

Demand Estimates and Projections

This chapter describes two types of water demands – gross and net. Gross demands, or water withdrawal demands, are the demands on the water resource required to meet a particular need of a water user or customer in an average year. Gross demands, calculated in million gallons per day (MGD), include the system losses from irrigation methods and water treatment processes used in delivering the water to end users.

Net demands, also calculated in MGD, directly meet the needs of end users or customers after accounting for treatment and process losses, and inefficiencies. In terms of Public Water Supply, these demands are commonly called “finished water demands.” For the 20-year planning horizon of the *2011 Upper East Coast Water Supply Plan Update* (2011 UEC Plan Update), net demands must be met by the proposed selection of sources, treatment processes, storage options, and reclaimed water use resulting from the Public Water Supply projects identified in **Chapter 6**.

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 gross and net water demands.

This chapter provides an overall perspective of the gross and net demands in terms of average weather conditions and associated growth in the Upper East Coast Planning Area (UEC Planning Area). Demand projections in the *2004 Upper East Coast Water Supply Plan Update* (2004 UEC Plan Update) and *2006 Upper East Coast Water Supply Plan Amendment* (2006 UEC Amendment) were determined using 2000 baseline data. For the 2011 UEC Plan Update, a new baseline incorporating 2005 data was

established to estimate demand projections. The 2005 baseline was developed from extensive data including population, land use, cropping and 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 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 through 2030.

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 from the 2005 baseline to 2030. In the case of agriculture, acreage and demands by crop type are included, and in the case of public water supplies, population and demands by utility are provided. Although not quantified in this chapter, environmental demands are addressed during the water supply planning process using resource protection criteria.

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A 1-in-10 year drought event is an event that results in an increase in water demand to a magnitude that would have a 10 percent probability of exceeding during any given year. Subsection 373.0361(2)(a), Florida Statutes (F.S.), states the level of certainty planning goal associated with identifying demands shall be based on meeting demands during a 1-in-10 year drought event.

DESCRIPTIONS OF WATER USE CATEGORIES

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

- ◆ **Agriculture Self-Supply:** Water used for commercial crop irrigation, livestock watering, and aquaculture.
- ◆ **Public Water Supply:** Water supplied by water treatment facilities for potable use (drinking quality) with projected average pumpages for 2030 greater than 0.1 MGD.
- ◆ **Domestic Self-Supply:** Water used by households served by small utilities (less than 0.1 MGD) and/or private wells.
- ◆ **Recreation/Landscape Self-Supply:** Water used for irrigation of golf courses, parks, cemeteries, and other self-supplied irrigation uses with demands greater than 0.1 MGD.
- ◆ **Commercial and Industrial Self-Supply:** Self-supplied water consumed by business operations greater than 0.1 MGD.
- ◆ **Power Generation Self-Supply:** Water consumed by power plants in the production of electricity, excluding use of saline water sources.

Urban demands are the combined total of Public Water Supply, Domestic Self-Supply, Recreation/Landscape Self-Supply, Commercial and Industrial Self-Supply, and Power Generation Self-Supply. These use categories are expected to account for 63 percent of the UEC Planning Area's total net demands by 2030.

The following Gross Water Demands section discusses the average gross demand projections for Agriculture Self-Supply, Recreation/Landscape Self-Supply, Commercial and Industrial Self-Supply, and Power Generation Self-Supply. The Net Water Demands section

discusses the average-year net demand projections for Public Water Supply and Domestic Self-Supply. Water supply development projects proposed for water treatment facilities can be found in **Chapter 6**.

GROSS WATER DEMANDS

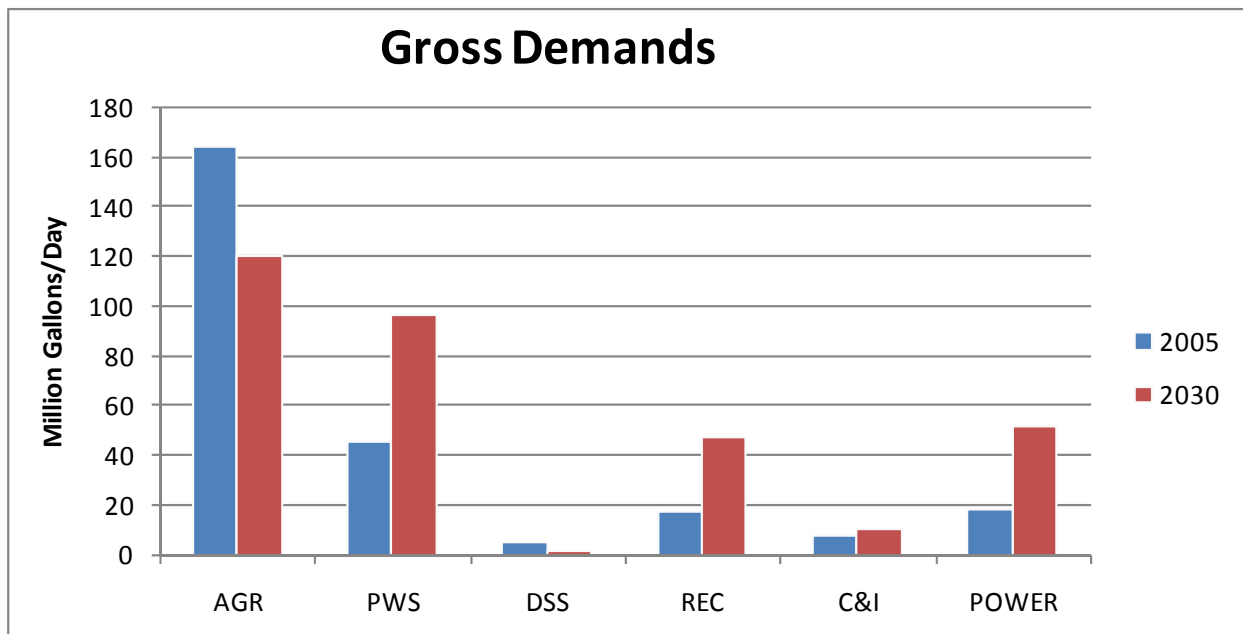
Gross demands differ from net demands for Public Water Supply, Recreation/Landscape Self-Supply, and Agriculture Self-Supply due to inefficiencies in the delivery or treatment of water for these uses. Not all the water withdrawn is available to meet the net demands; however, the difference between gross and net demands can be reduced through water conservation practices that in turn reduce demands on the water resource. **Figure 1** shows the 2005 baseline gross demands and projected 2030 gross demands for all water use categories.

In 2005, gross water demands for all categories in the UEC Planning Area totaled 254.5 MGD, compared with the projected total of 324.2 MGD by 2030, an increase of 27 percent (**Figure 1**). Key highlights include:

- ◆ Agriculture Self-Supply gross demands within the UEC Planning Area are projected to decline from the 2005 baseline of 164 MGD to 120 MGD by 2030. Despite this 27 percent reduction, agriculture is expected to remain the largest use category in the UEC Planning Area.
- ◆ Public Water Supply gross demands are expected to increase by 113 percent from the 2005 baseline of 44.9 MGD to 95.7 MGD by 2030, representing the second-largest use category in the UEC Planning Area (see Net Water Demands section for more information about Public Water Supply demands).
- ◆ Recreation/Landscape Self-Supply gross demands are projected to increase by 175 percent from the 2005 baseline of 16.9 MGD to 46.5 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 17.4 MGD to 51.3 MGD by 2030, largely due to new generation facilities planned by Florida Power & Light (FPL).

DISTRICT

Gross Demand or Withdrawal Demand: The amount of water withdrawn from the groundwater or surface water system to meet a particular need. Gross demands are nearly always higher than Net Demands because of inherent treatment and process losses, and inefficiencies associated with delivering water from the source to the end user.



	Agriculture Self-Supply ^a	Public Water Supply	Domestic Self-Supply	Recreation/Landscape Self-Supply	Commercial & Industrial Self-Supply	Power Generation Self-Supply	Total
Baseline 2005 MGD	164	45	5	17	7	17	255
Projected 2030 MGD	120	96	1	47	9	51	324
% Change	-27%	113%	-72%	175%	40%	195%	27%

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 the Comprehensive Everglades Restoration Program (CERP).

Figure 1. Estimated average-year gross demands by water use category. The bar chart compares demands by use category in million gallons per day (MGD), and the table shows the percentage of growth in each use category.

Agricultural Self-Supply

In the UEC Planning Area, total irrigated acreage for active agricultural production, particularly citrus, continues to shift downward. Compared with the 2005 baseline of 137,000 acres, total acreage is expected to decline by 27 percent to approximately 97,000 acres in 2030. Factors affecting this decrease include loss of citrus groves to disease, hurricane damage to crops, economic fluctuations, and removal of lands from agricultural use for ecosystem restoration and urbanization.

Although gross water demand in this category is projected to decline, from 164 MGD to 120 MGD, agriculture is expected to remain the largest use category in the region, with citrus as the largest crop (over 50 percent of all crops grown). The UEC Planning Area encompasses a portion of the Indian River Citrus District, known globally for its Indian River grapefruit.

The continuation and growth of citrus is contingent on the development of disease-resistant citrus trees. Research is currently under way involving the investigation of new techniques to grow citrus, such as the open hydroponics system. According to the citrus industry, no profitable alternative crop has been identified for this planning area at this time.

Agricultural water demand reflects projected irrigated acreage, crop and soil types, growing seasons, and irrigation system types and strategies. Acreage projections are based on the data and methods contained in the land use projection analysis completed by the SFWMD to support the 2011 UEC Plan Update. Agricultural acreage estimates from the U.S. Department of Agriculture (USDA) and the SFWMD Water Use Information System have been used to confirm or revise the previous analyses. In addition, representatives of the agricultural community and agricultural stakeholders, including the USDA, Institute of Food and Agricultural Sciences (IFAS), Natural Resources Conservation Service (NRCS), Farm Bureau, and local extension agencies provided input on agricultural acreage estimates, which were considered in the overall analysis.

Agriculture Self-Supply and Recreation/Landscape Self-Supply demand calculations for the 2011 UEC Plan Update were made using the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) Model. This chapter presents the gross irrigation demands for agriculture (**Figure 1**), as well as the net irrigation demands (**Figure 2**). Gross irrigation requirements reflect the efficiency of water delivery. Net demands reflect an estimate of the amount of water farmers need to place into the root zone of crops. **Appendix A** presents both net and gross irrigation demands by crop type under average-year and 1-in-10 drought conditions.

Recreation/Landscape Self-Supply

Gross demand for Recreation/Landscape Self-Supply is projected to increase by 175 percent from the 2005 baseline of 16.9 MGD to 46.5 MGD in 2030. Recreational demands supplied by PWS utilities are included in the PWS demands. Recreational Self-Supply water use projections primarily include landscape and golf course irrigation demands. Landscape irrigation includes water demands for all parks (small to large), communities with large

common areas, and area with large greens, such as ball fields, stadiums, cemeteries, etc. 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 Information System, including individual, major, and minor general permits. Future years were projected using county population growth rates, information provided by local planning officials, and golf course publications. A slower growth rate was assumed for golf courses.

Commercial and Industrial Self-Supply

Commercial and Industrial Self-Supply demands are projected to increase slightly by 3 MGD from 2005 to 2030. This use category includes large plant facilities for production processing, manufacturing, and technical needs, such as concrete, agricultural citrus processing, and bio-tech. Information from the SFWMD Water Use Information System was used to calculate the demands, along with population growth rates for each county.

Power Generation Self-Supply

Currently, two power generation plants in the UEC Planning Area are permitted to withdraw water: FPL Martin County Power Plant and Treasure Coast Energy Center (TCEC) located in Fort Pierce. The FPL Martin County site uses fresh water for cooling purposes, and the TCEC uses water from the Floridan aquifer. Both plants anticipate using reclaimed water for part of their needs at some point in the future. Neither of these facilities used reclaimed water in 2005.

The St. Lucie Nuclear Plant uses ocean water, which is not addressed in the water supply plans. The Indiantown Cogeneration Plant withdraws water from Taylor Creek/Nubbin Slough in the Kissimmee Basin Planning Area and is therefore not included in this plan update.

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 additional generating capacity to be installed will use fresh or alternative (brackish or reclaimed) water sources, and cooling tower technology as a heat rejection method. To date, most of the generating capacity has used flow through cooling, and much of this has been ocean water. FPL has future power generation plants planned for this area in 2020 and 2030. Power generation demands are expected to increase by 195 percent from the 2005 baseline of 17.4 MGD to 51.3 MGD by 2030.

NET WATER DEMANDS

Population and Water Use Trends

The UEC Planning Area's population is expected to increase by 107 percent from the 2005 baseline to 2030. St. Lucie County is projected to have the greatest growth, which 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 SFWMD will increase by approximately 28 percent. **Table 1** provides a summary of the population estimates for the counties or portions of counties located in the UEC Planning Area. 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.

Table 1. Population in the UEC Planning Area, 2005–2030.

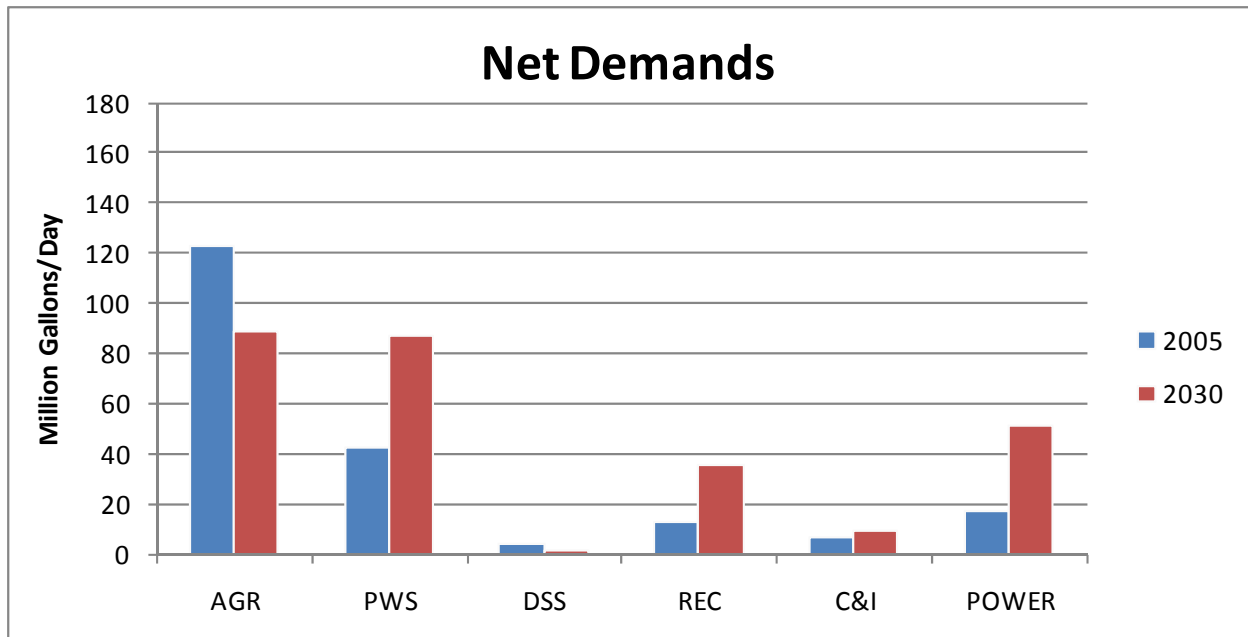
County Area	2005 ^a			2030 ^b		
	Population	Public Water Supply	Domestic Self-Supply	Projected Population	Public Water Supply	Domestic Self-Supply
St. Lucie	240,039	234,405	5,634	595,063	594,037	1,026
Martin	141,059	117,600	23,459	195,204	189,293	5,911
Eastern Okeechobee ^c	1,302	0	1,302	1,662	0	1,662
UEC Total	382,400	352,005	30,395	791,929	783,330	8,599

a. Source: University of Florida Bureau of Economic and Business Research, 2006 for the Year 2005.

b. SFWMD Population Methodology.

c. Portion in the SFWMD.





	Agriculture Self-Supply ^a	Public Water Supply	Domestic Self-Supply	Recreation/Landscape Self-Supply	Commercial & Industrial Self-Supply	Power Generation Self-Supply	Total
Baseline 2005 MGD	123	42	4	13	7	17	206
Projected 2030 MGD	89	87	1	35	9	51	273
% Change	-28%	106%	-72%	175%	40%	195%	32%

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 the Comprehensive Everglades Restoration Program (CERP).

Figure 2. Estimated average-year net demands by water use category. The bar chart compares demands by use category in MGD, and the table shows the percentage of growth in each use category.

Public Water Supply and Domestic Self-Supply

The UEC Planning Area includes the populations of Martin and St. Lucie counties, and the eastern portion of Okeechobee County within the SFWMD. The population of St. Lucie County is expected to increase by 148 percent over the next two decades. 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 (**Figure 2**). Public Water Supply demands increase significantly through the 2030 projection period, primarily due to the expected population increase. Domestic Self-Supply demand growth is less significant, as most new potable water demand will be served by public water systems.

DISTRICT

Net Demand or User/Customer Demand:

The water demands 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.

The SFWMD permanent resident population projections for this planning area are higher than the medium population projections from the University of Florida, Bureau of Economic and Business Research (BEBR 2009). In addition to BEBR population projections, the District used numerous resources to derive the county control population including Martin and St. Lucie Metropolitan Planning Organization traffic analysis zones, adopted local government and utility Water Supply Facility Work Plans approved by the Florida Department of Community Affairs (FDCA), SFWMD consumptive use permits, local governments' comprehensive plans and Evaluation and Appraisal reports, Developments of Regional Impact, and trends. For Martin and St. Lucie counties, the distribution of population relied primarily on traffic analysis zone projections used for transportation planning within each county. These were compared with utilities' projections, resulting in some adjustments, such as increasing growth for the City of Port St. Lucie. Population projections for Eastern Okeechobee County relied on medium BEBR population projections for Domestic Self-Supply projections. Currently, no water service provider exists in the eastern portion of Okeechobee County.

Estimates of Public Water Supply and Domestic Self-Supply 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. Conservation measures were not factored into the demand projections used in this chapter. Rather, conservation is considered a water source option (see **Chapter 4**).

DEMAND PROJECTIONS IN PERSPECTIVE

The demand projections presented in this 2011 UEC Plan Update are based on the best information available at this time. However, these projections reflect trends, circumstances, and industry intentions that change over time. For example, this plan update expects much greater population growth than the 2004 UEC Plan Update and 2006 UEC Amendment anticipated. The estimated growth is large enough that accommodating this population will require infill and development of existing urban areas, as well as development outside of current urban service boundaries. The District will continue to work closely with local governments and monitor growth decisions within this planning area.

There is an element of 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 (wind and flooding), economic fluctuations, removal of lands from agriculture for ecosystem restoration efforts, and pressures from urban development. The future of citrus in the UEC Planning Area depends on disease-resistant citrus trees. Research is being conducted to investigate new techniques to grow citrus, such as the open hydroponics system. No profitable alternative crop has been identified for this planning area at this time.

In summary, the major driving force behind the significant increase in overall gross water demands reflected in this 2011 UEC Plan Update is the region's anticipated population growth. Most of this growth, in absolute terms, is expected to take place in St. Lucie (148 percent) and Martin (38 percent) counties.

The UEC Planning Area's total population growth of approximately 409,000 residents from the 2005 baseline (382,400) through 2030 (791,929) is significantly higher than the population growth projection of 584,927 residents from 2000 to 2025 in the 2006 UEC Plan Amendment. The net result is that the 25-year overall increase in urban gross demands (all demand sectors except agriculture) in this plan update is 113.7 MGD, whereas urban gross demands in the 2006 UEC Plan Amendment were approximately 104 MGD. In contrast, gross agricultural demands are projected to decrease by 44 MGD between 2005 and 2030, compared to the 16 MGD increase projected in the 2004 UEC Plan Update.

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

REFERENCES CITED

Bureau of Economic and Business Research. 2009. Projections of *Florida Population by County, 2008-2035*. University of Florida, Gainesville, FL.