities reuse all or a portion of their wastewater. In 2008, about 9.8 MGD (41%) of the wastewater treated in the planning area was reused for a beneficial purpose. More than 7.9 MGD of reclaimed water was used for irrigating more than 7,000 residential lots, 17 golf courses, three parks, and seven schools

(FDEP 2010a). About 1.9 MGD of the planning area's reclaimed water supply was used for groundwater recharge through rapid infiltration basins and spray fields, and the remainder was used for industrial purposes. The use of reclaimed water for irrigation in the UEC Planning Area has helped reduce potential resource impacts.

In 2008, more than 14.0 MGD of the UEC Planning Area's 23.4 MGD of treated wastewater supply (which is potentially reusable) was disposed of via deep well injection. A listing of reclaimed water facilities and capacities is provided in **Appendix D**.

Reclaimed Water System Interconnects

Reclaimed water system interconnects are connections between two or more reclaimed water distribution systems. These systems may be owned or operated by different utilities, or may be shared between two or more domestic wastewater treatment facilities (WWTFs) that provide reclaimed water for reuse activities. When two or more reclaimed water systems are interconnected, additional system flexibility is attained, which increases efficiency and reliability. The City of Stuart is extending a reclaimed transmission main to provide its excess reclaimed water to Martin County for distribution and reuse.

Future Reuse in UEC Planning Area

Wastewater flows are projected by the utilities to increase from 23.7 MGD to a range of 40.0 to 67.0 MGD by 2030. Utilities currently distributing reclaimed water intend to continue and expand their reuse systems as additional reclaimed water and users become available. In many cases, future reuse will occur in new residential developments. However, utility master plans have not been developed through FY 2030 due to the slowdown in new residential construction during the past few years. As a result, conceptualization of a future reuse layout and plan is not feasible for this Plan Update.

Tropical Farms Reclaimed Water Facility

The City of Port St. Lucie Utility Systems Department is consolidating its wastewater systems into two regional facilities—Glades and Westport (**Appendix D**). The Glades WWTF was operational at 6 MGD in 2007 and 12 MGD in 2009. The primary means of wastewater management at these regional facilities will be reuse via public access irrigation of residential lots and golf courses. In anticipation of future reclaimed water use, the city installed numerous reclaimed water transmission mains. With the opening of the Glades WWTF, the Northport WWTF was decommissioned in January 2007. The Southport WWTF will also be decommissioned in 2012. The Glades WWTF is currently disposing effluent into

a deep injection well until demand and infrastructure is developed in this area. The Westport WWTF is currently reusing wastewater as its primary means of management.

The City of Stuart and the Fort Pierce Utilities Authority (FPUA) treat almost 35 percent of the wastewater generated in the UEC Planning Area and currently dispose of the effluent almost exclusively through deep well injection. The City of Stuart constructed advanced secondary treatment and high-level disinfection facilities to provide reclaimed water for public access irrigation. Additionally, the City of Stuart constructed portions of its reclaimed water transmission and distribution systems and will initiate reuse within the next two years. The City of Stuart is in the process of identifying additional opportunities for reuse, focusing on the replacement of groundwater withdrawals with reclaimed water for irrigation water use near its wellfields.

Wastewater Treatment Facility
South Hutchinson Island

The FPUA WWTF, located on South Hutchinson Island, has limited reuse potential because of the lack of demand near the facility both on Hutchinson Island and on the mainland. The FPUA is planning to construct the Mainland Water Reclamation Facility (MWRF) by 2018. Once constructed, FPUA plans to retire the Island Water Reclamation Facility. The MWRF will be designed for water reuse. The Treasure Coast Energy Center (TCEC) has contracted with FPUA to use 2.9 MGD of reclaimed water for cooling water for TCEC Unit 1. The FPUA may ultimately supply up to 11.6 MGD of reclaimed water for TCEC Units 2, 3, and 4. By 2030, the MWRF will be a 20-MGD capacity facility. Current plans indicate 11.6 MGD of reclaimed water will be used for the TCEC, 5.4 MGD for parks and golf courses, and approximately 3.0 MGD for other uses.

Supplemental Sources

The use of supplemental water supplies to meet peak demands for reclaimed water may enable a water utility to maximize its use of reclaimed water. However, during times of drought, water sources, such as surface water, groundwater, or storm water, may not be available to supplement reclaimed water supplies in some areas. Use of supplemental water supplies is subject to consumptive use permitting by the SFWMD.

St. Lucie West Services District currently supplements its reclaimed water supply with water from its stormwater management lakes. South Martin Regional Utility uses the SAS to supplement its reclaimed water.

New Storage Capacity for Surface Water or Groundwater

Storage is an essential component of any supply system experiencing fluctuation in supply and demand. Capturing excess surface water during wet conditions for water use during dry conditions increases the use of available water. Two-thirds of south Florida's annual rainfall occurs in the wet season. Without sufficient storage capacity, much of this water discharges to tide through the surface water management system. In the UEC Planning Area, potential types of water storage include ASR wells, reservoirs, and impoundments.

Aquifer Storage and Recovery

Potable water, surface water, groundwater, or reclaimed water can be stored using ASR. The percent of water that is recovered depends on subsurface conditions, and the level of treatment required after storage and recovery depends on whether the water is for public consumption, irrigation, surface water augmentation, or wetlands enhancement.

WATER OPTIONS

Aquifer Storage and Recovery (ASR) is the underground storage of water into an acceptable aquifer. Available waters are collected during times when water is plentiful (typically during the wet season in south Florida), treated to meet federal and state drinking water standards, and then pumped into an aquifer through a well. In south Florida, most ASR systems store treated water in the Floridan aquifer system, which contains brackish water. When recharged into the aquifer, the stored water displaces the brackish water. The aquifer acts as an underground reservoir for the injected water, reducing water lost to evaporation. The water is stored with the intent to later recover it for treatment and use during future dry periods.

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

To date, 36 ASR wells have been constructed within the SFWMD. There are no existing ASR wells in the UEC Planning Area; however, the City of Port St. Lucie Utility Systems Department has applied for the permitting of an ASR well for reclaimed water at its Westport WWTF. Two of the 36 ASR wells were constructed by the District and the U.S. Army Corps of Engineers (USACE) as part of the CERP ASR pilot projects. The remaining ASR wells have been constructed by water/wastewater utilities. Most of the ASR wells in the District store treated drinking water, although other source waters include raw groundwater, reclaimed water, and raw or treated surface water. Of the 36 existing ASR wells, some are fully permitted for operation, but the majority of wells are in operational testing or inactive.

Inactivity at some of these wells is related to a regulatory change in the primary drinking water standard for arsenic (i.e., 50 to 10 parts per billion). The change has added uncertainty to obtaining an operational permit from the FDEP for ASR systems. Through site testing, new treatment technology, and possible changes in regulatory criteria, ASR wells are considered a viable option for providing future water supply to meet growing demands.

As previously mentioned, the SFWMD, in cooperation with the USACE, is pursuing regional ASR systems as part of the CERP. The District and the USACE are conducting pilot tests of two ASR systems to evaluate the feasibility of ASR technology for large-scale storage of excess surface water. A report on the ASR pilot testing is expected in 2012.

Aquifer Storage and Recovery Pretreatment Investigation

The Aquifer Storage and Recovery Pretreatment System Pilot Project investigates methods to suppress the mobilization of arsenic that often occurs during ASR activities. This project is being co-funded by the Southwest Florida Water Management District (SWFWMD), St. Johns River Water Management District (SJRWMD), and the SFWMD (through the CERP). The pilot project began in 2008 and is expected to complete analysis by 2011. The project consists of: 1) evaluation of arsenic mobilization processes occurring during ASR activities, which is being pursued by two independent consultant teams, 2) bench-scale leaching studies on storage-zone cores, and 3) development of a degasification system to remove dissolved oxygen from source water prior to injection.

Local and Regional Reservoirs

Reservoirs can improve water quality and provide supplemental water supply for municipalities, agricultural and industrial uses, and environmental management.

Surface water reservoirs provide storage of water, primarily during wet-weather conditions for use in the dry season. Water is typically captured and pumped from rivers or canals and stored in reservoirs. 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 may provide water quality treatment before off-site discharge. Large-scale reservoirs (regional) are used for stormwater attenuation, water quality treatment in conjunction with stormwater treatment areas, and storage of seasonally available supplies for use during dry periods.

The St. Lucie and Indian River Counties Water Resources Study (HDR and HSW 2009) evaluated the potential for capturing excess water currently being discharged to the Indian River Lagoon in northern St. Lucie County and southern Indian River County, and making it available for beneficial uses. The study also evaluated the reconnection of the C-25 Basin, which is located in two water management district jurisdictions, the SFWMD and the SJRWMD. Reconnecting the C-25 Basin could allow available water supplies to be conveyed across jurisdictional boundaries to more efficiently meet each district's water demand. Five selected alternative plans were analyzed, resulting in the selection of a preferred alternative, and funding alternatives are being explored by the stakeholders.

C-25 Canal and S-50 Structure in St. Lucie County

Projects to Capture, Treat, and Store Water

A brief overview of projects planned to capture, treat, and store water in the UEC Planning Area follows.

The CERP Indian River Lagoon – South Project is designed to improve water quality within the St. Lucie Estuary and the Indian River Lagoon by reducing the damaging effects of watershed runoff, decreasing peak freshwater discharges to maintain salinity levels in the estuary, and reducing nutrient loads, pesticides, and other pollutants. The project may provide water supply for agriculture to offset reliance on the Floridan aquifer system. The recommended plan includes:

- Four reservoirs (C-44, C-23/C-24 North, C-23/C-24 South, and C-25)
- Three stormwater treatment areas (STAs) (C-44, C-23/C-24, and C-25)
- Three natural storage and water quality treatment areas (Allapattah, Pal-Mar, and Cypress Creek/Trail Ridge)

The CERP Indian River Lagoon – South Project and associated components are described in **Chapter 3**.

The C-44 (St. Lucie Canal) Reservoir and Stormwater Treatment Area Project is a component of the CERP Indian River Lagoon – South Project. Located in southern Martin County adjacent to the C-44 Canal, this component is designed to capture and store local stormwater runoff from the basin, treat some or all of the runoff, and return the water to the C-44 (St. Lucie Canal) when needed. This project is expected to reduce/attenuate damaging freshwater discharges, decrease nutrient load, maintain desirable salinity regimes in the estuary, increase available water supplies, and provide public access and recreational opportunities. The project consists of a 3,400-acre above-ground reservoir approximately 15 feet deep and a 6,300-acre STA. See **Chapter 3** for status of this project.


St. Lucie (C-44) Canal

Seawater

Another water source option for the UEC Planning Area is the use of desalinated seawater from the Atlantic Ocean. Although the ocean is an unlimited source of water from a quantitative perspective, the removal of salt is required before potable and irrigation uses are feasible. To accomplish salt removal, a desalination treatment technology is needed, such as distillation, reverse osmosis (RO), or electrodialysis reversal.

There are only three seawater desalination facilities operating in Florida. The Florida Keys Aqueduct Authority operates two seawater RO desalination plants. The state's newest seawater RO desalination facility is located in Tampa Bay, in the SWFWMD.

While seawater treatment cost trends are declining due to improvements in membrane technologies and energy recovery research, costs remain moderately higher than brackish water desalination. 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 power plants in south Florida (Metcalf & Eddy 2006). The study's most feasible three sites are co-located with Florida Power & Light's facilities in Fort Myers, Fort Lauderdale, and Port Everglades.

Summary of Water Source Options

Overall, with continued diversification of water supply source options, such as the use of the Upper Floridan aquifer and reclaimed water, and appropriate water conservation measures (demand management), the future water demands of the UEC Planning Area can be met during a 1-in-10 year drought condition over the 20-year planning horizon.

Water conservation measures are also considered an option to meet the water needs of the region by reducing water use demands. The following section presents an evaluation of water conservation measures.

WATER CONSERVATION

Water conservation, also known as demand management, is an integral part of water supply planning and water resource management. For planning purposes, water conservation is also considered a water source option because it reduces the need for future expansion of the water supply infrastructure.

The first part of this *Water Conservation* section identifies the conservation opportunities, programs, and tools available for urban water use, along with examples of potential water savings. The majority of these programs and tools apply to Public Water Supply, which provides water for residential, industrial, commercial, institutional, landscape, and recreational needs. The second part of this section reviews the best management practices and water conservation opportunities for agriculture. Information about the District's Comprehensive Water Conservation Program, water conservation-related laws and rules, available planning resources, and funding opportunities, is also presented in this discussion.

DISTRICT

The SFWMD's consumptive use permitting rules require Public Water Supply utilities to plan and implement water conservation measures. These rules have been in place since 1991.

As detailed in Section 2.6.1 of the Basis of Review (SFWMD 2010), these rules include the following:

- Adoption of an irrigation days/hours ordinance
- Adoption of a Florida-friendly landscape ordinance
- Adoption of an ultralow volume fixtures ordinance
- Adoption of a rain sensor device ordinance
- Adoption of a water conservation-based rate structure
- Implementation of a utility leak detection and repair program
- Implementation of a water conservation public education program
- An analysis of reclaimed water feasibility

General information about Water Conservation is provided in the Support Document (SFWMD 2011b).

Regionally, water conservation promotes permanent water use efficiencies and increases the available supply of water from existing sources to support growth and maintain natural resources. It is also more immediate, significantly less costly, and more energy efficient to conserve water than to develop new sources of water.

Water demand reduction is becoming a viable alternative and complement to developing new water supplies. While short-term water restrictions imposed during a water shortage can temporarily relieve pressure on water sources, lasting water conservation involves a combination of retrofits, new water-saving appliances, maintenance of infrastructure, and a collective water conservation ethic focused on resource use, allocation, and protection.

At the utility level, a well-crafted water conservation/demand management plan can improve a utility's system-wide operational efficiency and reduce, defer, or eliminate the need for investments in new production capacity. Quantitative analysis of a utility's current and future water production, service area characteristics, and population can yield robust estimates of water and cost savings achievable through water conservation. The SFWMD recommends that utilities compare the cost of water conservation measures and the resultant water savings with production costs for new sources.

INFO

Planning Area The SFWMD is divided into four areas within which planning activities are focused: Kissimmee Basin (KB), Upper East Coast (UEC), Lower West Coast (LWC), and Lower East Coast (LEC).

Utility Service Area The geographical region in which a water supplier has the ability and the legal right to distribute water for use (Basis of Review, SFWMD 2010).

The Comprehensive Water Conservation Program

The SFWMD's Comprehensive Water Conservation Program (CWCP), approved in September 2008, is a result of a Water Conservation Summit hosted by the Water Resources Advisory Commission (WRAC). Following the summit, discussions continued via a series of stakeholder meetings with stakeholders' input incorporated into the program as it developed. Stakeholders representing a wide variety of interests provided input during the development process.

The CWCP is a series of implementation strategies designed to bring about a permanent reduction in individual water use. The program is organized into 1) regulatory, 2) voluntary and incentive-based, and 3) education and marketing initiatives. Under the umbrella of these initiatives, the SFWMD and other agencies provide numerous water conservation tools and building codes requiring the use of water-efficient appliances and fixtures. Chapter 5 in the Support Document (SFWMD 2011b) provides additional background information about the development of the CWCP.

Urban Use – Tools, Programs, and Potential Savings

Water Conservation Audit – Irrigation Controller

In this 2011 UEC Plan Update, urban use is defined as water used for non-agricultural purposes. It includes the water used in homes and businesses, landscape irrigation, and power generation. The majority of water consumed for residential and commercial use is provided by public water utilities and measured at the user's intake. This Public Water Supply (PWS) measure is included in each utility's per capita rate. However, some homes and businesses use well water for their source of potable water. In addition, landscape irrigation systems that use water from surface water systems and wells are considered domestic self-supplied water. Although Domestic Self-Supplied (DSS) water is often not measured, it is considered urban use.

South Florida residents' water consumption rate is the highest in the state. It is estimated that south Florida residents consume 179 gallons of water per person per day (USGS 2005), of which approximately 70 gallons of water per day is consumed indoors. While this Plan Update concentrates on water conservation for urban use from PWS because savings are measurable, the District's recommended water conservation measures are also applicable to other self-supplied water users.

Measuring the Effects of Water Conservation

The key indicator of long-term water conservation effectiveness is per capita use rates and their fluctuations over time. Per capita consumption is calculated as PWS withdrawals in gallons per day (USGS 2005) divided by the number of permanent residents. The average single-family home in Martin County uses approximately 301 gallons of water per day, based on an average use of 136 gallons of water per person per day and an average of 2.21 residents per household (BEBR 2010). The average single-family home in St. Lucie County currently uses approximately 220 gallons of water per day, based on an average use of 90 gallons of water per person per day and an average of 2.44 residents per household (BEBR 2010). **Table 10** shows the base-year regional utility per capita use in the 1998, 2004, and 2011 UEC Water Supply Plans. Regional utility finished water per capita use has gone down, from a high in the 1998 UEC Water Supply Plan of 186 gallons per day per person to a low of 123 gallons per person per day in this 2011 UEC Plan Update.

Table 10. Per capita use rates in the UEC Planning Area (using overall finished water).

UEC Plan Year (base year used)	Per Capita Use (gallons per day per person)
1998 (1990)	186
2004 (2000)	167
2011 (2005)	123

At first glance, **Table 10** shows a pronounced downward trend in the use of finished water per person per day. This reduction in water use could suggest a water conservation ethic is emerging or dependence on potable water for irrigation is declining due to increased water reuse or use of private wells for irrigation. Regardless, water-efficient appliances, plumbing retrofits, minimum building code standards, education, and other water conservation-oriented practices contribute to the reduction in finished water use. The District's objective is to continue this water use trend by working with water users to achieve significant long-term water savings.

Public Water Supply Use / Utility and Local Government Programs

A variety of options are available to municipalities and water supply utilities for developing and enhancing water conservation programs. These options include high-level plans, such as goal-based programs, as well as specific solutions, such as plumbing retrofits and Smart Irrigation technology. Many of the options prescribed for PWS users are also applicable for DSS users.

Water conservation measures may be directed at individual users through conservation rate structures, retrofits, and rebates. These measures can also be promoted at the utility level by addressing plant efficiencies, use of reclaimed water, and automatic flushing devices. An effective program includes several programmatic water conservation components.

Appendix E provides the status for PWS conservation program implementation for municipalities and water utilities in the UEC Planning Area.

Water Conservation Rate Structures

Water pricing is an effective means to promote water conservation. A water conservation-based or tiered rate structure provides users with a financial incentive to reduce use. Users faced with higher rates will often achieve water conservation by implementing a number of the water conservation measures discussed in this chapter.

Water conservation-based rates may include:

- **Increasing the block rate** The marginal cost of water to the user increases in two or more steps as water use increases.
- **Seasonal pricing** Water consumed during peak season (October through May) is billed at a higher rate than water consumed in the off-peak season.
- **Quantity-based surcharges**
- **Time-of-day pricing**

In the UEC Planning Area, the majority of public water providers have a tiered rate structure in place as required by consumptive use permits. Utilities most frequently use a block rate structure, which is generally expected to have the largest impact on heavy irrigation users. The responsiveness of customers to water conservation rate structures depends on the existing price structure, incentives of the new price structure, the customer base, and their water uses. **Appendix E** provides single-family water rates in the UEC Planning Area.

Goal-based Water Conservation Plans

A goal-based water conservation plan allows utilities to achieve a water management district agreed-upon conservation goal to help meet future water supply needs and possibly eliminate the need to construct additional plants or wells.

A well-designed program identifies a variety of methods and practices that decrease water demand to meet numeric goals. Public Water Supply utilities intending to establish water conservation plans with a numerical goal for achievable water savings can use the Conserve Florida Water Clearinghouse's EZ Guide or a similar tool offering equivalent water conservation standards. The practices selected should reflect population projections, existing per capita use, the ability of the population to make the necessary changes, and a communication and outreach program. It is important for the plan to project the costs for supplying the additional water needed to meet water supply objectives. The District also recommends regular review and analysis of plan results, which allows programs to be adjusted as needed to meet water conservation goals. More information about goal-based water conservation is provided in **Appendix E**.

Conserve Florida's EZ Guide

Utilities in the UEC Planning Area are strongly encouraged to use the Conserve Florida Water Clearinghouse's (CFWC's) EZ Guide to create goal-based demand management plans for their utility service areas. Upon request, District staff provides support and assistance to utilities in using the EZ Guide or creating a service area demand management plan.

Specifically, the EZ Guide can help a utility:

- Create a service area profile
- Identify the water conservation projects that have the greatest net benefits
- Create a mid- to long-range water conservation (or demand management) plan

The EZ Guide generates estimates of indoor water use and savings for utility service areas using data from entities such as county property appraiser offices and the Florida Department of Revenue. Each entity maintains detailed data on all land parcels in the state. For each parcel, these data typically include the age of a structure, number of bathrooms, total square footage of the parcel, and total square footage of the built structure on the parcel. These data, along with population estimates, are used to create estimates of water consumption for structures built during each plumbing code era, and for each sector (e.g., single- and multi-family residential, industrial, commercial).

The EZ Guide output results include water savings, costs, and net benefits for each recommended water conservation option and each water use sector, sub-divided by plumbing code dates. In addition, the EZ Guide produces a ranked and optimized list of water conservation actions based on cost benefits and gallons of water saved. For more background information about the CFWC's EZ Guide, see the Support Document (SFWMD 2011b). Conserve Florida Water Clearinghouse's guide is available online at http://www.conservefloridawater.org/ez_guide.asp.

Water Conservation versus Development of Additional Water Supplies

Most water supply development options require significant upfront investments and ongoing maintenance costs. In most cases, demand management is often a more immediate and cost-effective means of meeting water supply needs. **Table 11** and **Table 12** compare the unit costs to save or create 1,000 gallons of water using an aggressive water conservation program or common water treatment technologies. Based on the costs in **Table 11**, **Table 12** shows the daily cost to produce 1 MGD, 3 MGD, and 5 MGD of water using nanofiltration and reverse osmosis compared with water conservation.

Table 11. Cost comparison for water conservation versus nanofiltration and reverse osmosis treatment technologies for 1,000 gallons of water.

	Hardware	Cost to Save or Create 1,000 Gallons	Cost Factors
Water Conservation[a]	High-Efficiency Fixtures/Appliances[b]	$0.40 to $2.00	Purchase and installation of hardware plus program administration costs.
New Plant Construction[c]	Nanofiltration (NF)	[d]$3.42 to $9.46	Annual capital cost for raw water supply, pretreatment, NF or RO process train, and post-treatment annual operation and maintenance expenses, and annual renewal and replacement fund deposit.
	Reverse Osmosis (RO)	[d]$4.41 to $11.33	
Expansion of Existing Facility[c]	Nanofiltration	[d]$3.13 to $9.07	NF or RO membrane units and associated equipment, filters, piping, and supplies.
	Reverse Osmosis	[d]$3.69 to $10.38	

a. Cost of 1,000 gallons saved is based on the cost of all devices across the service life and the number of gallons saved per day normalized to 1,000 gallons.
b. Toilets; faucet aerators; showerheads; irrigation sprayheads; rain and soil moisture sensors; and computerized irrigation controllers for large-scale irrigation.
c. Costs are considered to be order-of-magnitude estimates as defined by the American Association of Cost Engineers.
d. Amortization of initial capital investments is a term of 20 years at a 7 percent discounted rate.

Table 12. Daily cost of water conservation versus nanofiltration and reverse osmosis for 1 MGD, 3 MGD, and 5 MGD of water supply.

	Water Conservation[a]	New Plant Nanofiltration	New Plant Reverse Osmosis	Nanofiltration Expansion	Low-Pressure Reverse Osmosis Expansion
1 MGD	$2,000	$9,460	$11,330	$9,070	$10,380
3 MGD	$6,000	$13,500	$17,430	$12,330	$14,580
5 MGD	$10,000	$17,100	$22,050	$15,650	$18,450

a. Water conservation costs factored at $2.00 per 1,000 gallons.

Table 11 and **Table 12** indicate that the unit and daily cost of water conservation is significantly less than new water production through expansion of an existing facility or construction of a new plant. In addition, indoor water conservation measures reduce wastewater generation and flows that have to be treated and disposed of, resulting in additional cost savings not addressed in these tables. **Appendix E** contains a comparison of water conservation measures and alternative water supply development.

A well-crafted water conservation/demand management plan can improve a utility's system-wide operational efficiency, and reduce, defer, or eliminate the need for investments

in new production capacity. Utilities should consider adding water conservation to the water source options being evaluated to meet future growth and water production needs.

Case Study

The Miami-Dade Water and Sewer Department (MDWASD) is a real world example of how a utility was able to capitalize on cost and water savings through water conservation. The MDWASD implemented a goal-based water conservation plan that shows actual savings in dollars and gallons. This example presents compelling evidence of how water conservation can be used in combination with, or in lieu of, developing alternative water supplies.

EXAMPLE

Case Study

The *Miami-Dade County Water Use Efficiency Five-Year Plan* (Miami-Dade 2006), approved in 2006, was later used as the basis for the *Miami-Dade County Water Use Efficiency 20-Year Plan* (Miami-Dade 2007), which is estimated to generate 19.6 MGD in water savings by 2026. The MDWASD used the Conserve Florida Guide (a predecessor to the EZ Guide) to implement additional non-quantifiable measures and quantifiable best management practices to achieve water savings. The plan involves indoor plumbing fixture retrofit projects, permanent two-day-per-week irrigation restrictions, residential irrigation efficiency improvement projects, and other measures.

Based on the initial cost estimates of water supply development and quantified water conservation savings observed to date, each dollar the MDWASD spent on implementing its water conservation plan since 2006 has deferred or eliminated between $5 and $9 in capital project costs. Due in large part to water conservation plan implementation, per capita water demand has been reduced from 154 gallons per capita per day (GPCD) in 2005 to 140 GPCD in 2009. The drop in overall water demand, together with slower population growth rates, has allowed the MDWASD to reschedule its water supply development plan, eliminate two alternative water supply projects, and postpone four alternative water supply projects. In addition, the MDWASD was able to extend the duration of its consumptive use permit.

More information about the MDWASD's goal-based water conservation plan is provided in **Appendix E**.

Indoor Use

The indoor use category represents the water used within homes, businesses, and institutions to take care of everyday needs or operate a business. Examples of indoor use include preparing food, washing dishes, taking showers, flushing toilets, and running the manufacturing processes in plants.

Plumbing Fixture Efficiency

To help reduce indoor per capita use rates, the District supports the efforts of municipalities and utilities in the implementation of high-efficiency indoor retrofit programs. Programs that provide funding, hardware, or support for plumbing retrofits, including WaterSIP, Water CHAMP, and Florida Water Star℠, are discussed in detail later in this chapter.

WaterSense

The SFWMD became a WaterSense Promotional Partner in 2009. WaterSense is a program established by the U.S. Environmental Protection Agency to "protect the future of our nation's water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices." WaterSense helps consumers identify water-efficient products that meet rigorous efficiency and performance criteria. Products tested and proven to be at least 20 percent more efficient than those meeting current federal standards without compromising performance standards are awarded the WaterSense label. When designing and planning a retrofit program, the District recommends that utilities and municipalities refer to the WaterSense Program for standards criteria and information.

The District refers to WaterSense products and standards for use in its Water Savings Incentive Program (WaterSIP). Local municipalities are also encouraged to amend or enact local plumbing ordinances to require WaterSense fixtures in new construction and retrofit programs. The City of Stuart, which has a strong water conservation program, became the region's first WaterSense Promotional Partner in 2010.

More information about this program is available from the WaterSense website http://www.epa.gov/watersense.

Water-efficient Household Fixtures and Appliances

Newer manufactured water fixtures and appliances provide significant water savings compared to older appliances and fixtures. A more efficient washing machine generates a potential estimated savings of 20 gallons of water per use. A family running just five loads of laundry using a more efficient washing machine each week could save more than 5,000 gallons of water per year. **Table 13** shows water consumption for common indoor fixtures and appliances. In addition, **Table 13** includes the WaterSense Program's maximum allowable consumption rate, as well as flow rates for the highest efficiency fixtures and water-using appliances currently manufactured. A quantification of water savings is provided in the *Potential Urban Water Savings* section of this chapter.

Table 13. Gallons of water consumed per use of common indoor water fixtures and appliances.

	Water Consumption (Gallons) per Use					
	Toilets gals/flush	**Shower-heads gals/min**	**Faucets gals/min**	**Urinals gals/flush**	**Dish Washers gals/load**	**Clothes Washers gals/load**
Pre-1984	5.0–7.0	5.0–8.0	4.0–7.0	5.0	14.0	56.0
1984–1994	3.5–4.5	2.8–4.0	2.8–3.0	1.5–4.5	10.5–12.0	39.0–51.0
Post-1994	1.6	2.5	2.5	1.0	10.5	[a]27.0
WaterSense Max	1.3	2.0	1.5	0.5	–	–
Highest Efficiency	0.8–1.0	1.2–1.5	0.5–1.0	[b]0.0–0.1	4.5–6.5	16.0–22.0

a. After 1998.

b. Waterless urinals are only recommended under specific conditions.

The SFWMD recommends three online resources for consumers, building managers, utilities, and municipalities for research and comparison of indoor retrofit program water-using appliances:

- ENERGY STAR® Program (http://www.energystar.gov)
- Consortium for Energy Efficiency (http://www.cee1.org)
- Food Service Technology Center (http://www.fishnick.com)

Indoor / Outdoor Use

Florida Water Star℠

Florida Water Star℠ is a points-based residential recognition program that promotes water-efficient household appliances, plumbing fixtures, irrigation systems, and landscapes. The Florida Water Star℠ Program offers three residential certification levels:

- Standard Silver certification for new construction
- Gold certification for new construction (for additional water savings)
- Bronze certification (exclusively targeting existing residential properties)

Potential water use for a single-family home built to meet Florida Water Star℠ Silver criteria uses at least 40 percent less water outdoors and at least 25 percent less water indoors than a home built to current Florida building standards. Similarly, a single-family home built to Florida Water Star℠ Gold criteria uses at least 50 percent less water outdoors and at least 35 percent less water indoors than a home built to current Florida building standards.

Local governments that adopt Florida Water Star℠ Silver criteria as their water conservation standard for new residential properties can expect new residential homes in their jurisdictions to use as much as 35 percent less water than their current residential stock of single-family homes with permanent in-ground irrigation systems. Savings of up to 45 percent may be reasonably anticipated for such homes built to Florida Water Star℠ Gold criteria.

Table 14 and **Table 15** show PWS demand data for the UEC Planning Area (**Chapter 2**). These tables include available U.S. Geological Survey data (USGS 2005), which were used to calculate the percentage of total PWS attributable to residential PWS. Housing data from *The State of Florida's Housing, 2009* (Shimberg Center for Housing Studies 2010) were also used to calculate the percentage of water use attributable to single-family housing. Housing projections are based on 2010 data, assuming that the number of persons per household and the number of single-family homes as a percentage of total housing units remain constant through 2030. For the purposes of this analysis, it was also assumed that all new single-family homes have permanent in-ground irrigation systems. The tables show the maximum demand reduction potentially achieved with implementation of Florida Water Star℠ for new single-family homes in Martin and St. Lucie counties.

While Florida Water Star℠ Silver and Gold certifications are oriented toward new construction, the Florida Water Star℠ Program's Bronze certification encourages water-saving retrofits of existing homes. An existing single-family home with a permanent in-ground irrigation system built before 1991, and updated today to current Florida Water Star℠ Bronze criteria, may be expected to use 25 percent less water outdoors and indoors than a home built to pre-1991 Florida building standards. In 2010, homes built to current state water efficiency standards may experience comparable savings. However, large-scale retrofits may not be advisable, particularly for homes constructed in the past five years, as most appliances and fixtures may not have outlived their useful lives.

If all existing single-family homes in Martin and St. Lucie counties were updated to satisfy Florida Water Star℠ Bronze criteria, single-family water demand in Martin and St. Lucie counties would be reduced by an estimated 2.10 MGD and 3.78 MGD, respectively.

General information about the Florida Water Star℠ Program is included in Chapter 5 of the Support Document (SFWMD 2011b).

Table 14. Potential water demand reduction in Martin County based on implementation of Florida Water Star[SM].

Martin County	2010	2015	2020	2025	2030	Cumulative Single-family Change in Water Demand 2010–2030
Permanent Residents	150,468	160,590	171,393	182,922	195,138	
Single-family Housing Projections (Units)	45,464	48,522	51,787	55,270	58,961	
Incremental Housing Increase		3,058	3,264	3,483	3,691	
Water Consumption Estimates in MGD (Potential Water Savings in MGD)						
Single-family Water Demand without Florida Water Star[SM]	8.40	9.24	10.22	11.29	12.33	
Net Daily Five-year Change in Single-family Water Demand without Florida Water Star[SM]		0.84	0.98	1.07	1.04	**3.93**
Single-family Housing Water Demand assuming New Stocks are Built to Florida Water Star[SM] Silver Criteria (35% Demand Reduction)		8.95	9.88	10.92	11.97	
Net Daily Five-year Change in Single-family Water Demand assuming New Stocks are Built to Florida Water Star[SM] Silver Criteria (35% Demand Reduction)		0.54	0.64	0.69	0.68	**2.55**
Single-family Housing Water Demand assuming New Stocks are Built to Florida Water Star[SM] Gold Criteria (45% Demand Reduction)		8.86	9.78	10.81	11.86	
Net Daily Five-year Change in Single-family Water Demand assuming New Stocks are Built to Florida Water Star[SM] Gold Criteria (45% Demand Reduction)		0.46	0.54	0.59	0.57	**2.16**

Sources: Permanent Resident population from Appendix A: Demand Estimates and Projections of this Plan Update.
Single-family Housing Projections (Units) from *The State of Florida's Housing, 2009* (Shimberg Center for Housing Studies 2010).
Percent of water attributed to single-family units is from *Water Use Facts for 2005 and Trends* (USGS 2005).

Table 15. Potential water demand reduction in St. Lucie County based on implementation of Florida Water Star[SM].

St. Lucie County	2010	2015	2020	2025	2030	Cumulative Single-family Change in Water Demand 2010–2030
Permanent Residents	285,254	342,025	413,043	504,911	595,063	
Single-Family Housing Projections (Units)	93,762	112,422	135,766	165,962	195,595	
Incremental Housing Increase		18,660	23,343	30,197	29,633	
Water Consumption Estimates in MGD (Potential Water Savings in MGD)						
Single-family Water Demand without Florida Water Star[SM]	15.13	18.49	22.46	27.56	32.62	
Net Daily Five-year Change in Single-family Water Demand without Florida Water Star[SM]		3.36	3.96	5.11	5.05	**17.49**
Single-family Housing Water Demand assuming New Stocks are Built to Florida Water Star[SM] Silver Criteria (35% Demand Reduction)		17.32	21.07	25.78	30.85	
Net Daily Five-year Change in Single-family Water Demand assuming New Stocks are Built to Florida Water Star[SM] Silver Criteria (35% Demand Reduction)		2.18	2.58	3.32	3.28	**11.37**
Single-family Housing Water Demand assuming New Stocks are Built to Florida Water Star[SM] Gold Criteria (45% Demand Reduction)		16.98	20.67	25.27	30.34	
Net Daily Five-year Change in Single-family Water Demand assuming New Stocks are Built to Florida Water Star[SM] Gold Criteria (45% Demand Reduction)		1.85	2.18	2.81	2.78	**9.62**

Sources: Permanent Resident population from Chapter 2: Demand Estimates and Projections of this document.
Single-family Housing Projections (Units) from *The State of Florida's Housing, 2009* (Shimberg Center for Housing Studies 2010).
Percent of water attributed to single-family units is from *Water Use Facts for 2005 and Trends* (USGS 2005).

Outdoor Use / Landscape Irrigation

Up to 50 percent of the District's potable water supply is used for landscape irrigation. Up to 50 percent of the water applied to urban landscapes may be lost to evaporation and runoff with no direct benefit to the landscape. As one of the largest water uses in the UEC Planning Area, landscape irrigation has many water conservation opportunities. Outdoor water conservation has a dual objective: to reduce the amount of water used and to accommodate attractive and healthy landscaping. Potential demand reduction is possible through the use of landscape irrigation efficiency measures, which include use of Florida-friendly landscape principles, proper irrigation scheduling for automatic irrigation systems, rain sensors, Smart Irrigation technology, and proper irrigation system design and maintenance.

Year-Round Landscape Irrigation Water Conservation Measures Rule in the UEC Planning Area

On March 15, 2010, the Districtwide Year-round Landscape Irrigation Conservation Measures Rule (Year-round Irrigation Rule) went into effect following considerable input from various water use stakeholders, including utilities and large water users in Martin and St. Lucie counties. These measures are codified in Chapter 40E-24, F.A.C.

Broadly, this rule limits irrigation of existing landscapes to two days per week Districtwide, with no sprinkler irrigation allowed between 10 a.m. and 4 p.m. There is a provision for up to three-day-per-week irrigation in counties wholly located within the jurisdictional boundaries of the SFWMD, including Martin and St. Lucie counties. The rule provides local governments across the region the flexibility to adopt alternative landscape irrigation ordinances that are at least as stringent as the Year-round Irrigation Rule. Counties or cities may limit irrigation to two days per week or adopt alternative irrigation days within their jurisdictional boundaries based on local demand patterns, system limitations, or resource availability, at their discretion. For new lawns and landscapes, additional watering days are permitted for a period of up to 90 days following installation.

EXAMPLE

Under a two-day-per-week watering schedule, the 44 largest utilities in the District saved an estimated 138 MGD over a six-month period during the Phase 1 emergency water shortage restrictions of 2007. Utilities in Martin and St. Lucie counties saved more than 8 MGD over that same period, a demand reduction of nearly 19 percent compared to pre-water shortage demand levels. Under a three-day-per-week irrigation schedule during the emergency water shortage (Phase 1), utilities in Martin and St. Lucie counties saved nearly 3 MGD, a demand reduction of almost 7 percent compared to pre-water shortage demand levels.

Irrigation using reclaimed water, rain harvesting systems, and various low-volume methods such as microirrigation, container watering, and hand watering with a hose equipped with an automatic shut-off nozzle, may be used at any time.

In August 2010, the City of Stuart adopted two-day-per-week irrigation limits within its jurisdictional boundaries; properties in the remaining portions of incorporated and unincorporated Martin and St. Lucie counties could be irrigated up to three times per week, in accordance with the SFWMD Year-round Irrigation Rule.

The District estimates implementation of the Year-round Irrigation Rule may reduce overall potable water demand by 5 percent to 10 percent Districtwide. This estimate is based on the *Water Utilities Water Demand Reduction during the 2007–2009 Water Shortage* (SFWMD 2009c) report. Potential water savings for the District's Year-round Irrigation Rule may be calculated as follows in **Table 16**. Demand projections for 2030 are derived from the Public Water Supply demand data in **Chapter 2**.

Table 16. Estimates of possible impact of the SFWMD Year-round Landscape Irrigation Conservation Measures Rule concerning potable water use.

Year-round Irrigation Rule	Martin County (MGD)[a]	Martin County 2030 Est. (MGD)	St. Lucie County (MGD)[a]	St. Lucie County 2030 Est. (MGD)
2007 (pre-restriction) Water Use	18.01	28.57	25.32	62.88
Possible Demand Reduction with three-day-per-week irrigation restrictions	1.73 (9.6%)	2.74	2.23 (8.8%)	5.53
Possible Water Demand with three-day-per-week irrigation restrictions	16.28	25.83	23.09	57.35
Possible Demand Reduction with two-day-per-week irrigation ordinance implementation	3.03 (16.8%)	4.80	3.73 (14.7%)	9.24
Possible Water Demand with two-day-per-week irrigation ordinance implementation	14.97	23.77	21.60	53.64

Source: *Water Utilities Water Demand Reduction during the 2007–2009 Water Shortage Restrictions* (SFWMD 2009c).

a. Assuming irrigation water demand reductions experienced during the 2007–2009 water shortage remain consistent through 2030.

The SFWMD provides a model irrigation ordinance and technical support for local governments seeking to adopt their own two- or three-day watering rules. The District's water conservation staff and legal staff are available to review local ordinances for consistency with the Year-round Irrigation Rule and other state water laws. For additional information, see the Support Document (SFWMD 2011b).

Florida-Friendly Landscaping

Recent changes to Section 373.185, Florida Statutes (F.S.), replaced "Local Xeriscape™ ordinances" with "Local Florida-friendly landscaping ordinances" as the state's landscape design standard.

The FDEP and the state's water management districts are complying with the statutory requirements by providing a model Florida-friendly landscaping ordinance, as well as technical support for local governments electing to adopt Florida-friendly landscaping ordinances. The FDEP and University of Florida's *Florida-friendly Landscape Guidance Models for Ordinances, Covenants, and Restrictions* is available from http://www.dep.state.fl.us/water/nonpoint/docs/nonpoint/ffl-mo-ccr-1-09.pdf. See also Chapter 5 of the Support Document (SFWMD 2011b) and the Florida-friendly Landscaping website at http://www.floridayards.org.

Rain Sensors and Smart Irrigation Technology

Smart Irrigation technology consists of irrigation system components that regulate the frequency or duration of irrigation events in response to site-specific conditions.

EXAMPLE

City of Port St. Lucie

In Fiscal Year 2005, the City of Port St. Lucie converted its irrigation system along Port St. Lucie Boulevard to an upgraded central control/management irrigation system, including soil moisture sensor shut-off devices. Prior to implementing central control/management of the irrigation system, the system used an average of 358,000 gallons of water per year (2004–2005). Once central control/management was implemented, water use along Port St. Lucie Boulevard dropped to an average of 227,000 gallons per year (2006–2009) – an approximate 37 percent reduction in water use from prior years. Annual average rainfall during 2004–2005 was 56.28 inches, and from 2006–2009 average rainfall was 40.5 inches.

Based on the success of this project, Port St. Lucie implemented central control/management of 31 irrigation systems throughout the city. This effort reduced the city's water consumption to approximately 35 percent of its SFWMD allocation and produced a related energy cost savings of $150,000 per year. Additional savings were realized with less lawn mowing and fertilizing, and fewer chemicals used for weed and disease control.

In 2009, Section 373.62, F.S., was amended to require automatic landscape irrigation systems and recognition for Smart Irrigation technologies for potential water conservation. The statute requires all irrigation systems to use an automatic shutoff device of some type. These devices automatically override scheduled irrigation events when sufficient moisture is present in the microclimate, and include rain sensors and more efficient Smart Irrigation technologies, such as soil moisture sensors, evapotranspiration (ET) sensors, or weather-based shutoff devices.

University research in controlled settings confirms the water savings potential of properly installed and maintained automatic irrigation shutoff devices. A recent University of Florida study (Cardenas-Lailhacar, Dukes, and Miller 2010) of 59 residential homes in central and northern Florida demonstrated the reductions in irrigation water use compared with timed irrigation with no automatic shutoff device (**Table 17**).

Table 17. Reductions in irrigation water use based on device type.

Device	Percent Reduction[a]	Weather Conditions
Rain Sensor	Up to 34%	Normal to Rainy
Rain Sensor	Up to 15%	Dry
Soil Moisture Sensor	70–90%	Normal to Rainy
Soil Moisture Sensor	40–65%	Dry
Evapotranspiration-based Sensor	60% or more	Normal to Rainy
Evapotranspiration-based Sensor	40–50%	Dry

a. Two or three days per week.

Section 373.62, F.S., also requires licensed contractors who install or work on automatic irrigation systems to test existing shutoff devices for proper operation before completing other work on the system and to replace any devices or switches that are not in proper working order. The law also provides a statewide process for obtaining a variance from the applicable water management district day-of-week watering restrictions for users of Smart Irrigation systems meeting the specific requirements outlined in Subsection 373.62(7), F.S.

As directed in the legislation, water conservation ordinances must require contractors to report any non-compliant property to the proper local authorities. In addition, ordinances must impose minimum penalties for property owners and contractors who fail to comply. Funds generated by penalties imposed under the ordinance are to be used by the local government to further water conservation activities, including the administration and enforcement of the ordinance.

Urban Mobile Irrigation Labs

The Mobile Irrigation Laboratory (MIL) Program began in south Florida in 1989. The mission of the labs is to demonstrate and educate agricultural and urban water users on how to irrigate efficiently. The Martin County Urban MIL and the St. Lucie County Urban MIL were in operation until FY 2008. The 360 audits conducted in FY 2008 identified potential water savings of 96.85 million gallons per year (MGY), or 0.27 MGD.

Outdoor Use / Recreational Irrigation

Recreational water use includes water to irrigate parks, athletic fields, golf courses, large landscaped areas (e.g., homeowner association common areas and the areas around malls and office buildings), roadway medians, golf courses, and cemeteries. The demand for water used for this purpose generally increases at a rate similar to population growth.

Florida-friendly landscaping, rain sensors, and Smart Irrigation technology help lessen the associated demand increase.

Golf Course Water Conservation

As of 2010, 53 of the 407 (approximately 13%) permitted golf courses located within the jurisdictional boundaries of the SFWMD were located within the UEC Planning Area. The combined irrigated area of these golf courses is approximately 4,850 acres. Golf course irrigation demand in this region accounts for approximately 28 percent of the total recreational water demand.

For a summary listing of permitted golf courses in the SFWMD UEC Planning Area and its respective irrigation water sources, see **Appendix E**.

DISTRICT

Individual permit applicants for landscape and golf course irrigation projects shall develop a conservation program incorporating the following mandatory elements (Sections 2.3.1 and 5.2.3, Basis of Review, SFWMD 2010):

- Use of Florida-friendly landscaping principles for proposed projects and modifications to existing projects where it is determined that Florida-friendly landscaping is of significant benefit as a water conservation measure relative to the cost of implementation.
- Installation and use of rain sensor devices, automatic switches, or other automatic methods that have the capability to override the operation of the irrigation system when adequate rainfall has occurred is required.

The Comprehensive Water Conservation Program (CWCP) calls for District staff to confirm the use of appropriate irrigation-inhibiting technology, such as properly functioning rain sensors or soil moisture sensors, on existing golf courses. The District is inventorying Smart Irrigation technology throughout the region. The CWCP calls for golf courses to continue employing best management practices and adopt new irrigation technologies to improve landscape water use efficiency wherever feasible.

The SFWMD has partnered with the Florida Golf Course Superintendents Association (FGCSA) to create an inventory of the types of irrigation scheduling technologies currently employed by south Florida golf courses for irrigation of playing areas. Together, the District and the FGCSA have developed an informal short survey tool to gather data from area golf course superintendents. The information collected will be used to develop programs encouraging water use efficiency in the golf industry and promoting the water conservation practices many area golf courses already follow.

The survey was distributed to golf course superintendents Districtwide in the summer of 2010, and District staff is currently compiling and categorizing data received from the survey effort. The SFWMD anticipates that increased widespread use of Smart Irrigation technology, improved landscape design and management practices, and implementation of recognition programs will further optimize landscape water use efficiency in this sector.

Industrial / Commercial / Institutional Use

All applications for a consumptive use permit for Industrial/Commercial/Institutional use must demonstrate that the volume requested is reasonable and relates to the planned facility operations. The request must contain a water balance for the complete operation that includes the needs of the production process, personal needs of the employees and customers, and any treatment losses.

Irrigation System Check

Commercial or industrial water use permit applicants must submit a water conservation plan at the time of permit application. The water conservation plan must be prepared, implemented, and at a minimum, incorporate the following mandatory components (Section 2.4.1, Basis of Review, SFWMD 2010):

- A water audit of current operational processes.
- Within the first year of permit issuance or audit completion, if found to be cost-effective in the applicant's audit, the following must be implemented:
  - A leak detection and repair program.
  - Recovery/recycling or other program providing for technological, procedural, or programmatic improvements to the applicant's facilities.
  - Use of processes to decrease water consumption.
- Develop and implement an employee awareness and consumer education program concerning water conservation.
- Procedures and time frames for implementation.

EXAMPLE

South Florida Water Management District

In 2009, the SFWMD conducted indoor and outdoor water use assessments of its 12 facilities. The results of the assessments indicated that the District facilities are generally well maintained, but also revealed specific opportunities for improvements at each facility. If all recommended improvements at the facilities are implemented, the District could save as much as 3.5 million gallons of water and $8,700 annually for a total investment of $63,000. The prescribed recommendations are expected to be implemented over the next several years.

The District, along with an external panel of water conservation professionals, is developing a self-assessment manual for industrial/commercial/institutional facility managers. The comprehensive how-to manual is designed to guide facility managers through a series of self-conducted water-use assessment procedures. District staff will meet with facility managers to discuss water use efficiency improvements, introduce them to the self-assessment manual, and assist in creating efficiency improvement plans based on assessment results.

Water CHAMP

The Water Conservation Hotel and Motel Program (Water CHAMP) recognizes lodging facilities that have taken steps to increase water use efficiency. Specifically, participating properties must conduct voluntary linen and towel reuse programs and install high-efficiency (1 gallon per minute) faucet aerators in guest bathrooms. Participation in Water CHAMP by hotels and motels supports the water conservation criteria needed to join the Florida Green Lodging Program, as long as verified and approved by the FDEP.

INFO

The Water CHAMP Program was originally launched by the Southwest Florida Water Management District in 2002. In 2010, the SFWMD introduced Water CHAMP in the Florida Keys. All materials to begin the program—the high-efficiency faucet aerators, staff training materials, linen reuse pillow cards, towel reuse door hangers, and promotional materials for guests—were supplied to the property owners by the District at no cost. Hotels may save up to 20 gallons of water per occupied room, per night. Actual water savings by program participants in the Florida Keys is still being assessed.

The District is currently drafting a cost-share partnership agreement with the City of Stuart to implement Water CHAMP. The District is providing all start-up materials to enroll the city's hotels and motels in the program. The city will continue to support the program thereafter. One hundred percent enrollment in the program would encompass nine hotels and motels with a total of 627 rooms. **Table 18** summarizes the Water CHAMP water conservation potential in the UEC Planning Area.

Table 18. Potential water savings of the Water CHAMP Program in Martin and St. Lucie counties.

County	Current Number of Rooms	Potential Savings (MGY)[a]	Estimated Number of Rooms in all Facilities in 2035	Potential Savings (MGY)[a]
Martin County	1,335	5.8	2,300	10.1
St. Lucie County	3,891	17.1	5,350	23.4

Notes: MGY – million gallons per year (water).

a. Assumes 20 GPD per room savings with 60 percent occupancy rate.

Source: *Draft Regional Long-Range Transportation Plan 2035* (Martin County Metropolitan Planning Organization and St. Lucie County Transportation Planning Organization).

If all 79 hotels in the UEC Planning Area become SFWMD Water CHAMP lodging facilities, 22.9 MGY could potentially be saved (assuming an annual occupancy rate of 60%). The Regional Long-range Transportation Plan for 2035 estimates the expansion of the lodging industry to reach approximately 2,300 rooms in Martin County and 5,350 in St. Lucie County. If these estimates are realized, 33.5 MGY could potentially be saved (assuming an annual occupancy rate of 60%).

Other Urban Water Conservation Programs

The District's CWCP consists of numerous efforts to promote water conservation by a variety of means. In addition to programs already described, the following programs are applied across user groups for either indoor or outdoor use.

Water Savings Incentive Program

The Water Savings Incentive Program (WaterSIP) is the District's flagship funding assistance program. Through the WaterSIP, the SFWMD provides matching funds up to $50,000 to water providers and users (i.e., cities, utilities, industrial groups, schools, hospitals, and homeowners associations) for non-capital water-efficiency improvement projects. Projects include, but are not limited to, toilet and bathroom fixture retrofit programs; irrigation system retrofits involving the use of microirrigation or the latest irrigation scheduling technologies; automatic hydrant flushing devices that eliminate the need for manual line flushing; and low-flow pre-rinse spray valve retrofits to improve water efficiency in commercial kitchens.

Local governments, businesses, and non-profit organizations may apply for WaterSIP funding annually during an open application period. Applications are reviewed and ranked by a panel of water use professionals from the SFWMD and externally, based on established criteria that account for each project's water savings potential, cost-efficiency, technological innovation, and other characteristics.

Table E-9 in **Appendix E** provides WaterSIP projects funded through 2009.

Since its inception in 2003, the WaterSIP has supported nearly 130 local water conservation projects Districtwide, representing a total estimated water savings of approximately 2.3 billion gallons of water per year, at a $3.8 million cost to the District. In FY 2010, the District supported 13 projects Districtwide at a total cost of $460,000. These projects represented more than 238 MGY in potential water savings.

In the UEC Planning Area, the District allocated $248,512 for 12 projects funded from 2005 to 2009. These projects have saved an estimated 221 MGY. **Appendix E** provides an overview of the specific projects funded in the UEC Planning Area through the WaterSIP to date, including approved funding amounts and water savings estimates for each.

Education, Outreach, and Marketing

Education, outreach, and marketing are essential for accomplishing a measurable change in water conservation and instilling a lasting conservation ethic in south Florida businesses and communities. A variety of education, outreach, and marketing programs are available through the SFWMD. The following programs are designed to build a conservation culture, instill a stewardship ethic, and permanently reduce individual, industrial, and commercial water use.

- Everglades: An American Treasure
- Loxahatchee Impoundment Landscape Assessment
- Student Service Learning at DuPuis Management Area
- Teacher Training Workshops
- The Great Water Odyssey
- University of Florida Center for Training, Research & Education for Environmental Occupations

More information about each of these programs is included in the Support Document (SFWMD 2011b).

Potential Urban Water Savings

Water savings resulting from residential indoor retrofits were estimated for Martin and St. Lucie counties using county parcel and population data (BEBR), and a methodology similar to that used by the EZ Guide. These estimates include, but do not isolate, potential savings derived from Domestic Self-Supply water users.

Table 19 and **Table 20** show the number of residential dwelling units in Martin and St. Lucie counties in the single- and multi-family water using sectors, further divided by plumbing code change dates. Estimations of total potential water savings for each subsector are also provided. This information can help UEC planners and conservation professionals identify areas with the greatest savings potential from retrofit and water conservation initiatives.

Table 19. Residential units in Martin County and potential savings of indoor water use through water conservation.

Year Built/Plumbing Code Era	Number Single-family Residential Units	Single-family Water Savings at High-Efficiency Level (MGY)	Number Multi-family Residential Units	Multi-family Water Savings at High-Efficiency Level (MGY)
Pre-1984	20,597	1,308.7	2,872	182.4
1984–1994	14,143	401.7	1,120	31.8
Post-1994	14,892	21.7	2,185	28.6

High-efficiency water use rates: toilets 1.28 gallons (gal)/flush; showerheads 2 gal/minute (min); faucets 1 gal/min; dishwashers 4.5 gal/load; clothes washers 16 gal/load.

Table 20. Residential units in St. Lucie County and potential savings of indoor water use through water conservation.

Year Built/Plumbing Code Era	Number Single-family Residential Units	Single-family Water Savings at High-Efficiency Level (MGY)	Number Multi-family Residential Units	Multi-family Water Savings at High-Efficiency Level (MGY)
Pre-1984	28,653	2,008.9	3,821	267.9
1984–1994	25,374	794.5	1,316	41.2
Post-1994	43,868	634.4	4,557	65.9

High-efficiency water use rates: toilets 1.28 gal/flush; showerheads 2 gal/min; faucets 1 gal/min; dishwashers 4.5 gal/load; clothes washers 16 gal/load.

These data assume all homes replaced all original fixtures and appliances with newer, more efficient ones. Savings resulting from water conservation efforts targeting outdoor water use are more difficult to estimate. By using Florida-friendly landscaping principles and improving irrigation efficiency through the use of weather-based controllers or cut-off devices (such as rain and soil moisture sensors), an estimated water savings of 35 percent can be realized (Cardenas-Lailhacar, Dukes, and Miller 2010; McCready, Dukes, and Miller 2009; Colorado State University 2010). A typical quarter-acre lot equipped with a five-zone irrigation system irrigating for 30 minutes per zone uses approximately 2,250 gallons per irrigation event. A savings of 35 percent would amount to approximately 82,000 gallons of water per year or 122,850 gallons of water per year for each property irrigating twice or three times per week, respectively.

Although an exact quantification of countywide outdoor water use and savings cannot be made directly through parcel data alone, if the number of residential units falling within the as-built plumbing code era is known, planners in the UEC Planning Area can gauge the significance of the outdoor water use sector as a potential water conservation target area. Planners who are familiar with the area should be able to estimate the typical lot size and the prevalence of automatic irrigation systems for each of the plumbing code eras.

Water consumption within the Industrial/Commercial/Institutional water use category has been correlated to square footage of building space under climate-control (heating ventilation and conditioning, referred to as heated area) (Morales, Martin, and Heaney 2009). Efficiency improvements in the commercial and institutional water use category have been shown to produce water savings ranging from 15 percent to 50 percent, with 15–35 percent being typical (Dziegielewski et al. 2000). Industrial operations may see similar savings. Using Florida Department of Revenue parcel data, which include square footage of the heated area and water use per square foot of heated area coefficients, estimates of water use and potential savings (in MGY) for the Industrial/ Commercial/Institutional water use category are provided for Martin and St. Lucie counties in **Table 21** and **Table 22**.

Table 21. Estimated water use and potential savings through improved water use efficiency within the Industrial/Commercial/Institutional water use category in Martin County.

Water Use Sector	Square Footage (in millions)	Current Estimated Water Use (MGY)	Potential Reduction Range (MGY)
Industrial	7.5	117.5	17.6–41.1
Commercial	17.0	824.0	123.6–288.4
Institutional	9.9	325.0	48.7–113.7

Note: The potential water use reduction range is based on estimates of efficiency increases of 15 percent to 35 percent.

Aggregate coefficients for converting square footage to water use are as follows: Industrial 1.31 gal/ft^2/month, Commercial 4.03 gal/ft^2/month, Institutional 2.73 gal/ft^2/month.

Potential reduction range equal to 15 percent and 35 percent reductions of current estimated water use.

Table 22. Estimated water use and potential savings through improved water use efficiency within the Industrial/Commercial/Institutional water use category in St. Lucie County.

Water Use Sector	Square Footage (in millions)	Current Estimated Water Use (MGY)	Potential Reduction Range (MGY)
Industrial	12.3	192.9	28.9–67.5
Commercial	16.8	813.5	122.0–284.7
Institutional	11.8	386.6	58.0–135.3

Note: The potential water use reduction range is based on estimates of efficiency increases of 15 percent to 35 percent.

Aggregate coefficients for converting square footage to water use are as follows: Industrial 1.31 gal/ft^2/month, Commercial 4.03 gal/ft^2/month, Institutional 2.73 gal/ft^2/month.

Potential reduction range equal to 15 percent and 35 percent reductions of current estimated water use.

Maximizing Water Savings

As detailed in the *Water Conservation versus Development of Additional Water Supplies* section of this chapter, the Miami-Dade Water and Sewer Department (MDWASD) is an excellent example of a regional PWS utility that is successfully implementing a goal-based water conservation plan as part of its current consumptive use permit. In addition to dollar

and water savings, the drop in per capita water demand has allowed the MDWASD to remain within its Biscayne aquifer allocation, subsequently shifting its 2027 demand to 2030. In turn, the MDWASD was able to reschedule its water supply development plan and extend the duration of its consumptive water use permit, deferring re-application expenses.

Table 23 summarizes potential water use savings in Martin and St. Lucie counties based on the following assumptions:

- High-efficiency fixtures are implemented by all residential units, both single- and multi-family.
- Measures to realize a 15 percent to 35 percent reduction in water use are implemented by all Industrial/Commercial/Institutional equivalent square footage.

The numbers in **Table 23** are meant to illustrate maximum potential water savings based on a particular set of assumptions and not intended to serve as a realistic objective.

Table 23. Summary of potential savings of indoor water use through water conservation in Martin and St. Lucie counties.

	Martin County (Savings in MGY)		St. Lucie County (Savings in MGY)	
Single Family Residential				
Pre-1984	1,308.7		2,010.2	
1984–1994	401.7		795.6	
Post-1994	21.8		636.4	
Multi-Family Residential				
Pre-1984	182.0		268.0	
1984–1994	32.0		41.3	
Post-1994	29.0		66.1	
Total Residential Savings	1,975.2		3,817.6	
	15% Efficiency Increase	**35% Efficiency Increase**	**15% Efficiency Increase**	**35% Efficiency Increase**
Industrial	17.6	41.1	28.9	67.5
Commercial	123.6	288.4	122.0	284.7
Institutional	48.7	113.7	58.0	135.3
Total ICI Savings	189.9	443.2	208.9	487.5
Total Savings in MGY	2,165.1	2,418.4	4,026.5	4,305.1

Agricultural Use – Tools, Programs, and Potential Savings


Low-volume Drip Irrigation

Agriculture remains the largest water user in the UEC Planning Area. As such, the Agricultural Self-Supply water use sector offers significant water conservation potential. In the consumptive use permitting process, water allocation for agriculture is based on a number of factors including crop type, growing and irrigation methods, and site-specific parameters, such as soil type and anticipated rain. Because a number of these factors are fixed, demand reduction must be based on aspects that can be changed, such as irrigation and growing methods. Generally, these types of changes are expensive and require careful planning and consideration.

Citrus growers continue to increase their irrigation efficiency. According to the Indian River Citrus League, at least 90 percent of growers use low-volume irrigation systems and approximately 10 percent use flood/seepage systems. Some growers have adopted an Advanced Citrus Production System/Open Hydroponic System, which in recent experiments has demonstrated water savings of 33 percent to 60 percent.

For certain crops, such as citrus, vegetable, and container nursery, the SFWMD requires new water permit holders to use low-volume irrigation or other systems of equivalent efficiency. Flood/seepage irrigation type systems are typically used for tomato, corn, rice, and sugarcane production. While this type of irrigation is not as efficient as microirrigation, it is recognized that flood irrigation does provide some recharge to the surficial aquifer.

Agricultural Best Management Practices

Agricultural best management practices (BMPs) are actions agricultural businesses can take to protect or improve water quality or quantity while maintaining or even enhancing agricultural production. The Florida Department of Agriculture and Consumer Services (FDACS) and the FDEP develop and adopt BMPs by rule for different types of agricultural operations.

Most BMPs in the region are established to improve water quality; however, some contain an implicit water conservation component. Two BMPs have implicit water conservation benefits – irrigation efficiency and tailwater recovery. Approximately 5,300 acres in FY 2009 and 4,800 acres in FY 2010 were part of the irrigation efficiency program

conducted by the District's Agricultural MILs. Data were not available for the tailwater recovery BMP program.

Irrigation efficiency is defined as the proportion of the water that is beneficially used to the irrigation water applied. Irrigation efficiency can be improved by either replacing an irrigation system or by optimizing the operation and maintenance of an existing irrigation system. The selection of a new system depends on the type of crop, soil, water source, and water availability.

A review of irrigation scheduling—time between irrigation events and amount of water applied—might result in an increase of irrigation efficiency. Growers and ranchers in the UEC Planning Area commonly rely on visual inspections and climatic conditions, such as rainfall gauges, evapotranspiration, and weather forecasts to schedule their irrigation. Many farmers use soil moisture sensors to understand soil conditions for particular fields and crops. Soil moisture sensors can be valuable tools for agricultural irrigation scheduling.

A new crop production technique called Advanced Citrus Production System/Open Hydroponic System uses soil moisture sensors. This practice is expected to be used by more citrus growers in the UEC Planning Area in the future. The BMP programs offered through the FDACS may require the use of tensiometers, a type of soil moisture sensor.

Tailwater recovery is defined as a planned system to collect, store, and transport irrigation tailwater for use again. The purpose of tailwater recovery is to conserve irrigation water supplies through the capture and recycling of the water that runs off the field. It also improves off-site water quality. This system normally includes a combination of practices and equipment that collects, conveys, stores, and recycles irrigation runoff water for use. Common components include pickup ditches, sumps, pits, pumps, and pipelines.

Agricultural Mobile Irrigation Labs

Agricultural MILs evaluate the performance of irrigation systems and encourage the adoption of efficient irrigation management practices that conserve water. The St. Lucie Agricultural MIL services the UEC Planning Area. The MIL is managed and administered by the St. Lucie Soil & Water Conservation District with funds traditionally provided by the FDACS and the SFWMD.

In FY 2009, an estimated actual water savings of 122 MGY, or an equivalent of 0.33 MGD, was realized as a result of 100 MIL evaluations conducted in the UEC Planning Area. The actual water savings data were obtained from a small number of farms and are based on follow-up evaluations. More information about the MIL Program is provided in the Support Document (SFWMD 2011b).

Real-time Weather Data – Florida Automated Weather Network

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

In the UEC region, the University of Florida maintains a weather station in Fort Pierce. When funds are available, the SFWMD assists in expanding FAWN's scope within the UEC Planning Area. Another weather station is located just north of the UEC region in Indian River County. The St. Johns River Water Management District assists with funding for this station. Access to FAWN is available from http://fawn.ifas.ufl.edu/data/.

Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP), implemented through the U.S. Department of Agriculture–Natural Resources Conservation Service (USDA–NRCS), was reauthorized in the *Farm Security and Rural Investment Act of 2002* to provide a voluntary conservation program for farmers and ranchers. The program promotes agricultural production and environmental quality as compatible national goals. Financial and technical assistance are offered for eligible participants to install or implement structural and management practices that address impaired water quality and conservation of water resources on eligible agricultural land. For example, reduction of soil erosion and sedimentation can have a positive impact on water quality and improve irrigation efficiency. During FY 2009 and FY 2010, 16 farms, covering 9,158 acres, and 12 farms, encompassing 2,668 acres, participated in the program, respectively.

Potential Agricultural Water Savings

Agricultural crops in the UEC Planning Area include citrus, sugarcane, nursery, and sod. Most citrus acreage is irrigated by low-volume systems. Sugarcane is irrigated with flood/seepage systems. Most vegetables grown in the region are irrigated with flood/seepage systems, while some crops are irrigated with low-volume systems. Details about crop irrigation can be found in **Appendix A**.

Alternative Water Supply Projects

Although water conservation helps a utility reduce or defer development of new water production capacity, in most cases, new water supplies will also be needed to accommodate the region's future growth.

Through Florida's Water Protection and Sustainability Program, funds provided by the state are matched dollar for dollar with SFWMD funds for Alternative Water Supply (AWS)

Funding Program projects. Up to 40 percent of a project's construction cost can be funded through the District's AWS Funding Program to qualified applicants seeking cost-sharing assistance. The District, in cooperation with the state, has approved $178.8 million Districtwide for the construction of 437 AWS projects since 1997. From FY 2006 to FY 2009, the program created 400 MGD of additional capacity Districtwide. In the UEC Planning Area, $21.7 million in approved funding was appropriated for projects from FY 2006 to FY 2009. Completed water supply development projects in the UEC region created 71 MGD of new water capacity from FY 2006 through FY 2009.

Local governments are proposing 20 water supply development projects for this 2011 UEC Plan Update. See **Chapter 6** and **Appendix C** for more information.

Water Conservation Summary

The District will continue to track the progress of the utilities and municipalities developing sources to meet future demands, but funding is not anticipated to return to pre-FY 2009 levels for some time. For this reason, demand reduction is important and necessary. The District intends to effect long-term reductions in water consumption across all water use sectors by promoting and implementing many of the water conservation measures and the CWCP initiatives presented in this chapter.

Appendix E of this 2011 UEC Plan Update includes the status of water conservation implementation; water conservation rate structures; water conservation versus development of additional water supplies; goal-based water conservation plans; a summary of permitted golf courses and associated water sources/irrigated acreage; and the WaterSIP projects funded in FY 2009.

City of Port St. Lucie Water Treatment Facility

5

Water Resource Development Projects

The role of the SFWMD in water supply is primarily planning and water resource development (Section 373.705, F.S.). 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 UEC Planning Area. This document was created in September 2010 using the FY 2010 budget and includes schedules and costs for FY 2010–2014.

LAW / CODE

Water resource development is defined in Subsection 373.019(22), 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.

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 water management districts. These projects may support water supply development, and are intended to ensure the availability of an adequate supply of water for all competing uses deemed reasonable-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 options described in **Chapter 4** to provide water to users. Water supply development projects are addressed in **Chapter 6**.

TOPICS

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, groundwater monitoring, and numerical modeling provide important information about aquifer characteristics, such as hydraulic properties and water quality, but do not generate water. These efforts help quantify water resources that may be available and are useful in developing

appropriate facility design, estimating sustainable yield, and evaluating the economic viability of water supply development projects. The water resource development projects described in this chapter serve an important role in supporting the water supply development projects described in **Chapter 6**. Water resource development projects include drilling and testing; groundwater and evapotranspiration (ET) assessments; groundwater and wetland monitoring; Districtwide feasibility studies; modeling; water conservation; Minimum Flows and Levels (MFLs) and Water Reservations, as well as other efforts. Water conservation encourages measures to use water more efficiently so that the water saved can be used to meet new needs. In effect, water conservation may expand current water supplies.

The water resource efforts presented in this chapter reflect the current budget categories the District uses for funding both new and ongoing water resource development projects. Information about the status of these projects and implementing entities is also included. Annual updates on the status of water resource development projects are provided in the District's *South Florida Environmental Report* available from http://www.sfwmd.gov/sfer.

REGIONAL WATER RESOURCE DEVELOPMENT PROJECTS

The SFWMD funds development and application of numerical models for evaluation of groundwater and surface water resources in the District's four planning areas. These models support development of regional water supply plans, MFLs, Water Reservations, and other projects benefitting a planning area's water resources. The District is currently performing the following modeling efforts with an emphasis on the UEC Planning Area.

East Coast Floridan Aquifer System Model

Use of the Floridan aquifer as a water source is anticipated to expand with the increased demand for water and limited availability of freshwater sources. The 2004 UEC Plan Update (SFWMD 2004) recommended the development of a groundwater model to conduct analysis of future increased withdrawals from the Floridan aquifer in the Upper East Coast. As mentioned in **Chapter 3**, the Lower East Coast (LEC) Floridan Model (HydroGeologic, Inc. 2006) was expanded to include the UEC Planning Area. This combined LEC/UEC Model, referred to as the East Coast Floridan Aquifer System (ECFAS) Model (Golder Associates 2008), is designed to provide simulations of the regional groundwater flow and water quality changes in the Floridan aquifer system in response to groundwater withdrawals.

In FY 2011, the SFWMD budgeted $105,000 for an independent peer review of the model. The kick-off peer-review meeting was held February 3, 2011. The final peer-review report is scheduled for the third quarter of 2011. Upon completion of the peer review and response to comments, the ECFAS Model will be available for water supply planning efforts to assess potential impacts of future withdrawals from the Floridan Aquifer System (FAS).

Additional modifications to the ECFAS Model may be needed based on results of the peer review.

Lower East Coast Subregional Model, Model Calibration

The Lower East Coast Subregional (LECsR) Model was developed by the SFWMD based on the U.S. Geological Survey (USGS) MODFLOW computer code. This model simulates groundwater flow in the surficial aquifer system of the SFWMD's Lower East Coast Planning Area as well as in Martin County. It is used for planning and regulatory purposes. A peer review was conducted on the LECsR Model and a report prepared by the peer-review panel in June 2006. Since then, the model has been updated to reflect the majority of peer-review comments. The final peer-review comment to be addressed is calibration of the model for groundwater levels and canal flows. This effort is scheduled for completion in FY 2011.

Other Efforts

The District also co-funds water resource development efforts with local, state, and federal agencies. Several efforts initially cited in the 2004 UEC Plan Update now fall under the auspices of the Comprehensive Everglades Restoration Plan (CERP), the St. Lucie River Watershed Protection Plan, and other Everglades restoration projects. These projects are discussed in **Chapters 3** and **4**.

South Fork of the St. Lucie River

In addition, the following efforts are discussed in **Chapter 4**:

- Dispersed Water Management and Treatment Program
- Aquifer Storage and Recovery Pretreatment Investigation

DISTRICTWIDE WATER RESOURCE DEVELOPMENT PROJECTS

Projects generally encompassing more than one planning area are considered Districtwide projects. **Table 24** at the end of this chapter summarizes the estimated costs and time frames for completion of the described Districtwide water resource development projects. Aspects specifically pertaining or having relevance to the UEC Planning Area are identified within the context of these Districtwide projects. **Table 24** does not include other programs, such as the CERP, which have their own budgets and are primarily ecosystem restoration projects with a water resource development component.

Hydrogeologic Assessment and Monitoring

Well Drilling and Aquifer Testing Program

The Districtwide Well Drilling and Aquifer Testing Program provides an improved understanding of the geology and hydrology of the aquifers in south Florida as new exploratory or test wells are constructed. This hydrogeologic information is used to help develop groundwater models, update existing models, and support other projects. Sites for new drilling and testing are selected based on need. This program provides new data about aquifer parameters, improves the characterization of aquifer systems, and helps quantify hydraulic responses to stresses, such as pumping. These data help produce more accurate modeling results and provide increased knowledge for water supply development and management.

Fort Pierce Floridan Well Drilling

Full documentation of each well site (including location, well construction details, geophysical logging, and aquifer testing data) is provided in SFWMD technical publications, and this information has been loaded into the District's corporate environmental database, DBHYDRO, available from the SFWMD website at http://www.sfwmd.gov/dbhydro.

Study of the Floridan Aquifer System at the C-23 Canal Site in Martin County

C-23 Canal and S-97 Structure

A SFWMD hydrogeologic investigation of the FAS at the C-23 Canal site in north-central Martin County was completed in 2008 as recommended in the 2004 UEC Plan Update (SFWMD 2008). The objective of the study was to gather information needed to characterize the FAS in western Martin County where data were limited. The data gathered will further development of a regional groundwater flow model in support of future UEC planning and regulatory decisions. These data are being used to assess the aquifer, identify available water supply, and develop and update District models.

Study of the Lower Floridan Aquifer in the Central Florida Coordination Area

The Upper Floridan aquifer (UFA)—the traditional freshwater source in central Florida—is approaching its sustainable yield as evidenced by decreased water levels in natural systems, such as wetlands, lakes, and springs. Due to concerns about the sustainability of groundwater resources to meet current and future needs, the Central Florida Coordination Area (CFCA) was established by the SFWMD, Southwest Florida Water Management District (SWFWMD), and St. Johns River Water Management District (SJRWMD). The governing boards of the three water management districts authorized the development of rules to limit further withdrawals from the UFA. The Lower Floridan aquifer (LFA) is thought to be a potential key source of alternative water supply in the CFCA to meet future demands. The District recognizes, however, there are many uncertainties associated with development of the LFA, which include the following:

- Productivity south of Orange County
- Extent and quality of "fresher" water zones being targeted for water supply
- Extent of the high-capacity Boulder Zone for reverse osmosis (RO) concentrate disposal or potential water supply
- Degree of confinement between the LFA and the UFA, and overlying water bodies the districts are trying to protect
- Extent to which the LFA receives recharge

All of these factors affect the suitability and sustainability of the LFA as a long-term alternative water supply source. Toward that end, the SFWMD, in coordination with the SWFWMD and SJRWMD, has developed a four-year plan to investigate the Lower Floridan aquifer and boulder zone in the CFCA. The SFWMD plan targets five areas within the Upper Kissimmee Basin for data collection. Hydrologic and isotope data will be gathered from

various zones within the stratographic column. The SFWMD authorized $1,475,693 for the first year of the investigation through FY 2012. Four District staff members are assigned to this project.

Groundwater and Evapotranspiration Assessments

A number of specialized hydrogeologic and evapotranspiration (ET) studies have been completed by the USGS in cooperation with the SFWMD. The information provided from these studies is needed to enhance the understanding of groundwater conditions and ET rates across the District. Typically, each project requires several years of effort by the USGS, including rigorous analysis of the data. Some projects are conducted in cooperation with other water management districts or other governmental agencies. The USGS reports, maps, and data are peer-reviewed and highly respected, making these resources valuable references for groundwater modeling and environmental assessments, as well as for policy and decision-making.

USGS Evapotranspiration Study

In FY 2011, the USGS will conclude its multi-year evapotranspiration study. The study's objective is to determine ET rates over pine uplands, marshes, wet prairies, and cypress stands in south Florida, presenting a broader representation of ecological communities than previously investigated. Three years of simultaneous data collection at five stations were completed in 2010. Following quality assurance/quality control of the data by SFWMD staff, finalized data will be uploaded to DBHYDRO (http://www.sfwmd.gov/dbhydro) with the final study report due in 2012.

Transport and Reaction Simulation Engine for Modeling of Water Quality

A study of the development and application of water quality modeling components that could be applied to the SFWMD Regional Simulation Model was completed in FY 2009. As a result of this study, a spatially distributed water quality model for phosphorus transport and cycling in wetlands was developed for application throughout the District (USGS 2008).

Surface and Groundwater Monitoring

To understand current conditions and monitor changes, the District has an extensive groundwater and surface water monitoring program. More than 1,200 surface water sites and more than 500 groundwater wells are monitored. Some sites are owned and maintained by the District, some are private wells whose owners allow the District to perform monitoring, and some belong to other agencies, such as the USGS, the U.S. Army Corps of Engineers (USACE), and local utilities. Monitoring sites are located throughout the District in all of the aquifers. Surface water sites are located in wetlands, lakes, canals, and headwater and tailwater areas of water control structures. Historical surface water stage time-series data from the District and other external government agencies are available in DBHYDRO.

The District maintains this extensive network of monitoring sites, most of which date back several decades, and archives the data in DBHYDRO. Data from sites monitored by the USGS are published annually by the USGS.

Floridan Aquifer System Groundwater Monitoring Network

A local FAS groundwater level and water quality monitoring network was established in the UEC Planning Area from 1996–2007. This local network fed into the District's regional network, which involves cooperative agreements with agricultural owners to include agricultural well sites. The data are intended to evaluate current conditions and allow for calibration of an updated numerical model of the FAS in the area (i.e., East Coast Floridan Aquifer System Model). The regional network was expanded from 2007 to 2009 to include additional well sites. Three sites were co-located with the local governments' utilities in Fort Pierce, Port St. Lucie, and Martin County, along with multiple wells at the District's C-23 site. Continuous water level recorders have been installed at these sites, and periodic water quality assessments are conducted.

Feasibility Studies

The SFWMD has performed feasibility studies to determine the viability of water resource development options to increase water supply through water resource alternatives. These efforts involve collecting and analyzing data and conducting numerical modeling. The District recently funded several studies, including the *St. Lucie and Indian River Counties Water Resources Study* (HDR and HSW 2009), the *Water Desalination Concentrate Management and Piloting Study* (Carollo Engineers, Inc. 2009), and water reuse pilot projects partnering with the City of Plantation and the City of Sunrise as separate initiatives (MWH 2008; Hazen and Sawyer 2008).

St. Lucie and Indian River Counties Water Resources Study

The St. Lucie and Indian River Counties study, co-sponsored by the SFWMD and SJRWMD, was completed in November 2009 (HDR and HSW 2009). The study's objective was to 1) address excess surface water in St. Lucie and Indian River counties currently being discharged to the Indian River Lagoon by capturing, conveying, and storing the water to make it available for beneficial use, and 2) to provide for increased flexibility of water management in these counties. The study also evaluated the reconnection of the C-25 Basin, which is located in two water management district jurisdictions, the SFWMD and the SJRWMD. Reconnecting the C-25 Basin could allow available water supplies to be conveyed across jurisdictional boundaries to more efficiently meet each district's water demands. Five selected alternative plans were analyzed, resulting in the selection of a preferred alternative, and funding alternatives are being explored by the stakeholders.

Water Desalination Concentrate Management and Pilot Study

The *Water Desalination Concentrate Management and Pilot Study* (Carollo Engineers, Inc. 2009) was conducted to evaluate ways to increase treatment efficiency, decrease desalination concentrate by-products, and identify affordable and sustainable brackish water treatment technologies in south Florida. The overall goal of the study was to evaluate alternatives for concentrate minimization in south Florida and provide recommendations through identification of affordable and sustainable treatment technologies. The study provided a systematic evaluation of a concentrate minimization approach, which demonstrated its feasibility as a representative brackish water treatment.

Existing treatment schemes for four representative reverse osmosis (RO) facilities were evaluated and four promising approaches for concentrate minimization were broadly evaluated for the three facilities in terms of several economic and non-economic criteria. The evaluated concentrate minimization approaches included: 1) dual RO system with intermediate chemical precipitation, 2) brine concentrator and evaporation ponds, 3) brine concentrator and crystallizer, and 4) salt recovery and extraction. The dual RO process with intermediate chemical precipitation was selected as the preferred approach for inland desalination plants within the SFWMD. The total treatment cost with this approach was estimated to be about half that of product water generated with a brine concentrator approach. Due to the observed similarity of salts limiting RO recovery in south Florida brackish waters evaluated in this study, this concentrate treatment approach may be applicable at many brackish desalting plants within the District.

Natural Systems Protection

Minimum Flows and Levels Activities

The District develops Minimum Flows and Levels for specific water bodies to protect these water bodies from significant harm due to a reduction in water levels or flows. A Priority Water Bodies List and Schedule for MFLs, Water Reservations, and Restricted Allocation Areas is developed by the District and submitted to the Florida Department of Environmental Protection (FDEP) annually (SFWMD 2011a). To date, MFLs have been adopted for the following water bodies within the District's boundaries:

- North Fork of the St. Lucie River
- Northwest Fork of the Loxahatchee River
- Lake Okeechobee
- Florida Bay
- The Everglades (Holey Land and Rotenberger Wildlife Management Areas, Water Conservation Areas 1, 2, and 3, and Everglades National Park)
- Biscayne aquifer
- Caloosahatchee River

- Lower West Coast aquifers
- Lake Istokpoga

No additional MFLs are scheduled to be adopted in the UEC Planning Area in the next five years. Minimum Flows and Levels being developed in other District planning areas are addressed in each regional water supply plan update.

PROTECTION

Minimum Flows and Levels

Minimum Flows and Levels (MFLs) provide technical criteria that are important management tools used by the District to protect major water bodies from significant harm due to reduction in water levels or flows. These criteria provide a basis for defining the point at which additional withdrawals will result in significant harm to water resources.

The following questions address factors to consider in establishing MFLs:

- What are the priority functions of each water resource, and what are the baseline conditions necessary to support those functions?
- What level of protection for these functions is required under the MFL to prevent significant harm to the water body?

If the water body is below the MFL or expected to fall below the MFL within 20 years, a recovery strategy is required. The recovery strategy may include construction of new or improved water storage facilities, development of additional water supplies, and implementation of water conservation. New or additional withdrawals may be limited until the water body is no longer experiencing significant harm.

Water Reservations Activities

The District also provides a list to the FDEP specifying water bodies where Water Reservation and Restricted Allocation Area rules will be developed to protect natural system water from future consumptive use allocations. The District is required to use its reservation or allocation authority to protect water for natural systems identified by CERP projects in advance of executing agreements with the USACE to construct these projects. The list and schedule for development of Water Reservation and Restricted Allocation Area rules reflect authorizations and appropriations by the U.S. Congress for specific Everglades restoration projects.

PROTECTION

Water Reservations
A Water Reservation is a legal mechanism to set aside water for the protection of fish and wildlife or public health. The volume of water to be reserved is determined through scientific analysis. The District then undertakes rulemaking to ensure that the volume of water is not allocated for consumptive uses. Water management districts develop Water Reservations to ensure a healthy and sustainable native fish and wildlife community through natural cycles of drought, flood, and population variation. Water provided by federally funded restoration projects must be protected for fish and wildlife by Florida's reservation or allocation authority, as only projects designed to achieve environmentally based performance measures are eligible for federal cost share.

Restricted Allocation Areas
A Restricted Allocation Area rule is a regulatory mechanism for protecting water resources from adverse impacts due to consumptive uses of water, as defined in Section 373.223(1), F.S., and outlined in Section 3.2.1 of the Basis of Review (SFWMD 2010).

The District's first Water Reservation supports the CERP Picayune Strand and Fakahatchee Estuary Project, and became effective July 2, 2009. On March 18, 2010, the District adopted a Water Reservation for the North Fork of the St. Lucie River in support of the CERP Indian River Lagoon – South Project.

Work began in 2010 on a Water Reservation for the Caloosahatchee River and Estuary in support of the CERP Caloosahatchee River (C-43) West Basin Storage Reservoir Project. In January 2011, the District's Governing Board listed the Caloosahatchee River and Estuary as a Priority Water Body for Water Reservation rulemaking.

No additional water reservations are scheduled to be adopted in the UEC Planning Area in the next five years. Water reservations being developed in other District planning areas are addressed in each regional water supply plan update.

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. Water savings achieved through water conservation measures are the most cost-efficient way to expand current water supplies. Water conservation activities are reported in **Chapter 4** of this document and annually in Chapter 5A: Five-Year Water Resource Development Program of the *South Florida Environmental Report, Volume II* available from http://www.sfwmd.gov/sfer.

The Water Savings Incentive Program (WaterSIP) provides matching funds of up to $50,000 to water providers and users (i.e., cities, utilities, industrial groups, schools, hospitals, and homeowners associations) for water-saving technologies. These technologies include low-flow plumbing fixtures, rain sensors, and other hardware. From FY 2005 to FY 2009, the District provided $2.8 million to support 101 projects that have an estimated potential water savings of 1,792 million gallons of water per day (MGD) Districtwide.

The Mobile Irrigation Laboratory (MIL) Program provided funding to conduct efficiency audits of agricultural and urban irrigation systems. In 2010, five MILs were operating throughout the District—four agricultural MILs and one urban MIL in Big Cypress Basin. In FY 2011, the District continues to fund only the Big Cypress Basin MIL. Anticipated water savings from the MIL Program Districtwide for FY 2010–FY 2014 is approximately 438 MGY.

The Florida Department of Agriculture and Consumer Services (FDACS) continues to fund the four agricultural MILs Districtwide (one is the St. Lucie Agricultural MIL that serves the UEC Planning Area). The urban MILs were funded by FDACS and the SFWMD through 2008. However, the Soil & Water Conservation Districts seek other funding sources for the remaining urban MILs.

The District also funds water conservation outreach programs in the UEC Planning Area, such as public awareness symposiums. For more information about the District's Comprehensive Water Conservation Program, see **Chapter 4** of this document and the Support Document (SFWMD 2011b).

SUMMARY

Water resource development projects serve various purposes in support of water supply development. Benefits of the resource development projects discussed in this chapter include:

- Improved understanding of the hydrogeologic system that is the source of both traditional and alternative water supplies for the UEC Planning Area.
- Prevention of the loss of natural resources.
- Preservation of existing supplies through better resource understanding, and management and implementation of regional resource improvement programs.
- Water conservation to protect water sources and provide an efficient way to expand current water supplies.
- Increased future supply availability through testing or program implementation.

The CERP projects are not directly reported as water made available in this 2011 UEC Plan Update. Future water supply plan updates will reconsider this assessment as projects are completed and water needed for environmental protection is identified.

Table 24 provides the estimated costs and time frames for completion of Districtwide water resource development projects.

Table 24. Implementation schedule and costs for Districtwide Water Resource Development Projects, Fiscal Years 2010–2014.

Districtwide Water Resource Development Projects	Plan Implementation Schedule and Costs ($ in thousands)					
	FY 2010 $	FY 2011 $	FY 2012 $	FY 2013 $	FY 2014 $	Total $
Drilling and Testing Est. start date: 1990 Est. finish date: ongoing	0	0	0	0	0	0
Groundwater and ET Assessments Est. start date: 1954 and 2002, respectively Est. finish date: ongoing	150	0	0	0	0	150
Groundwater and Wetland Monitoring Est. start date: 2002 Est. finish date: ongoing	381	437	459	482	506	2,265
Districtwide Feasibility Studies Est. start date: 2001 Est. finish date: ongoing	0	0	0	0	0	0
Modeling Est. start date: 1998 Est. finish date: ongoing	Staff Time	Staff Time	Staff Time	0	0	0
MFL and Water Reservation Activities Est. start date: 1995 Est. finish date: ongoing	179	220	220	220	220	1,059
Comprehensive Water Conservation Program Est. start date: 1977 Est. finish date: ongoing	580	801	1,022	1,243	1,464	5,110
Total	**1,290**	**1,458**	**1,701**	**1,945**	**2,190**	**8,584**

Source: *2010 SFWMD South Florida Environmental Report, Volume II, Chapter 5A, Table 5A-1* (SFWMD 2011a).

LAW / CODE

Subsection 373.707(3), 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, multi-jurisdictional 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.

6

Water Supply Development Projects

This chapter provides a summary of the water supply development projects anticipated to meet the water needs of the UEC 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 growing Public Water Supply (PWS) sector. Additional details about demand projections, local government information, and water supply development projects can be found in **Appendices A**, **B**, and **C**, respectively.

TOPICS

- Regional and Local Planning Linkage
- Projects Identified for 2011 UEC Plan Update
- Funding
- Summary
- PWS Utility Summaries

Growing population in the UEC Planning Area is driving the need for water supply development. The population in this region is expected to increase by 107 percent from the 2005 baseline population of 382,324 to 791,861 by 2030. Net water demand for all users is projected to increase by 32–42 percent, from 202 MGD in 2005 to 273–288 MGD by 2030.

As discussed in previous chapters, the availability of fresh groundwater is limited to meet the needs of future growth in the UEC Planning Area. Therefore, the additional water needed to meet future urban demand is expected to be developed from other sources, primarily through continued development of brackish groundwater from the Floridan aquifer and use of reclaimed water.

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

LAW / CODE

Water supply development is defined in Subsection 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.

development projects to meet future demands. For other water use categories, specific projects are identified as provided.

In the UEC Planning Area, eight local government utilities and nine private utilities serve 12 local governments. These entities are listed in **Appendix B** and **Appendix D**. Five drainage and water control special districts (Chapter 298, F.S.) are also located within the UEC Planning Area.

REGIONAL AND LOCAL PLANNING LINKAGE

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

INFO

Planning Area The SFWMD is divided into four areas within which water supply planning activities are focused: Kissimmee Basin (KB), Upper East Coast (UEC), Lower West Coast (LWC), and Lower East Coast (LEC).

Utility Service Area The geographical region in which a water supplier has the ability and the legal right to distribute water for use (Basis of Review, SFWMD 2010).

The water supply development projects proposed in the 2006 UEC Plan Amendment for PWS utilities proved useful to local governments in preparing their 10-Year Water Supply Facilities Work Plans. Since the 2006 Amendment, the District has worked closely with staff from PWS utilities to identify water supply development projects for this 2011 UEC Plan Update. Many of these projects, listed in the Utility Summaries, are also included in the local governments' 10-Year Water Supply Facilities Work Plans. With the exception of projects using 100 percent seawater or reclaimed water, all water supply projects must be permitted by the District.

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

Appendix B provides information and statutory requirements relevant to local government comprehensive plans. The regional and local water supply planning process is described as follows and illustrated in **Figure 20**.

PROCESS

Regional and Local Water Supply Planning Process

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

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

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

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

By November 15 of every year, all utilities are required to submit a progress report about the status of their water supply projects (completed, under way, or planned for implementation). By December 1 of each year, local governments are required to submit updated capital improvement information to the Florida Department of Community Affairs (FDCA) and the SFWMD. **Figure 20** shows the linkage and sequence of the water supply planning process with water facilities work plans and local government comprehensive plans, beginning with the adoption of a water supply plan update.

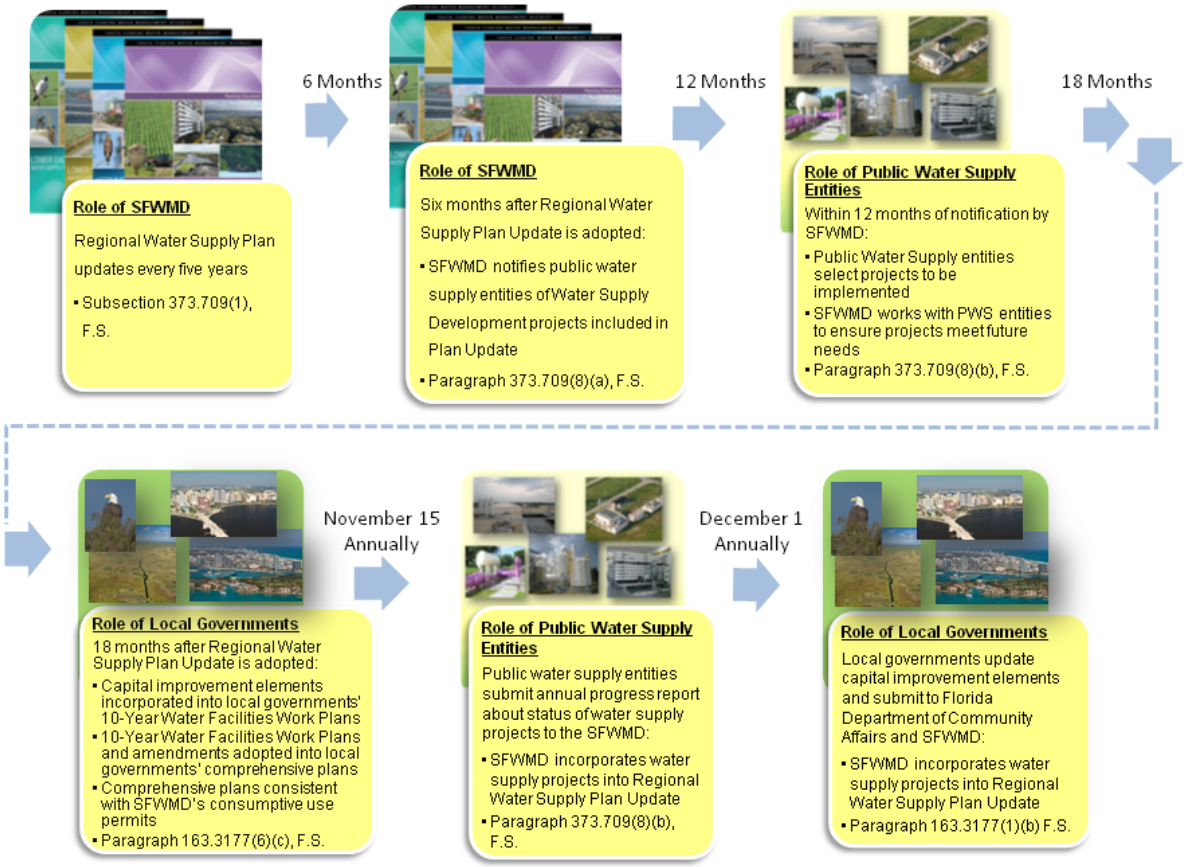


Figure 20. Linking regional water supply planning with local government comprehensive planning.

Consumptive Use Permitting

Consumptive use permits are required for all water supply development projects, except for those using 100 percent seawater or reclaimed water. While this plan identifies a number of projects, it is important to point out that each project must go through the permitting process and demonstrate the following:

- Demand to support the project
- Reasonable-beneficial use of water
- Project does not interfere with existing legal users
- Project is in the public interest

It is also understood that the dates of projects may change based on local economic and growth changes.

PROJECTS IDENTIFIED FOR THE 2011 UEC PLAN UPDATE

To manage the water resources in the region, this 2011 UEC Plan Update promotes the diversification of sources for the water supply projects needed to meet future demands. Projects proposed for inclusion in this 2011 UEC Plan Update were evaluated based on several factors, such as resource constraints, which include MFLs and Water Reservations, and whether a project actually contributes to new water supply. Included in this evaluation were projects proposed in local governments' 10-Year Water Supply Facilities Work Plans and identified in utility annual progress reports.

Wastewater Treatment Facility

Twenty multi-phased PWS facility projects are proposed for FY 2010–FY 2030. The proposed PWS projects use diverse water sources and there is sufficient water to meet projected demands over the next 20 years. The water sources used for these proposed projects are fresh water, which is derived from either surface water or surficial groundwater (shallow aquifer) systems; brackish groundwater (deep aquifer) from the Floridan aquifer system; and reclaimed water, which is treated wastewater. These proposed water projects include one surficial (1 MGD) project, 11 Floridan (58 MGD) projects, and eight reclaimed (34 MGD) projects. Together, these 20 multi-phased facility projects have the potential to create 93 MGD of additional water supply. A summarized list of all projects can be found in **Appendix C**. This list includes projects submitted for the 2011 UEC Plan Update and completed projects that received funds from the District's Alternative Water Supply (AWS) Funding Program from FY 2006 to FY 2009.

Power generation entities are planning power plants that will make use of surface water, brackish water, and reclaimed water when available. Agricultural water users continue to use surface water with Floridan water as a secondary/backup source. Water users may be able to benefit from increased surface water from Comprehensive Everglades Restoration Plan (CERP) projects in the future, if water is certified available for consumptive uses.

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 PWS category.

Public Water Supply

Public Water Supply (PWS) demand, which includes all potable uses served by municipal and private utilities, is projected to grow from the 2005 net baseline of 42.2 MGD to 92.0 MGD by 2030. This increase in water demand is distributed among the utilities. In **Appendix B**, current and future utility service area maps reflect the proposed changes in service area boundaries and legal municipal boundaries.

Public water demand is currently met through a combination of fresh groundwater from the surficial aquifer system and brackish groundwater from the Floridan aquifer system. In addition, many utilities have responsibility for wastewater management and most have implemented use of reclaimed water. Uses of reclaimed water include the irrigation of parks, golf courses, landscapes, common areas, residential lots, and median strips, as well as power generation. Many of these uses were self-supplied before connection to reclaimed water. 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 water supply projects for the future. **Table 25** shows the UEC Planning Area PWS net demands for 2005 and 2030, by county.

Table 25. Public Water Supply demands and projections for 2005 and 2030.

County	2005 PWS Demand (MGD)	2030 Projected PWS Demand (MGD)[a]
St. Lucie	24.4	62.9
Martin[b]	17.8	29.1
Eastern Okeechobee[c]	0.0	0.0
Total	42.2	92.0

a. Projected finished water yields are from projects listed in the PWS Utility Summaries and do not include Domestic Self-Supply projections.

b. Includes only the population in Martin County served by Jupiter and Tequesta utilities.

c. Portion of county in the UEC Planning Area; no utilities are in this portion of the county.

Data in the Utility Summaries

Individual Utility Summaries are presented at the end of this chapter. The summaries provide baseline information about finished water demands, existing permitted sources and allocations, the last four years of constructed and proposed projects that create water capacity, special permit conditions, and other related information. The population and water demands for each utility are based on the methodology and results provided in **Appendix A**. The water demand figures represent per capita finished water use rates and net water demands. These are different from raw per capita rates and gross demands that reflect water withdrawn at the source before treatment. There may be significant differences in the quantity of raw water and the finished water delivered due to differences in efficiencies of the treatment processes.

This Plan Update uses permanent population for existing demand projections. This is consistent with the methodology used by the University of Florida, Bureau of Economic and Business Research (BEBR) for population estimates.

In addition to fresh surface water or fresh groundwater sources, the Utility Summaries include water sources from the Floridan aquifer and from reclaimed water. **Table 26** summarizes the 20 PWS water and wastewater plant projects planned by PWS entities, and the potential new water supplies to be produced by 2030.

Table 26. Water supply development projects and yields (MGD) for 2030.

Alternative Water Source	Number of Multi-Phased Plant Projects	Yield (MGD)
Fresh Water (Surficial Aquifer)	1	1.0
Brackish (Floridan Aquifer)	11	58.0
Reclaimed (Treated Wastewater)	8	34.0
Total	20	93.0

In the UEC Planning Area, all utilities indicated adequate supplies to meet projected demand by the Year 2030 with the combination of existing supplies and submitted projects. The 10 brackish projects constructed from 2006 to 2009 created 47 MGD of new brackish capacity, which assisted in providing the UEC Planning Area with a good base for meeting future demands. In addition, the reclaimed water projects constructed from 2006 to 2009 created 25 MGD of new reclaimed capacity. The projected 59 MGD of proposed fresh water (1 MGD) and brackish (58 MGD) water supply development projects by PWS entities will exceed the 45 MGD of water needed to meet demands for the PWS sector by the Year 2030. **Table 26** reflects the proposed 34 MGD of reclaimed water projects to be completed by 2030.

The design capacity listed for each project reflects finished capacity rather than raw water capacity. Floridan aquifer projects generally included proposed construction of reverse osmosis (RO) treatment plants. At present, approximately 62 percent of water treatment capacity in this region is RO using the Floridan aquifer as its source. Brackish water projects were proposed by utilities throughout the UEC Planning Area, with 87 percent of the projects proposed in St. Lucie County and 13 percent of the projects proposed in Martin County.

For planning purposes, proposed reclaimed water projects for the UEC Planning Area consist of the construction and expansion of wastewater treatment facilities along with reuse distribution lines and facilities. Currently, 59 percent of the wastewater generated in Martin County is reused, while 33 percent of the wastewater in St. Lucie County is reused (FDEP 2010a). Construction and expansion of existing reuse projects in this region is moving forward, and many new projects have been proposed throughout the region.

Domestic Self-Supply

Domestic Self-Supply net demands in the UEC Planning Area are projected to decrease from 4.3 MGD in 2005 to less than 1 MGD in 2030. Domestic Self-Supply includes potable water from a private supply, typically a domestic well serving a private residence. Property owners relying on such systems own, operate, and maintain domestic wells. Domestic Self-Supply needs are met almost exclusively with fresh groundwater. About 8 percent of the 2005 population was self-supplied, but this is projected to decline to less than 1 percent by 2030, as more self-supplied residents connect to regional utilities and future growth is accommodated by PWS systems.

Agricultural Self-Supply

Agricultural water use includes supplies for irrigated, commercially grown crops. Agricultural irrigation gross demands accounted for 64 percent of the total demand in 2005, and make up at least 37–40 percent of the projected gross demands in 2030. Agriculture is expected to remain the largest use category in the UEC Planning Area. **Appendix A** provides more information about agricultural water use and projected demands.

Farming in the UEC

Fresh surface water from the C-23, C-24, and C-25 canals is the primary water source for agricultural irrigation in this region, with brackish groundwater from the Floridan aquifer as a backup source during periods of low rainfall. A Restricted Allocation Area rule is in effect for these canals (Section 3.2.1, Basis of Review, SFWMD 2010).

Although citrus production has declined since publication of the 2004 UEC Plan Update, citrus (e.g., grapefruit, oranges, tangerines) is the dominant crop, and is projected to represent more than 75 percent of the irrigated crops grown in the UEC Planning Area through 2030. The production decline is primarily due to citrus canker, citrus greening, hurricanes, international competition, and transition of agricultural land to urban development, and land for ecosystem restoration. However, acreage for citrus production is expected to increase as new rootstock and new production techniques become available, such as the Advanced Production/Open Hydroponic Systems. These practices, which facilitate early yields and fruit quality, may prove beneficial to orchard profitability (Stover, Castle, and Spyke 2008).

From 2003 to 2004, the District conducted a permit renewal process for irrigation users within the UEC Planning Area. These renewals were for projects that used any volume of

water. Water use permits that were renewed for citrus groves are still in effect, and most are valid for 20-year durations.

Historically used freshwater sources, including fresh surface water from lakes and canals and the surficial aquifer, are not expected to be adequate to meet all projected demands, especially because the C-23, C-24, and C-25 canals are designated as Restricted Allocation Areas. Accordingly, no additional surface water will be allocated from these canals or any connected canal systems that derive water supply from these District canals, over historic allocations (Section 3.2.1, Basis of Review, SFWMD 2010). For more details, see **Chapter 3**.

The Lake Okeechobee Service Area is also designated as a Restricted Allocation Area. These criteria limit surface water withdrawals from Lake Okeechobee and connected surface waters. These criteria apply to new projects, existing unpermitted projects, and modifications or renewals to existing projects located within the Lake Okeechobee Service Area. Requested allocations cannot cause an increase in the volume of surface water withdrawn from Lake Okeechobee over the entire base condition water use unless an alternative is identified as listed in the rule (Section 3.2.1, Basis of Review, SFWMD 2010).

Development of groundwater and surface water may be practicable in some areas; however, permitting new freshwater supplies will essentially depend on local resource conditions. Increased withdrawals from the C-23, C-24, and C-25 canals are currently restricted by District rules. Although additional surface water may be available in the future from CERP reservoir construction projects, it is premature to identify potential volumes of water anticipated to be available until construction is complete and projects are operational. Potential new water may be provided through subregional storage and the capture and recycling of storm water (stormwater retention and tailwater recovery).

The continued use of best management practices (BMPs), including water conservation, could reduce the amount of water needed to meet crop demands (FDACS 2010). These efforts are discussed in **Chapter 4**. In addition, the Florida Department of Agriculture and Consumer Services (FDACS) develops, and adopts by rule, agricultural BMPs to address water quality. Some BMPs contain an implicit water conservation component. Growers who enroll in the FDACS BMP Program and implement the BMPs demonstrate their commitment to water resource protection, have a presumption of compliance with state water quality standards, and are eligible for technical and financial assistance toward meeting water resource protection goals. As of September 30, 2010, the FDACS BMP Program in the UEC Planning Area has enrolled a variety of growers whose agricultural land uses total 232,749 acres. Most Indian River Citrus growers participate in the FDACS BMP Program and comprise more than half of the enrolled acreage in the UEC Planning Area (FDACS 2010).

Industrial / Commercial / Institutional Self-Supply

Industrial/Commercial/Institutional Self-Supply in the UEC Planning Area is based on the assumption that growth in self-supply is proportional to the growth in population.

Industrial/Commercial/Institutional Self-Supply demand is expected to increase by 3 MGD, from 6.7 MGD in 2005 to 9.4 MGD in 2030. Many industrial, commercial, and institutional water uses are met through PWS utilities. Others are self-supplied small users (their use falls below the 0.1 MGD limit for identification of individual permit users in this Plan Update), located remotely from PWS lines. The estimates in this Plan Update include the larger self-supplied users, most of which have historically relied on fresh groundwater and, to a limited extent, fresh surface water.

This use category includes large plant facilities for production, processing, manufacturing, and technical needs, such as concrete, agricultural citrus processing, and biotechnology. Although fresh groundwater supplies are generally considered adequate to meet the relatively small new demands projected for this use category, other water supply options should be considered depending on local conditions and location.

Once reclaimed water becomes available, opportunities for its use will be evaluated in the permitting process.

Recreational / Landscape Self-Supply

The Recreational/Landscape Self-Supply category includes irrigation for large landscaped areas, such as parks, golf courses, common areas, and cemeteries. Historically, irrigation supplies for this category include local fresh groundwater and surface water captured from canals or from ponds in stormwater management systems. In the UEC Planning Area, Recreational/Landscape Self-Supply gross irrigation demand is projected to increase from the 2005 baseline of 17 MGD to 45 MGD by 2030.

The projected increase in growth for this category should be met, for the most part, by currently proposed reclaimed water projects. In the UEC Planning Area, reclaimed water can be used to irrigate large landscaped areas, such as golf courses, parks, and cemeteries, as well as residential and commercial parcels. It is expected that some of the eight multi-phased wastewater treatment facility reclaimed

Golf Course – St. Lucie County

water projects will replace current freshwater sources, or will provide irrigation for new development needs. In addition, stormwater recycling should also be considered in new developments.

Specific users have not yet been determined for the projects identified in the Utility Summaries. The overall annual average quantity of reclaimed water expected to be made available for recreational irrigation needs in the UEC Planning Area during the next 20 years slightly exceeds the current and projected demands for Recreational/Landscape Self-Supply. Therefore, there is an opportunity to switch users of freshwater sources, or even a potable source, from their current sources to reclaimed water. Where reclaimed water will not be available, future users may qualify for limited freshwater withdrawals on a permit-by-permit basis.

Power Generation Self-Supply

The Power Generation Self-Supply category in the UEC Planning Area is expected to grow by approximately 34 MGD during the next 20 years as Florida Power & Light (FPL) has plans to develop two new facilities in the UEC Planning Area. Florida Power & Light expects that much of the additional generating capacity to be installed will use fresh, brackish, or reclaimed water sources, and cooling tower technology as a heat rejection method.

Currently, two power generation plants in the UEC Planning Area are permitted to withdraw water: FPL Martin Power Plant and Treasure Coast Energy Center (TCEC), located in western Martin County and the City of Fort Pierce, respectively. The FPL Martin site uses fresh water for cooling purposes, and the Treasure Coast Energy Center uses water from the Floridan aquifer. The TCEC anticipates using reclaimed water for part of its needs at some point in the future. The existing St. Lucie Nuclear Plant is located in this region and uses ocean water, which is not addressed in the water supply plans because ocean water is not regulated by consumptive use permitting. The existing Indiantown Cogeneration Plant withdraws water from Taylor Creek/Nubbin Slough in the adjacent Kissimmee Basin Planning Area and therefore is not included in this Plan Update.

FUNDING

Funding for water supply development and water conservation at the local level is the shared responsibility of water suppliers and users. The State of Florida and the water management districts provide funding assistance to local water users developing alternative water supplies and measurable water conservation programs. In most cases, funding is allocated to projects included in a region's water supply plan update, although some projects not in the plan update, but consistent with the plan's goals may be funded. When the District deems appropriate, the plan update should also specifically identify the need for multi-jurisdictional approaches to project options based on analysis, and permittable, financial, and technical feasibility. The SFWMD provides funding for alternative water supply and water conservation through its Alternative Water Supply (AWS) Funding

Program and the Water Savings Incentive (WaterSIP) Program. An alternative water supply project or water conservation project identified in this 2011 UEC Plan Update makes that project eligible for future funding, although funding is not guaranteed. An application must be submitted and processed for the determination of an award.

Alternative Water Supply Program

Alternative water supply sources in the UEC Planning Area include brackish water from the Floridan aquifer, reclaimed water (treated wastewater), excess storm water during the rainy season, sources made available through the addition of new storage capacity, and any other sources designated as nontraditional. Water conservation projects that result in quantifiable water savings are also eligible for water management district funding.

In the UEC Planning Area, from FY 2006 to FY 2009, seven PWS projects were completed creating 71 MGD of new water capacity. Many of these projects benefited from Florida's Water Protection and Sustainability Program, from which funds provided by the state were matched dollar for dollar with SFWMD funds. From FY 2006 to FY 2009, $21.7 million in approved funding was appropriated for projects located in the UEC Planning Area. The funds were distributed through the District's AWS Funding Program to qualified applicants seeking cost-sharing assistance. Due to current economic conditions, the State of Florida did not allocate funding for AWS projects in its FY 2010 or FY 2011 budgets. However, the SFWMD allocated $2.6 million for such projects in FY 2011.

Water Savings Incentive Program

As described in **Chapter 5**, the WaterSIP provides 50-50 cost-share funding for implementation of water savings projects that reduce urban water usage. The District provides matching funds up to $50,000 to water providers and users (i.e., cities, utilities, industrial groups, schools, hospitals, homeowners associations) for water-saving technologies. These technologies include low-flow plumbing fixtures, rain sensors, fire hydrant flushing devices, and other hardware. From FY 2005–FY 2009, the District allocated $248,512 for 12 UEC Planning Area projects, which represents an estimated potential savings of 221 million gallons per year (MGY).

SUMMARY

To date, water supply has been managed well in the UEC Planning Area. Public Water Supply projects were developed and constructed in a timely manner and plans to meet future demand increases are under way. In 2010, a majority of the water treatment capacity in this region uses reverse osmosis treatment of brackish groundwater from the Floridan aquifer. Water supply projects are designed to ensure that adequate potable water facilities are constructed and available concurrent with new development.

The population growth over the next 20 years will significantly increase the region's public water demands, particularly in the urban sector. The Public Water Supply sector is projected to double its water demands from 2005 to 2030. More than 20 new multi-phased PWS projects are contained in this UEC Plan Update that use reverse osmosis treatment of brackish groundwater sources from the Floridan aquifer and reclaimed water for irrigation and recharge purposes. The Public Water Supply sector has more than an adequate supply of projects and water sources to meet the 2030 future demands. The constructed projects (2006–2009) and the proposed water supply development projects (2010–2030) are included in the Utility Summaries for each major public water supplier and listed in **Appendix C**.

According to the District's Restricted Allocation Area rules, surface water from the C-23, C-24, and C-25 canal systems cannot be allocated for any proposed new use over historic allocations (Section 3.2.1, Basis of Review, SFWMD 2010). In addition, Restricted Allocation Area criteria for the Lake Okeechobee Service Area limit proposed use of surface water from Lake Okeechobee and hydraulically connected canals, such as the St. Lucie Canal (C-44).

Despite the limitations placed on the surface water sources, there is currently sufficient water supply allocation to meet the needs of the Agricultural Self-Supply sector. The industry is also considering stormwater recovery to increase water availability. Existing agricultural irrigation will continue to use fresh surface water from the C-23, C-24, C-25, and C-44 canals as the primary water source for irrigation in this region, with brackish groundwater from the Floridan aquifer as a backup source during periods of low rainfall.

The Recreational/Landscape Self-Supply use sector is projected to grow and therefore water supply needs are projected to increase. The sector's future needs are expected to be met primarily through development of reclaimed water systems, and blended surface water and brackish groundwater. Water conservation methods using more efficient irrigation systems and Florida-friendly plants offer potential cost-savings and can reduce demands for additional supplies.

The Industrial/Commercial/Institutional Self-Supply sector is expected to remain fairly stable with a slight increase. Water use in this category typically has a recycling component, which should continue and perhaps gain efficiency to reduce water demands in the future.

PUBLIC WATER SUPPLY UTILITY SUMMARIES

UTILITY SUMMARY

Supply Entity: Indiantown Company
County: Martin
Service Area: Unincorporated Martin County serving Indiantown, Cogeneration Power Plant, and Indiantown Golf and Country Club

Description: Based upon facility production capacity, water supplies comprise 100 percent fresh groundwater supplies and are projected to remain the same in the future. The utility is reusing 100 percent (0.52 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	5,252	5,684	8,290	10,677
Per Capita (gallons per day finished water)	125	125	125	125
Potable Water Demands (daily average annual finished water in MGD)	0.66	0.71	1.04	1.35

FACILITY PRODUCTION CAPACITY FDEP Facility Design Capacity Plus Projects Design Capacities	Capacity MGD 2005	Cumulative Facility & Projects Capacity (MGD) 2010	2020	2030
Water Source: Surficial	1.30	1.30	1.30	1.90
Floridan	0.00	0.00	0.00	0.00
Total Capacity	1.30	1.30	1.30	1.90
Non-Potable Water				
Source: Reclaimed (Capacity)	0.65	1.65	1.65	1.65

PROJECTS SUMMARY Water Supply Facility Projects	Src.	Tot. Capital Cost ($ M)	Cumulative Design Capacity (MGD) 2010	2020	2030
Indiantown WTF Expansion from 1.3 MGD to 1.9 MGD	F	$3.20	0.00	0.00	0.60
Fresh Water Total	**F**	**$3.20**	**0.00**	**0.00**	**0.60**
Completed Indiantown WWTF Reclaimed Water Production Facility; Reclaimed Water Main to Cogeneration Power Plant; and Reuse Upgrades (2007–2008)	R	$2.40	1.00	1.00	1.00
Reclaimed Total	**R**	**$2.40**	**1.00**	**1.00**	**1.00**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00041-W; Annual Allocation: 1.17 MGD; Permit Expires: 8/18/2029.

UTILITY SUMMARY

Supply Entity: Martin Correctional Institution
County: Martin
Service Area: Unincorporated Martin County serving Martin Correctional Institution

Description: Water supplies comprise 100 percent fresh groundwater supplies and are projected to be 10 percent fresh groundwater and 90 percent brackish water supplies in the future. The utility is reusing 100 percent (0.17 MGD) of its wastewater.

The institution's average annual inmate population was 1,488 in 2009 and the per capita use rate was 150 gallons per capita per day. Per the consumptive use permit, the maximum number of inmates base was 2,341, with some inmates in housing with a reuse system for irrigation. The institution is negotiating with the City of Port St. Lucie Utility Systems Department to receive up to 0.35 MGD of water in 2011. It is anticipated that the existing institution treatment plant will be decommissioned upon service being provided by Port St. Lucie Utility Systems. The water provided by Port St. Lucie will be a blend of 90 percent brackish and 10 percent fresh groundwater from the surficial aquifer.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	0	0	0	0
Per Capita (gallons per day finished water)	N/A	N/A	N/A	N/A
Potable Water Demands (daily average annual finished water in MGD)	0.15	*0.15	*0.15	*0.15
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.15	*0.15	0.00	0.00
Floridan	0.00	0.00	*0.35	*0.35
Total Capacity	0.15	*0.15	*0.35	*0.35
Non-Potable Water				
Source: Reclaimed (Capacity)	0.00	0.00	0.00	0.00

* It is anticipated that beginning in 2011, water will be provided by City of Port St. Lucie Utility Systems Department up to 0.35 MGD – annual maximum daily flow in 2009 was 0.289 MGD.

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**2010**	**2020**	**2030**
Memorandum of Understanding – City of Port St. Lucie Utility Systems Department to Provide up to 0.35 MGD (90% or greater from Floridan aquifer).	B	TBD	0.35	*0.35	*0.35
Brackish Total	**B**	**TBD**	**0.35**	**0.35**	**0.35**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00277-W; Annual Allocation: 0.29 MGD; Permit Expires: 6/17/2027.

* Water to be provided by City of Port St. Lucie Utility Systems Department.

UTILITY SUMMARY

Supply Entity: Martin County Utilities (North/Jensen Beach, Tropical Farms, Vista/Port Salerno, and Martin Downs)
County: Martin
Service Area: Unincorporated Martin County (portions serving Jensen Beach, Martin Downs, Palm City, Port Salerno, South Hutchinson Island, Tropical Farms, Miles Grant Golf and Country Club, Indian River Plantation, and Floridian Golf Resort), City of Stuart (portion), Ocean Breeze Park, and Town of Sewell's Point

Description: Based on plant capacity, water supplies comprise 67 percent traditional groundwater supplies and 33 percent brackish groundwater, and are projected to be 34 percent traditional and 66 percent alternative water supplies in the future. The utility is reusing 58 percent (2.73 MGD) of its wastewater.

Bulk Water: Martin County has an agreement with Stuart to sell alternative water from 0.15 MGD to 1.62 MGD starting in 2011.
Utility Purchases: Martin County recently purchased two existing utilities (Miles Grant and Indian River Plantation). The population and water demand projections from these two utilities are incorporated into the population and demand projections for Martin County listed below.
Unincorporated St. Lucie County Service: Martin County Utilities also serves a small southerly portion of South Hutchinson Island and Floridian Golf Resort.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	70,995	77,675	93,043	111,491
Per Capita (gallons per day finished water)	129	129	129	129
Potable Water Demands (daily average annual finished water in MGD)	9.16	10.02	12.00	14.38
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial (includes utilities purchased in 2005 and 2010)	[a]11.36	11.36	10.77	10.77
Floridan	5.50	14.30	18.30	18.30
Total Capacity	16.86	25.66	29.07	29.07
Non-Potable Water				
Source: Reclaimed (Capacity)	5.62	13.30	17.00	17.00

a. Miles Grant and Indian River Plantation facility capacities were added, and due to the planned decommissioning of the same facilities, capacities were then deducted starting in 2020.

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**2010**	**2020**	**2030**
Completed Tropical Farms WTF Expansion and RO Membrane Cleaning System (2006–2009)	B	$10.50	8.80	8.80	8.80
Tropical Farms WTF Expansion from 10 MGD to 14 MGD	B	$9.50	0.00	4.00	4.00
Brackish Total	**B**	**$20.00**	**8.80**	**12.80**	**12.80**
Completed Tropical Farms and North WWTF Expansions (2006–2008)	R	$2.41	7.68	7.68	7.68
North/Jensen Beach WWTF Expansion from 2.4 MGD to 3.6 MGD	R	$8.80	0.00	1.20	1.20
Tropical Farms WWTF Expansion Phase 2 from 5 MGD to 7.5 MGD	R	$9.20	0.00	2.50	2.50
Reclaimed Total	**R**	**$20.41**	**7.68**	**11.38**	**11.38**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Numbers: 43-00102-W, 43-00089-W, 43-00752-W, 43-01724-W, and 43-00169-W.

Annual Allocation: 24.68 MGD (Cumulative allocation for the five permits); Permit Expires on various dates through 2028.

UTILITY SUMMARY

Supply Entity: Piper's Landing
County: Martin
Service Area: Unincorporated Martin County serving Piper's Landing Yacht and Country Club

Description: Water supplies comprise 100 percent traditional groundwater supplies and are projected to remain the same in the future. The utility is reusing 100 percent (0.07 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	604	604	604	604
Per Capita (gallons per day finished water)	134	134	134	134
Potable Water Demands (daily average annual finished water in MGD)	0.08	0.08	0.08	0.08
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.20	0.20	0.20	0.20
Floridan	0.00	0.00	0.00	0.00
Total Capacity	0.20	0.20	0.20	0.20
Non-Potable Water				
Source: Reclaimed (Capacity)	0.10	0.10	0.10	0.10

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
No Projects.	--	--	--	--	--

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00173-W; Annual Allocation: 0.08 MGD; Permit Expires: 6/15/26.

UTILITY SUMMARY

Supply Entity: Sailfish Point
County: Martin
Service Area: Unincorporated Martin County serving Sailfish Point development on Hutchinson Island

Description: Based on facility capacity, water supplies comrpise 100 percent brackish groundwater and are projected to remain the same in the future. The utility is reusing 100 percent (0.08 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	[a]362	362	362	362
Per Capita (gallons per day finished water)	[b]438	438	438	438
Potable Water Demands (daily average annual finished water in MGD)	0.16	0.16	0.16	0.16
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.00	0.00	0.00	0.00
Floridan	0.35	0.35	0.35	0.35
Total Capacity	0.35	0.35	0.35	0.35
Non-Potable Water				
Source: Reclaimed (Capacity)	0.25	0.25	0.25	0.25

a. Sailfish Point has 515 dwelling units with an estimated 362 permanent residents and an estimated 794 seasonal residents (approximately 1,156 residents maximum day).

b. Approximately 80 percent of the maximum population is seasonal, affecting the per capita rate.

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
No Projects.	--	--	--	--	--

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00146-W; Annual Allocation: 0.22 MGD; Permit Expires: 10/10/2022.

UTILITY SUMMARY

Supply Entity: South Martin Regional Utility (SMRU)
County: Martin
Service Area: Town of Jupiter Island, Hobe Sound vicinity, and portions of southeastern unincorporated Martin County

Description: Based on facility production capacity, water supplies comprise 67 percent traditional groundwater supplies and 33 percent brackish groundwater, and are projected to be 59 percent traditional and 41 percent alternative water supplies in the future. The utility is reusing 100 percent (0.79 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	19,534	23,372	29,344	38,478
Per Capita (gallons per day finished water)	175	175	175	175
Potable Water Demands (daily average annual finished water in MGD)	3.41	3.92	5.14	6.73
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	6.14	6.14	6.14	6.14
Floridan	2.00	2.00	4.20	4.20
Total Capacity	8.14	8.14	10.34	10.34
Non-Potable Water				
Source: Reclaimed (Capacity)	1.20	2.60	3.60	3.60

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
RO WTF Expansion from 2.0 MGD to 4.2 MGD	B	$3.50	0.0	2.2	2.2
Brackish Total	**B**	**$3.50**	**0.0**	**2.2**	**2.2**
Completed WWTF Irrigation Quality Water Improvement Program Phases (2006–2009)	R	$2.53	1.4	1.4	1.4
WWTF Supplemental Irrigation Quality (IQ) sources	R	$1.00	0.0	1.0	1.0
Reclaimed Total	**R**	**$3.53**	**1.4**	**2.4**	**2.4**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00066-W; Annual Allocation: 5.47 MGD; Permit Expires: 11/9/2010.

UTILITY SUMMARY

Supply Entity: City of Stuart
County: Martin
Service Area: City of Stuart and unincorporated Martin County (portion)

Description: Based on facility production capacity, water supplies comprise 100 percent traditional groundwater supplies and are projected to decrease incrementally to 80 percent in 2028 through a long-term agreement with Martin County to purchase alternative water. The utility is presently not reusing its wastewater.

Agreement with Martin County: The City of Stuart has entered into a long-term agreement with Martin County to purchase potable water from 0.15 MGD to 0.84 MGD starting in 2011 and continuing through 2028. As a part of the long-term agreement, Stuart will treat from 0.15 MGD to 0.84 MGD of wastewater for Martin County starting in 2010 through 2028.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	16,504	17,428	20,648	23,648
Per Capita (gallons per day finished water)	200	200	200	200
Potable Water Demands (daily average annual finished water in MGD)	3.30	3.49	4.13	4.73
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	6.00	6.00	6.00	6.00
Floridan	0.00	*0.15	*0.49	*0.84
Total Capacity	6.00	6.15	6.49	6.84
Non-Potable Water				
Source: Reclaimed (Capacity)	0.00	2.33	2.33	2.33

* Purchased from Martin County Utilities.

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**2010**	**2020**	**2030**
Memorandum of Understanding with Martin County Utilities to Purchase Floridan Water from 0.15 MGD to 0.84 MGD.	B	$0.05	0.15	0.49	0.84
Brackish Total	**B**	**$0.05**	**0.15**	**0.49**	**0.84**
Stuart WWTF Expansion Final Phase and Reclaimed Water Transmission Main to Interconnect with Martin County	R	$3.00	0.00	2.33	2.33
Reclaimed Total	**R**	**$3.00**	**0.00**	**2.33**	**2.33**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 43-00053-W; Annual Allocation: 3.67 MGD; Permit Expires: 11/23/2029.

UTILITY SUMMARY

Supply Entity: Fort Pierce Utilities Authority (FPUA)
County: St. Lucie
Service Area: City of Fort Pierce and provides bulk water to St. Lucie County Utilities

Description: Water supplies comprise 81 percent traditional groundwater supplies and 19 percent brackish groundwater, and are projected to be 46 percent traditional and 54 percent alternative water supplies in the future. The utility is reusing 5 percent (0.30 MGD) of its wastewater.

Bulk Water: FPUA provides 1.9 MGD bulk water via four metered connections to St. Lucie County Utilities. Bulk water is accounted for in the consumptive use permit and per capita analysis of FPUA. St. Lucie County Utilities distributes the purchased bulk water to 16,689 residents as follows: North Hutchinson Island to the Indian River County line, Portofino Shores, Indian River Estates, and the Midway Road-Okeechobee Road Corridor.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population[a]	74,202	82,020	100,661	123,483
Per Capita[b] (gallons per day finished water)	116	116	116	116
Potable Water Demands (daily average annual finished water in MGD)	8.59	9.52	11.68	14.33
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	13.00	13.00	13.00	13.00
Floridan	3.00	7.30	15.30	15.30
Total Capacity	16.00	20.30	28.30	28.30
Non-Potable Water				
Source: Reclaimed (Capacity)	0.75	0.75	5.75	5.75

a. Population includes bulk water provided to St. Lucie County.
b. Per capita includes bulk water provided to St. Lucie County.

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**2010**	**2020**	**2030**
Completed Henry Gahn Floridan Aquifer Wells and WTF Expansion (2006–2008)	B	$4.70	4.30	4.30	4.30
Henry Gahn WTF Expansion from 6.99 MGD to 14.99 MGD (includes Floridan aquifer wells)	B	$19.80	0.00	8.00	8.00
Brackish Total	**B**	**$24.50**	**4.30**	**12.30**	**12.30**
Mainland Water Reclamation Facility Phase 1	R	$55.60	0.00	5.00	5.00
Reclaimed Total	**R**	**$55.60**	**0.00**	**5.00**	**5.00**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00085-W; Annual Allocation: 21.13 MGD; Permit Expires: 7/11/2027.

UTILITY SUMMARY

Supply Entity: Harbour Ridge
County: St. Lucie
Service Area: Unincorporated St. Lucie County serving Harbour Ridge Country Club

Description: Water supplies comprise 100 percent traditional groundwater supplies and are projected to remain the same in the future. The utility is reusing 100 percent (0.07 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	1,573	1,573	1,573	1,573
Per Capita (gallons per day finished water)	80	80	80	80
Potable Water Demands (daily average annual finished water in MGD)	0.13	0.13	0.13	0.13
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.36	0.36	0.36	0.36
Floridan	0.00	0.00	0.00	0.00
Total Capacity	0.36	0.36	0.36	0.36
Non-Potable Water				
Source: Reclaimed (Capacity)	0.12	0.12	0.12	0.12

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
No Projects.	--	--	--	--	--

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00449-W; Annual Allocation: 0.13 MGD; Permit Expires: 8/7/2029.

UTILITY SUMMARY

Supply Entity: Panther Woods Master Association
County: St. Lucie
Service Area: Unincorporated St. Lucie County serving Panther Woods

Description: Water supplies comprise 100 percent traditional groundwater supplies and are projected to remain the same in the future. The utility is reusing 100 percent (0.08 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	380	465	694	1,038
Per Capita (gallons per day finished water)	223	223	223	223
Potable Water Demands (daily average annual finished water in MGD)	0.08	0.10	0.15	0.23

FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.43	0.43	0.43	0.43
Floridan	0.00	0.00	0.00	0.00
Total Capacity	0.43	0.43	0.43	0.43
Non-Potable Water				
Source: Reclaimed (Capacity)	*0.11	0.11	0.11	0.11

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
No Projects.	--	--	--	--	--

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00462-W; Annual Allocation: 0.12 MGD; Permit Expires: 4/3/2012.

* 2008 FDEP.

UTILITY SUMMARY

Supply Entity: City of Port St. Lucie Utility Systems Department (Prineville, James E. Anderson (JEA), Glades, Westport, and Southport)
County: St. Lucie
Service Area: City of Port St. Lucie (including a portion of The Reserve development) and portions of unincorporated St. Lucie County

Description: Water supplies comprise 32 percent traditional groundwater supplies and 68 percent brackish groundwater, and are projected to be 10 percent traditional and 90 percent alternative water supplies in the future. The utility is reusing 28 percent (1.05 MGD) of its wastewater.

Service to Martin Correctional Institute: This utility is negotiating with Martin Correctional Institution and Martin County Utilities to provide future potable water supply of up to 0.35 MGD to the Institution in 2010–2011 and is addressed in the Institution's Utility Summary.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	125,519	158,678	253,588	375,263
Per Capita (gallons per day finished water)	104	104	104	104
Potable Water Demands (daily average annual finished water in MGD)	13.10	16.50	26.37	39.03
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Facility Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	8.00	8.00	8.00	8.00
Floridan	17.15	50.80	70.80	80.80
Total Capacity	25.15	58.80	78.80	88.80
Non-Potable Water				
Source: Reclaimed (MGD)	3.04	27.39	27.39	39.39

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**2010**	**2020**	**2030**
Completed JEA Brackish Projects (2006–2008)	B	$27.20	33.65	33.65	33.65
Rangeline Construct 10 MGD RO WTF and Expand to 30 MGD with Water Mains and Facilities.	B	$75.20	0.00	20.00	30.00
Brackish Total	**B**	**$102.40**	**33.65**	**53.65**	**63.65**
Completed Reclaimed Projects including Glades, and Westport WWTF Expansions and Veranda Planned Urban Development Irrigation Quality (PUD IQ) Mains Master Irrigation (2006–2009)	R	$8.70	14.35	14.35	14.35
Glades WWTF Expansion from 12 MGD to 24 MGD with Reuse Water Mains and Facilities.	R	$16.90	0.00	0.00	12.00
Westport WWTF Expansion from 2 MGD to 12 MGD with Reuse Mains and Facilities.	R	$2.80	10.00	10.00	10.00
Reclaimed Total	**R**	**$28.40**	**24.35**	**24.35**	**36.35**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00142-W; Annual Allocation: 51.38 MGD; Permit Expires: 7/10/2028.

UTILITY SUMMARY

Supply Entity: The Reserve Community Development District (CDD)
County: St. Lucie
Service Area: The Reserve development (portion) is located within the City of Port St. Lucie, and receives bulk water from St. Lucie West Services District

Description: Water supplies comprise 67 percent traditional groundwater supplies and 33 percent bulk purchased brackish groundwater, and are projected to be 45 percent traditional and 55 percent alternative water supplies in the future.

Bulk Water: The Reserve has an agreement with St. Lucie West Services District (SLWSD) to purchase alternative water until 2024, with automatic five-year incremental renewals, unless terminated by either party. The bulk purchase will allow The Reserve to meet its projected water demands without increasing its consumptive use permit allocation.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	4,313	4,833	6,238	6,238
Per Capita (gallons per day finished water)	72	72	72	72
Potable Water Demands (daily average annual finished water in MGD)	0.31	0.35	0.45	0.45
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.41	0.41	0.41	0.41
Floridan[a]	0.20	0.25	0.30	0.50
Total Capacity	0.61	0.66	0.71	0.91
Non-Potable Water				
Source: Reclaimed (Capacity)	0.00	0.00	0.00	0.00

a. Bulk alternative water received from St. Lucie West Services District Utility per agreement.

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
Memorandum of Understanding with St. Lucie West Services District to Purchase Alternative Bulk Water until 2024 with Automatic Five-Year Incremental Renewals.	B	Not specified	0.25	0.30	0.50

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00552-W; Annual Allocation: 0.17 MGD; Permit Expires: 3/24/2029.

UTILITY SUMMARY

Supply Entity: Spanish Lakes
County: St. Lucie
Service Area: Unincorporated St. Lucie County serving Spanish Lakes Fairways and Spanish Lakes Country Club Village.

Description: Water supplies comprise 100 percent traditional groundwater supplies and are projected to remain the same in the future. The utility is reusing 100 percent (0.27 MGD) of its wastewater.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	5,650	5,650	5,650	5,650
Per Capita (gallons per day finished water)	74	74	74	74
Potable Water Demands (daily average annual finished water in MGD)	0.42	0.42	0.42	0.42
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	1.20	1.20	1.20	1.20
Floridan	0.00	0.00	0.00	0.00
Total Capacity	1.20	1.20	1.20	1.20
Non-Potable Water				
Source: Reclaimed (Capacity)	0.59	0.59	0.59	0.59

PROJECTS SUMMARY					
Water Supply Facility Projects	**Src.**	**Tot. Capital Cost ($ M)**	**Cumulative Design Capacity (MGD) 2010**	**2020**	**2030**
No Projects.	--	--	--	--	--

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Numbers: 56-00401-W (Spanish Lakes Country Club Village) and 56-00627-W (Spanish Lakes Fairways); Annual Allocation: 0.31 MGD (Spanish Lakes Country Club Village) and 0.38 MGD (Spanish Lakes Fairways); Permits Expire: 7/15/2026 and 4/10/2013, respectively.

UTILITY SUMMARY

Supply Entity: St. Lucie County Utilities (Holiday Pines, North Hutchinson Island, and South Hutchinson Island)
County: St. Lucie County
Service Area: Unincorporated St. Lucie County (serving north county area, central county area, and South Hutchinson Island). Distributes bulk water purchases from FPUA to unincorporated St. Lucie County (serving North Hutchinson Island, Indian River Estates, Portofino Shores, and the Midway Road-Okeechobee Road Corridor)

Description: Water supplies comprise 100 percent traditional groundwater supplies, and are projected to be 2 percent traditional and 98 percent alternative water supplies in the future. The utility is reusing 81 percent (0.65 MGD) of its wastewater.

Bulk Water: St. Lucie County Utilities receives 1.9 MGD bulk water from FPUA. Bulk water is delivered to four metered connection points, and St. Lucie County Utilities distributes potable water to 16,689 residents in the following areas: North Hutchinson Island, Indian River Estates, Portofino Shores, and the Midway-Okeechobee Coordination Area.

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population[a]	2,038	2,038	22,974	61,153
Per Capita (gallons per day finished water)	69	69	110	110
Potable Water Demands (daily average annual finished water in MGD)	0.14	0.14	2.53	6.73
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.29	0.29	0.29	0.29
Floridan	0.00	0.00	12.00	12.00
Total Capacity	0.29	0.29	12.29	12.29
Non-Potable Water				
Source: Reclaimed (Capacity)	2.28	2.58	2.58	2.58

a. Population does not include bulk water provided by FPUA.

UTILITY SUMMARY (CONTINUED)

PROJECTS SUMMARY					
			Cumulative Design Capacity (MGD)		
Water Supply Facility Projects	Src.	Tot. Capital Cost ($ M)	2010	2020	2030
Northwest County Construct 2.0 MGD RO WTF (2011–2015) and Expand by 2 MGD (2016–2020) to 4.0 MGD	B	$24.00	0.00	4.00	4.00
Central County Construct 2.0 MGD RO WTF (2011–2015) and Expand by 2 MGD (2016–2020) to 4.0 MGD	B	$24.00	0.00	4.00	4.00
South County Construct 2.0 MGD RO WTF (2011–2015) and Expand by 2.0 MGD (2016–2020) to 4.0 MGD	B	$24.00	0.00	4.00	4.00
Brackish Total	**B**	**$72.00**	**0.00**	**12.00**	**12.00**
North Hutchinson Island WWTF Expansion from 0.5 MGD to 0.8 MGD	R	$4.00	0.30	0.30	0.30
Reclaimed Total	**R**	**$4.00**	**0.30**	**0.30**	**0.30**

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00406-W; Annual Allocation: 6.82 MGD; Permit Expires: 3/13/2028.

UTILITY SUMMARY

Supply Entity: St. Lucie West Services District (SLWSD)
County: St. Lucie
Service Area: St. Lucie West development located within the City of Port St. Lucie

Description: Water supplies comprise 100 percent brackish groundwater supplies and are projected to remain the same in the future. The utility is reusing 69 percent (2.67 MGD) of its wastewater.

Bulk Water: SLWSD has an agreement with The Reserve Community Development District to provide brackish supplemental potable water until 2024, with automatic five-year incremental renewals, unless terminated by either party (see The Reserve Community Development District Utility Summary for more details).

POPULATION AND DEMANDS	Historical 2005	Projected 2010	2020	2030
Population	15,036	16,755	17,001	17,001
Per Capita (gallons per day finished water)	72	72	72	72
Potable Water Demands (daily average annual finished water in MGD)	1.11	1.21	1.22	1.22
FACILITY PRODUCTION CAPACITY				
FDEP Facility Design Capacity Plus Projects Design Capacities	**Capacity MGD 2005**	**Cumulative Facility & Projects Capacity (MGD) 2010**	**2020**	**2030**
Water Source: Surficial	0.00	0.00	0.00	0.00
Floridan	3.40	3.40	3.40	3.60
Total Capacity	3.40	3.40	3.40	3.60
Non-Potable Water				
Source: Reclaimed (Capacity)	2.99	2.99	2.99	2.99

PROJECTS SUMMARY

Water Supply Facility Projects	Src.	Tot. Capital Cost ($ M)	Cumulative Design Capacity (MGD) 2010	2020	2030
SLWSD RO WTF Expansion from 3.4 MGD to 3.6 MGD	B	$2.00	0.00	0.00	0.20
Brackish Total	**B**	$2.00	0.00	0.00	0.20

Legend: Src.=Source, F=Fresh Water; B=Brackish Water; R=Reclaimed Water; C=Captured Storm/Surface Water; O=Other; WTF=Water Treatment Facility; WWTF=Wastewater Treatment Facility; FDEP=Florida Department of Environmental Protection

Note: Potential future water conservation savings are not included above unless a specific project is identified. Water conservation and potential water savings are addressed in Chapter 4.

SFWMD Consumptive Use Permit Number: 56-00614-W; Annual Allocation: 2.33 MGD; Permit Expires: 9/14/2025.

7
Future Direction

INTRODUCTION

TOPICS

- Water Sources
- Coordination
- Climate Change

This chapter summarizes the future direction for water supply in the UEC Planning Area. As this 2011 UEC Plan Update confirms, utilities serving the UEC Planning Area have established or identified water source options to address the water supply needs of the region through at least 2030. This Plan Update also concludes that with appropriate management and the continued diversification of water supply sources, there is sufficient water to meet the needs of this region during a 1-in-10 year drought condition through the 20-year planning horizon. The Comprehensive Everglades Restoration Plan (CERP) projects, which are ongoing throughout the planning horizon, may maximize water resources by addressing issues of timing, retention, and freshwater flow regimes to the coastal environmental resources in the planning area, and may increase availability of fresh water for future use.

Roosevelt Bridge over the St. Lucie River (Hutchinson Island in background)

The guidance offered in this chapter should be considered in developing water source options to meet future needs. Statutory requirements, existing conditions, resource constraints (including protection tools and criteria), and the needs of all water users are addressed, with emphasis placed on alternative water supply development and water conservation. The District's future direction for water supply planning in the UEC Planning Area also involves coordination between utilities and monitoring to respond to climate change and sea level rise.

Withdrawals from the surficial aquifer system (SAS) are limited due to potential impacts on wetlands, as well as the increased potential for saltwater intrusion into freshwater sources; therefore, the Floridan aquifer system (FAS) will be used as a source, to a greater degree, to meet future water demands in the UEC Planning Area. Since publication of the 2004 UEC

Plan Update, the majority of the region's utilities have increased the use of brackish water from the FAS for water supply. In addition, when surface water availability is limited, agricultural use of the Floridan aquifer augments surface water. Blending brackish water with fresh water from the SAS is a practical solution for meeting some of the region's Public Water Supply (PWS) and agricultural water use needs. In addition, the use of reclaimed water has increased significantly since the 2004 UEC Plan Update, offsetting the use of groundwater to meet future water supply needs.

In the UEC Planning Area, water users have diversified supply sources and reduced reliance on the SAS. Many of the UEC Planning Area utility consumptive use permits were renewed within the last five years. Most of the water use permits issued are valid for 20-year durations, and allow continued surficial and Floridan aquifer system allocations. These permits, allocations, and water source options were used in the development of this 2011 UEC Plan Update. Chapter 373.707, F.S., encourages water users and utilities in this region to continue developing alternative water supply sources and water conservation measures.

Water Sources

Water needed to meet increased future urban demand in the UEC Planning Area is expected to be developed primarily through brackish groundwater from the FAS and reclaimed water. All water users are urged to implement water conservation measures to further reduce water supply needs. The SFWMD offers the following recommendations and guidance for consideration by local governments, water users (Public Water Supply; Domestic Self-Supply; Agricultural; Industrial, Commercial, and Institutional; Recreational/Landscape; Power Generation), utilities, and District water supply managers and staff, as a basis for the future direction of water supply planning in the UEC Planning Area.

Groundwater

Floridan Aquifer System

- Landowners are encouraged to plug and abandon inactive or dysfunctional FAS wells in accordance with existing rules and regulations.
- An independent, scientific peer review began in February 2011 for the East Coast Floridan Aquifer System (ECFAS) Model. After incorporating peer-review comments, the SFWMD intends to use the model for predictive analysis for the next UEC water supply planning process.
- Local water users and utilities developing FAS well drilling programs and gathering data are encouraged to collaborate with the District. Water quality, water level, and hydrogeologic data submitted for input into the ECFAS Model for predictive analysis will be used to develop the next five-year water supply plan update.

Surficial Aquifer System

- The potential use of the SAS for new and expanded uses will be evaluated on a permit-by-permit basis through the District's consumptive use permitting process.
- To reduce the UEC Planning Area's reliance on the SAS, water users are encouraged to continue developing alternative water sources to meet future water demands.
- Utilities should use concentrate water from membrane softening of surficial aquifer water beneficially (e.g., blending with reclaimed water where feasible).
- Regular reviews of saltwater intrusion monitoring adequacy are needed by the SFWMD and utilities to ensure resource protection of the SAS.

Surface Water

- No additional surface water may currently be allocated from the C-23, C-24, or C-25 canals over and above existing allocations pursuant to District rules (Section 3.2.1, Basis of Review, SFWMD 2010). Additional surface water may be available in the future when water storage is available from CERP reservoir construction projects; however, it is premature to identify potential volumes of water anticipated to be available until construction is complete and projects are operational.

Reclaimed Water

- Local utilities are urged to expand reuse of reclaimed water and minimize deep well disposal practices.
- Local governments are central to the success of expanded reclaimed water use. Building codes and land development regulations should be adopted by local governments, requiring construction of reclaimed water infrastructure for proposed projects exceeding prescribed acreage thresholds, and use of reclaimed water when it becomes available, and where appropriate.
- Using reclaimed water for landscape irrigation minimizes impacts to potable water supplies. Water supply is an essential consideration for utilities designing and developing reclaimed water programs.
- Reclaimed water storage extends the use of limited seasonal water supplies. Interconnects between utilities also maximize the use of reclaimed water.

Use of Reclaimed Water is Encouraged

- Technical assistance to establish mandatory reuse zones (geographic areas designated by local governments through ordinance where the use of reclaimed water is required) will be provided to local governments by the SFWMD.

New Storage Capacity for Surface Water or Groundwater

Aquifer Storage and Recovery

- Local utility explorations of Aquifer Storage and Recovery and other viable options are needed to extend the use of current water resources to meet future demands. Aquifer Storage and Recovery extends water supplies for use during peak demand periods. (Permitting considerations should be included in the evaluation process.)

Local and Regional Reservoirs

- Comprehensive Everglades Restoration Plan projects will continue to be implemented by the SFWMD, with support from the U.S. Army Corps of Engineers.
- The design of new or retrofitted surface water management systems for agricultural operations should incorporate water conservation and water supply considerations through best management practices.

Seawater

- Desalinated seawater from the Atlantic Ocean remains a water source option resource that could be considered by utilities, where appropriate.

Water Conservation

- The District will continue to implement the Comprehensive Water Conservation Program begun in 2008.
- Local governments should evaluate the implementation of water conservation measures appropriate for their jurisdiction. Water conservation plans could be developed to implement indoor and outdoor measures through use of the Conserve Florida Water Clearinghouse's EZ Guide, or a similar tool offering equivalent water conservation standards. As a guideline, water conservation measures should include general policy considerations and technology retrofits, as described in this Plan Update. District staff is available to provide assistance in using the EZ Guide.
- Utilities are encouraged to develop goal-based water conservation plans. District staff is available to assist utilities in developing such plans.
- Local governments should develop or enhance existing ordinances to be consistent with Florida-friendly landscaping provisions (Section 373.185, F.S.).
- Water conservation public education programs help to instill a year-round landscape irrigation conservation ethic. Local governments and utilities are encouraged to continue providing water conservation-related educational programs in cooperation with the SFWMD.

- Where feasible, local governments should consider implementing a two-day-per-week water irrigation ordinance. District staff is available to assist local governments with model ordinance methodologies upon request.
- When applicable, agricultural water users are encouraged to use the Florida Automated Weather Network (FAWN) irrigation tools.
- Installation of higher efficiency irrigation systems by agricultural water users is encouraged where applicable and appropriate for specific crop types.

Coordination

Coordination and collaboration throughout the water supply planning process is essential among regional, local government, and utility planning entities.

- 10-Year Water Supply Facilities Work Plans are due within 18 months of the adoption the UEC Plan Update. Local governments and utilities need to provide linkage and coordination between the UEC Plan Update and the local government water supply related components of comprehensive plans.
- Work with agricultural communities and agencies to develop methodologies and data sources for future crop projections.

Climate Change

Climate change has the potential to affect hydrologic conditions and thus water supply sources and patterns of water demand. The degree of climate change in various regions and the possible impacts to those regions is highly uncertain. Despite uncertainties, the District is considering climate change phenomena and its related effect on hydrologic conditions in the water supply planning process.

Some types of change in climate and subsequent effects on hydrologic conditions have been observed by the scientific community. Long-term data show increasing temperatures and a corresponding sea level rise. For planning purposes, the SFWMD is estimating a sea level rise of 5–20 inches in south Florida by 2060 (SFWMD 2009a). The anticipated rise in sea level may change the hydrodynamics of the coastal estuaries and the location and shape of the groundwater interface, and may increase the intrusion of salt water into groundwater. Analysis is needed to identify the impact of sea level rise on utility wellfields at risk of saltwater intrusion within the District. In addition, comprehensive monitoring is needed to accurately characterize and measure aquifer conditions and saltwater movement.

The following direction and guidance is provided for climate change and sea level rise within the District water supply planning areas:

- Saltwater intrusion monitoring should be reviewed for adequacy by utilities and the SFWMD. Recommendations are needed for additional or revised monitoring regimes.

Successful implementation of this 2011 UEC Plan Update requires close coordination with other regional, local government, and utility water supply planning entities. Collaboration with stakeholders is also essential for directing the implementation of the preceding recommendations and guidance. This partnering should ensure that water resources in the UEC Planning Area are prudently managed and available to meet future demands.

Glossary

1-in-10 year drought A drought of such intensity that it is expected to have a return frequency of once in 10 years. A drought in which below normal rainfall occurs and has a 90 percent probability of being exceeded over a 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 (see *Level of Certainty*)

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

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

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

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

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

Alternative Water Supply (AWS) "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.).

Aquatic preserve Water body set aside by the state to be maintained in essentially natural or existing condition for protection of fish and wildlife and public recreation so its aesthetic, biological, and scientific values may endure for the enjoyment of future generations.

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

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

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

Artesian A commonly used expression, generally synonymous with "confined," 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 groundwater at pressures greater than atmospheric pressures.

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

Baseline condition A specified period of time during which collected data are used for comparison 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 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.

Benthos/Benthic Macroscopic organisms that live on or in the bottom substrate, such as clams and worms (contrast to plankton and nekton).

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 the 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 used to dispose of secondary-treated effluent from wastewater treatment plants and concentrate from membrane water treatment plants via deep injection wells.

Brackish water Water with a chloride level greater than 250 milligrams per liter (mg/L) and less than 19,000 mg/L (Basis of Review, SFWMD 2010).

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

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 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.

Comprehensive Everglades Restoration Plan (CERP) The federal-state partnership 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.

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

Conservation (see *Water conservation*)

Conservation Rate Structure (see *Water Conservation Rate Structure*)

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

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

Cubic feet per second (cfs) A rate of flow (e.g., in streams and rivers) equal to a volume of water 1 foot high and 1 foot wide flowing a distance of 1 foot in 1 second. One cfs is equal to 7.48 gallons of water flowing each second. For example, if a car's gas tank was 2 feet by 1 foot by 1 foot (2 cubic feet), then gas flowing at a rate of 1 cubic foot/second would fill the tank in two seconds.

DBHYDRO The SFWMD's corporate environmental database, storing hydrologic, meteorologic, hydrogeologic, and water quality data.

Demand The quantity of water needed to fulfill a requirement.

Demand management Water conservation. 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, or alter land uses.

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

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

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

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

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

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

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

Ecology The study of the inter-relationships of plants and animals to one another and to their physical and biological environment.

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

Ecosystem restoration The process of reestablishing to as near its natural condition as possible, the structure, function, and composition of an ecosystem.

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

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

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

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 water 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.

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

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

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

Finished water Water that has completed a purification or treatment process; water that has passed through all the processes in a water treatment plant and is ready to be delivered to consumers. (Contrast with *Raw Water*.)

Finished water demand (see *Net water demand*)

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

Flatwoods (pine) Natural communities that occur on level land and are characterized by a dominant overstory of slash pine. Depending on soil drainage characteristics and position in the landscape, pine flatwood habitats can exhibit xeric to moderately wet conditions.

Floodplain wetland Palustrine wetland area adjacent to a lake and separated by a natural berm in which flooding occurs during high water events. May or may not have been a littoral wetland historically.

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

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

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

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

Flow regime Seasonal variation in river runoff response usually expressed as monthly mean flow.

Fresh water An aqueous solution with a chloride concentration less than or equal to 250 mg/L (Basis of Review, SFWMD 2010).

Geophysical log A record of the structure and composition of the earth with depth encountered when drilling a well or similar type of test or boring hole.

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

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

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

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

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

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

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

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

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

Indian River Lagoon (IRL) A lagoon extending 156 miles from north of Cape Canaveral to Stuart along the east coast of Florida. The lagoon is one of America's most diverse estuaries, home to thousands of plant and animal species.

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

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

Inflow 1) The act or process of flowing in or into. 2) The measured quantity of water that has moved into a specific location.

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

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

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

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

Leaching The process by which soluble materials in the soil, such as salts, nutrients, pesticide chemicals, or contaminants, are washed into a lower layer of soil or are dissolved and carried away by water.

Leak detection Systematic method to survey the distribution system and pinpoint the exact locations of hidden underground leaks.

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.

Marsh A frequently or continually inundated unforested wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions.

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.

Million gallons per day (MGD) A rate of flow of water equal to 133,680.56 cubic feet per day, or 1.5472 cubic feet per second, or 3.0689 acre-feet per day. A flow of one million gallons per day for one year equals 1,120 acre-feet (365 million gallons). To hold one million gallons of water, a swimming pool approximately 267 feet long (almost as long as a football field), 50 feet wide, and 10 feet deep would be needed.

Minimum Flow and Level (MFL) The point at which further withdrawals would cause significant harm to the water resources or natural systems. MFLs are established by water management districts pursuant to Sections 373.042 and 373.0421, F.S., for a given water body and set forth in Parts II and III of Chapter 373.

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.

MODFLOW A modular, three-dimensional, finite-difference groundwater modeling code created by the U.S. Geological Survey, which is used to simulate the flow of groundwater through aquifers. The SFWMD uses it for subregional groundwater modeling.

Monitor well Any human-made excavation by any method to monitor fluctuations in groundwater levels, quality of underground waters, or the concentration of contaminants in underground waters.

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

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

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

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

Nutrient loading Discharging of nutrients from the watershed (basin) into a receiving water body (lake, stream, wetland); expressed usually as mass per unit area per unit time [kilograms per hectare per year (kg/ha/yr) or pounds per acre per year (lbs/ac/yr)].

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

Outflow 1) The act or process of flowing out of. 2) The measured quantity of water that has left an area or water body during a certain period of time.

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

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

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

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

Planning Area The SFWMD is divided into four areas within which planning activities are focused: Kissimmee Basin (KB), Upper East Coast (UEC), Lower West Coast (LWC), and Lower East Coast (LEC).

Potable water Water that is safe for human consumption.

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.

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

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

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

Public Water Supply (PWS) demand All potable (drinking quality) water supplied by water treatment facilities with projected average pumpages of 0.1 MGD or greater to all types of customers, not just residential.

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

Ratoon A shoot sprouting from a plant base, as in banana, pineapple, or sugarcane.

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

Raw water demand (see *Gross water demand*)

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

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

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

1) Natural Recharge, which consists of precipitation or other natural surface flows making their way into groundwater supplies.

2) Artificial or Induced Recharge, which includes actions 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.

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 (Rule 62-610.200, F.A.C.)

Recreational/Landscape Self-Supply Water used for landscape and golf course irrigation. The landscape subcategory includes water used for parks, cemeteries, and other irrigation applications of 0.1 million gallons per day (MGD) or greater. 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 373.709, 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.

Restricted Allocation Areas 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 (Basis of Review, SFWMD 2010).

Retention The prevention of stormwater runoff from direct discharge into receiving waters; included as examples are systems that discharge through percolation, exfiltration, filtered bleed-down, and evaporation processes.

Retrofit (1) Indoor: The replacement of existing water fixtures, appliances, and devices with more efficient fixtures, appliances, and devices for the purpose of water conservation. (2) Outdoor: The replacement or changing out of an existing irrigation system with a different irrigation system, such as a conversion from an overhead sprinkler system to a microirrigation system (Basis of Review, SFWMD 2010).

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 (1) An aqueous solution with a chloride concentration greater than 250 mg/L and less than that of seawater. (Basis of Review). (2) 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.) Any water that contains more than 500 mg/L of total dissolved solids (TDS). This may be brackish water (500 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.

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

Salinity Of or relating to chemical salts usually measured in parts per thousand (ppm), milligrams per liter (mg/L), or practical salinity units (psu).

Salt water (see *Seawater or Salt Water*)

Seawater or **Salt water** Water with a chloride concentration at or above 19,000 mg/L (Basis of Review, SFWMD 2010).

Sedimentation The action or process of forming or depositing sediment.

Seepage irrigation Irrigation that conveys water through open ditches. Water is either applied to the soil surface (possibly in furrows) and held for a period of time to allow infiltration, or is applied to the soil subsurface by raising the water table to wet the root zone.

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.

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

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

Significant harm As defined in 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.

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 discharge Precipitation and snowmelt runoff from roadways, parking lots, roof drains that is collected in gutters and drains; a major source of nonpoint source pollution to water bodies and a challenge to sewage treatment plants in municipalities where the storm water is combined with the flow of domestic wastewater (sewage) before entering the wastewater treatment plant.

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.

Substrate The physical surface upon which an organism lives; the natural or artificial surface upon which an organism grows or to which it is attached.

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

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

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

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

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

Ultralow-volume fixtures Water-conserving plumbing fixtures that meet industry standards at a test pressure of 80 pounds per square inch (psi).

Upconing Process by which saline water underlying fresh water in an aquifer rises upward into the freshwater zone as a result of pumping water from the freshwater zone.

Uplands An area with a hydrologic regime that is not sufficiently wet to support vegetation typically adapted to life in saturated soil conditions; non-wetland; upland soils are non-hydric soils.

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

Water conservation The permanent, long-term reduction of daily water use. Permanent water use reduction requires the implementation of water saving technologies and measures that reduce water use while satisfying consumer needs. Water conservation is considered a water source option because it reduces the need for future expansion of the water supply infrastructure (see *Demand management*).

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

Water quality (1) A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose. (2) The physical, chemical, and biological condition of water as applied to a specific use. Federal and state guidelines set water quality standards based on the water's intended use, whether it is for recreation, fishing, drinking, navigation, shellfish harvesting, or agriculture.

Water Reservation A water reservation is a legal mechanism to set aside water for the protection of fish and wildlife or the public health and safety from consumptive water use. The reservation is composed of a quantification of the water to be protected, which includes a seasonal and a location component.

Water Resources Advisory Commission (WRAC) The SFWMD Water Resources Advisory Commission 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 groundwater storage, and groundwater recharge augmentation; and, related technical assistance to local governments and to government-owned and privately owned water utilities (Section 373.019, F.S.).

Watershed A region or area bounded peripherally by a water parting and draining ultimately to a particular watercourse or body of water. Watersheds conform to federal hydrologic unit code (HUC) standards and can be divided into sub-watersheds and further divided into catchments, the smallest water management unit recognized by SFWMD Operations. Unlike Drainage Basins, which are defined by Rule, watersheds are continuously evolving as the drainage network evolves.

Water Shortage 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 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.

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, F.S.)

Water Supply Plan (see *Regional Water Supply Plan*)

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.

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).

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. A portion of the North Fork of the Loxahatchee River was federally designated as the first Wild and Scenic River in Florida on May 17, 1985.

Withdrawal Water removed from a ground- or surface-water source for use.

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

High Service Pumps at South Martin Regional Utility
Supplying Water to Distribution System

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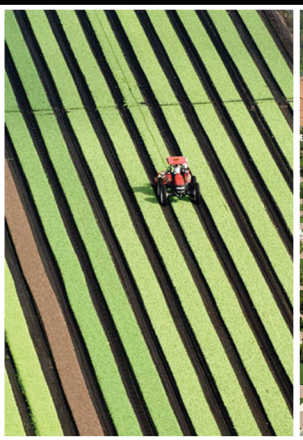
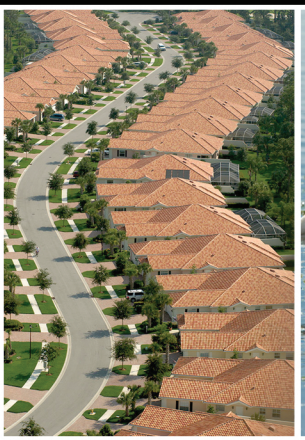


Meeting South Florida's water supply needs while safeguarding its natural systems requires innovative solutions, cohesive planning, and a shared vision.

South Florida Water Management District

Committed to managing and protecting our region's water resources

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