South Florida Water Management District
2017 Estimated Water Use Report

December 2018

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EXECUTIVE SUMMARY

This report compiles estimated water use information by use category within the South Florida Water Management District for calendar year 2017, based primarily on water pumpage records reported pursuant to water use permitting requirements. Water use is defined as any consumptive use of water that reduces the supply from which it is withdrawn or diverted. This report is not intended to comprehensively account for all water used or conveyed within the District (e.g., for flood control, natural systems, water quality treatment). In 2017, approximately 2,629 million gallons per day (mgd) of surface water and groundwater were used in the following categories (**Figure ES-1**):

- Public Water Supply (1,084 mgd)
- Domestic and Small Public Supply (41 mgd)
- Industrial/Commercial/Institutional (116 mgd)
- Agricultural Irrigation (1,076 mgd)
- Recreational/Landscape Irrigation (302 mgd)
- Power Generation (10 mgd)

Of the 2,629 mgd, approximately 1,640 mgd were derived from groundwater and 989 mgd were derived from surface water sources, with 2,444 mgd being freshwater and 185 mgd considered saline water. Additionally, approximately 254 mgd of reclaimed water were used primarily for landscape irrigation and, to a lesser extent, industrial and power generation uses.

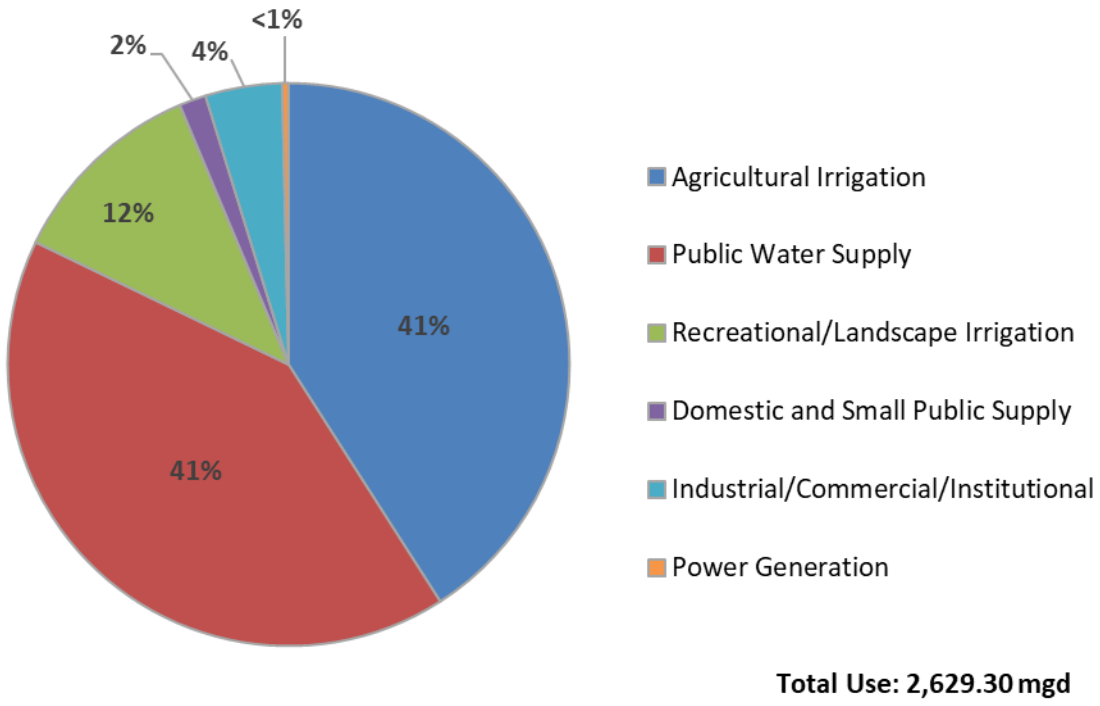

Figure ES-1. Percentage Water Use by Category

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ACRONYMS AND ABBREVIATIONS

AGR	Agricultural Irrigation
D&I	Diversion and Impoundment
District	South Florida Water Management District
DSS	Domestic and Small Public Supply
EAA	Everglades Agricultural Area
FDEP	Florida Department of Environmental Protection
ICI	Industrial/Commercial/Institutional
mgd	million gallons per day
mg/L	milligrams per liter
PCUR	per capita use rate
PWR	Power Generation
PWS	Public Water Supply
REC	Recreational/Landscape Irrigation
SFWMD	South Florida Water Management District
USGS	United States Geological Survey

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INTRODUCTION

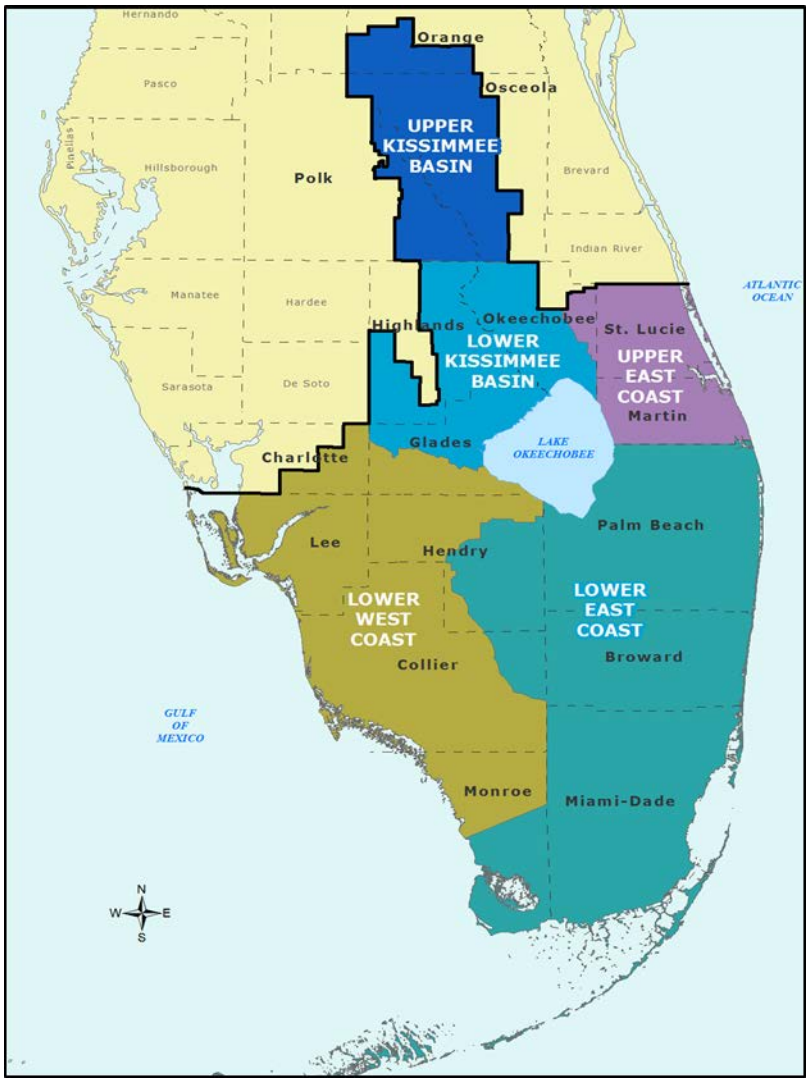
The South Florida Water Management District (SFWMD or District) is a regional government agency responsible for managing and protecting the water resources of South Florida by balancing and improving water quality, flood control, natural systems, and water supply. The District encompasses all or part of 16 counties from Orlando to the Florida Keys and serves a population of approximately 8.3 million residents. Created in 1949, it is the oldest and largest of the state's five water management districts. Among other duties, water management districts are responsible for water use permitting and water supply planning within their jurisdictional areas.

This report compiles estimated water use within the SFWMD for calendar year 2017. Water use is defined as any consumptive use of water that reduces the supply from which it is withdrawn or diverted. This report is a complement to the District's regional water supply plans, which capture current and projected water use, and to periodic water use reports prepared by the United States Geological Survey (USGS) (Marella 2014, 2015; Marella and Dixon, 2018). This report is based primarily on water pumpage records reported pursuant to water use permitting requirements. However, because 20 percent of the overall volume was estimated, rather than reported, the report is called the *Estimated Water Use Report*. This report is an important source of data and information to support the District's water resource programs and initiatives, including water supply planning, water use permitting, and water conservation.

This report documents the District's assessment of total water use. Estimated amounts are based on best available data at the time of publication. The document is not intended to comprehensively account for all water used or conveyed within the District (e.g., for flood control, natural systems, water quality treatment).

GEOGRAPHIC DESCRIPTION

The District encompasses more than 18,000 square miles in all or part of 16 counties of central and southern Florida. To manage water supply and plan for current and future water uses, the District is geographically divided into five planning regions (**Figure 1**). These regions are home to many permanent and seasonal residents in addition to a large tourist industry, a significant agricultural industry, and a growing industrial and commercial sector. Several major natural systems are located within the District, including the Upper Chain of Lakes, Kissimmee River and floodplain, Lake Okeechobee, Caloosahatchee River and Estuary, St. Lucie River and Estuary, Big Cypress National Preserve, Everglades Water Conservation Areas, Everglades National Park/Florida Bay, and Biscayne National Park.



Upper Kissimmee Basin: Osceola County and portions of Orange and Polk counties

Lower Kissimmee Basin: Portions of Okeechobee, Highlands, and Glades counties

Upper East Coast: Martin and St. Lucie counties and a portion of eastern Okeechobee County

Lower East Coast: Palm Beach, Broward, and Miami-Dade counties and portions of Monroe, Collier, and Hendry counties

Lower West Coast: Lee County, most of Collier County, and portions of Glades, Hendry, Monroe, and Charlotte counties

Figure 1. Water Supply Planning Regions

WATER USE PERMITTING AND REPORTING

Ensuring an adequate supply of water to protect, enhance, and restore natural systems and to meet all other existing and projected needs is a fundamental element of the SFWMD's mission. The District has adopted rules for regulating the use of water as contained in Chapter 40E-2, Florida Administrative Code, including the *Applicant's Handbook for Water Use Permit Applications* (Applicant's Handbook; SFWMD 2015). Uses exempt from permitting are indoor domestic use at a single-family or duplex dwelling, water used for firefighting purposes, the use of seawater, and the use of reclaimed water. The SFWMD issues two types of permits based primarily on the quantity of water required: Individual and General (both by rule and noticed). Individual permits normally are those allocating at least 0.10 million gallons per day (mgd) of water (averaged annually). Regional exceptions exist, such as the South Dade Agricultural Area, where Individual permits are issued for allocations of at least 0.30 mgd, and the Lower West Coast, where Individual permits are issued for groundwater allocations of at least 0.01 mgd. General permits by rule include landscape irrigation at a single-family dwelling or duplex, on-site short-term dewatering, and

closed-loop systems. Noticed General permits typically are for water users consuming less than 0.10 mgd that meet certain other requirements. Users with General permits (whether by rule or noticed) are not required to account for or report their water use.

Users with Individual permits typically are required to account for their water use and report a monthly volume used to the SFWMD. Individual permits are required to have a reliable, repeatable water use accounting system to record water use from all withdrawal facilities. For pumped systems, acceptable water use accounting systems include calibrated flowmeters or clocks that totalize pump operation. For gravity flow systems, acceptable methods include the use of rated water control structures in conjunction with certified structure rating curves. Water use accounting and calibration methods must be submitted as part of the permit application. Prior to the use of any authorized facility, the approved water use accounting method must be operating and the initial calibration submitted to the SFWMD. Recalibration results for the water use accounting method are required every 5 years (from the date of last calibration).

The water use of 19,215 permits was evaluated for calendar year 2017. In addition, there are 1,669 active permits for dewatering and 390 active permits for heating/cooling pools and air conditioning units. These 390 permittees recirculate water in such a way that there is no net consumption (closed-loop system); therefore, these permits were not included in the total use estimates. Another 117 permits using surface water exist within the boundaries of the Everglades Agricultural Area (EAA), which were evaluated holistically and are discussed later. Finally, 34 permits were classified as "other" that cumulatively contribute a negligible volume (less than 0.50 mgd) and were disregarded.

WATER USE ESTIMATION METHODOLOGY

The most accurate way to determine the amount of water used each year would be to total the annual water use of every user. However, as described previously, not all water users are required to account for and report their annual use, and some users had not reported their water use at the time of this report. Recognizing these data deficiencies, this report utilized water use information from water users that reported their use in 2017 and estimated the amount of water used by those who did not or do not report.

The specific water demands of each permittee are evaluated at the time of permit application, and each permittee has a calculated maximum volume of water allowed for use (i.e., a permit allocation). The annual permit allocation is determined by calculating the quantity of water to be withdrawn over a 12-month period under 1-in-10 year drought conditions for the associated use category. For agricultural irrigation users, it is the amount of water a crop needs to supplement the rainfall received during 1-in-10 year drought conditions. For other use categories, it is the quantity of water required by each component of demand for the particular use, which may include factors such as treatment losses; other sources of water; conservation practices; and water purchased, sold, or transferred. It is important to understand that the allocated permit volume for most categories is the water volume required by those users during 1-in-10 year drought conditions. Therefore, during 1-in-10 year drought conditions for the entire area of the District, the total water use for the District should approximate the summation of all the permit allocations. Water use in 2017 was less than the amount allocated in permits.

The ratio of reported use to the permit allocation (referred to herein as the allocation utilization ratio) was used as an analogue to obtain an estimate of use for permittees who did not report or were not required to report. The estimation process used in this 2017 report was similar to previous years, with two noteworthy exceptions. First, the allocation utilization ratios used in previous years were the total reported pumpage volumes to total permit allocations. For 2017, each permit's allocation ratio was calculated and then the ratios were averaged. Further analysis completed as part of this 2017 report suggests a straight average of reported utilization ratios is more representative of the water use behavior of non-reporting permit holders and therefore used for each water use category described later. Second, for each water use category, the set of permits with reported 2017 water use were evaluated to remove outlier allocation utilization ratios that would bias water use estimates. Outlier allocation utilization ratios less than the 10^{th} percentile and greater than the 90^{th} percentile were removed from the calculation of average water use category allocation utilization ratios. Using a combination of reported and estimated water use for each permittee, the total amount of water used for each use category was estimated. Further information on specific methods by use category are described later in this document.

WATER SOURCES

This report estimates the volume of water withdrawn or diverted from groundwater and surface water sources. Reported pumpage data were ascribed to specific water sources (i.e., groundwater or surface water). All estimated data were assigned a source based on their related facility types. Permittees exclusively utilizing pumps to extract water were assigned as surface water users, and those exclusively using wells were designated as groundwater users. In cases where a permittee has both pumps and wells, the estimated volumes were split proportionally between surface water and groundwater sources based on the average reported ratio of groundwater to surface water use. Average groundwater to surface water use ratios were calculated and applied to each water use category. Some permits employ "recharge" facilities (almost exclusively groundwater sources), which provide recharge water to surface water bodies to be repumped, mostly for irrigation use. In those cases, in order to avoid double counting, the volume from the groundwater source was subtracted from the volume delivered for irrigation to obtain an adjusted volume attributed to the surface water body.

As stated earlier, the use of reclaimed water is not regulated by water management districts. However, reclaimed water use is a key component of water resource management. The beneficial use of reclaimed water for irrigation and other uses has reduced the need for surface water and groundwater sources. Reclaimed water data are compiled separately in this report based on inventories produced by the Florida Department of Environmental Protection (FDEP) from data submitted by utility providers. Some permits contain supply sources that are used for blending with reclaimed water or as a backup supply should reclaimed water become unavailable. Permittees with these permit types that did not report water withdrawals were assumed to have met all their water demands from a reclaimed water supplier and were not estimated individually. When reclaimed water was partially used (reported) by a permittee, only the volume from the groundwater or surface water source was counted to avoid double counting the reclaimed water volumes. Additional information on sources is provided under individual use categories later in this report.

WATER QUALITY

Water use estimates contained in this report are divided into fresh water and saline water. For the purposes of this report, the following terms and definitions from the Applicant's Handbook (SFWMD 2015) are used to define different water qualities:

- ***Freshwater*** is water with a chloride concentration ≤250 milligrams per liter (mg/L)
- ***Saline water*** is water with a chloride concentration between 250 and 19,000 mg/L
- ***Seawater*** or ***Saltwater*** is water with a chloride concentration ≥19,000 mg/L

In general, freshwater sources in the District include the Upper Floridan aquifer in the Upper and Lower Kissimmee Basins; the surficial aquifer system in the Upper East Coast Planning Area; the Biscayne aquifer in the Lower East Coast Planning Area; the Lower Tamiami, Water Table, and Sandstone aquifers in the Lower West Coast Planning Area; and surface water upstream of coastal salinity water control structures. Saline water sources in the SFWMD include the Floridan aquifer system in the Upper East Coast, Lower East Coast, and Lower West Coast planning areas, while seawater sources include the Atlantic Ocean and Gulf of Mexico as well as connected tidal water bodies. Saline water and saltwater sources require blending with freshwater sources or desalination treatment prior to use as potable water or for irrigation. Only a fraction of the permits requires water quality testing to determine salinity. Therefore, the volumes reported as saline water are only for permits known to require treatment or blending from known saline sources, primarily in the Public Water Supply (PWS) category and to a lesser extent the Recreational/Landscape Irrigation (REC) and Agricultural Irrigation (AGR) categories. If the salinity of the source water and treatment/blending requirements are unknown, the water quantities are classified as fresh.

WATER USE CATEGORIES

Water use estimates in this report were developed for each of the following six water use categories established by the FDEP in collaboration with the state's five water management districts for use in water supply planning:

- Public Water Supply (PWS)
- Domestic and Small Public Supply (DSS)
- Industrial/Commercial/Institutional (ICI)
- Agricultural Irrigation (AGR)
- Recreational/Landscape Irrigation (REC)
- Power Generation (PWR)

PWS includes treated potable water provided to some of the other use categories within a utility's service area boundaries. The other categories include users that are separately permitted and do not receive water from a utility but rather have their own water supply withdrawal facilities (e.g., wells, pumps, structures). These water supply categories are not identical to the use classes utilized in permitting. As a result, permitting use classes were combined in some cases to develop the water use estimate for the water supply categories used in this report.

Dewatering activities are not included in this report. Dewatering involves pumping water from an area to produce a dry working condition and includes withdrawals of water for construction activities, some mining operations, and minor uses such as exploratory testing, short-term remedial action plans, and aquifer performance tests. Water from dewatering activities normally is required to be retained on site such that losses are limited to evaporation, which are considered minimal compared to the volumes pumped. Furthermore, permits for dewatering are not given allocations (although General permits must comply with daily and annual withdrawal limits), and permittees generally are not required to report water use to the SFWMD.

There are 390 permits classified as industrial that utilize wells for their geothermal properties and are not included in this report. These "closed-loop" applications include air conditioning and swimming pool temperature regulation, which extract groundwater, pass it through a heat exchange unit, and then reinject the warm or cool water back into the ground. The result of the closed-loop system operation effectively is a zero-balance withdrawal. Recent changes to water use rules have made these type systems a "no notice" permit such that they are no longer issued a permit number or tracked.

Diversion and Impoundment (D&I) permits usually are for large parcels of land that contain smaller users within their boundaries. These permittees divert surface water through pumps or control structures, or divert a combination of surface water and groundwater into a conveyance canal network system, to provide for the demands of secondary users and of consumptive and non-consumptive uses. There are 24 D&I permits outside of the EAA that exclusively serve agriculture, and 2 permits that partially serve agriculture. The estimated volumes for these permits are included in the AGR category. In addition, there are 9 D&I permits within the EAA whose water use is accounted for in the EAA estimate later in this report. Finally, 23 D&I permits primarily for recharging aquifer and canal networks, hydrating wetlands, maintaining salinity barriers along the coast, or providing fire protection were not included in the water use estimates of this report.

2017 WEATHER

Average historical (1915 to 2017) annual rainfall within the District is 52.21 inches. **Figure 2** presents the annual deviation from average rainfall over the past century. From 2007 to 2017, average annual rainfall within the District varied by 16 inches; the driest year was 2007 with 42.89 inches (18 percent below average), and the wettest year was 2017 with 63.68 inches (23 percent above average). However, a Districtwide average number does not tell the whole story as rainfall varies not only by year but also by month and location. The District typically receives two-thirds of its annual rainfall between May and October (**Figure 3**). **Figure 4** presents the rainfall amounts received by each basin within the District for 2017. Note that **Figure 4** utilizes a 30-year annual rainfall average of 51.83 inches related to percent and inches deviation from "average".

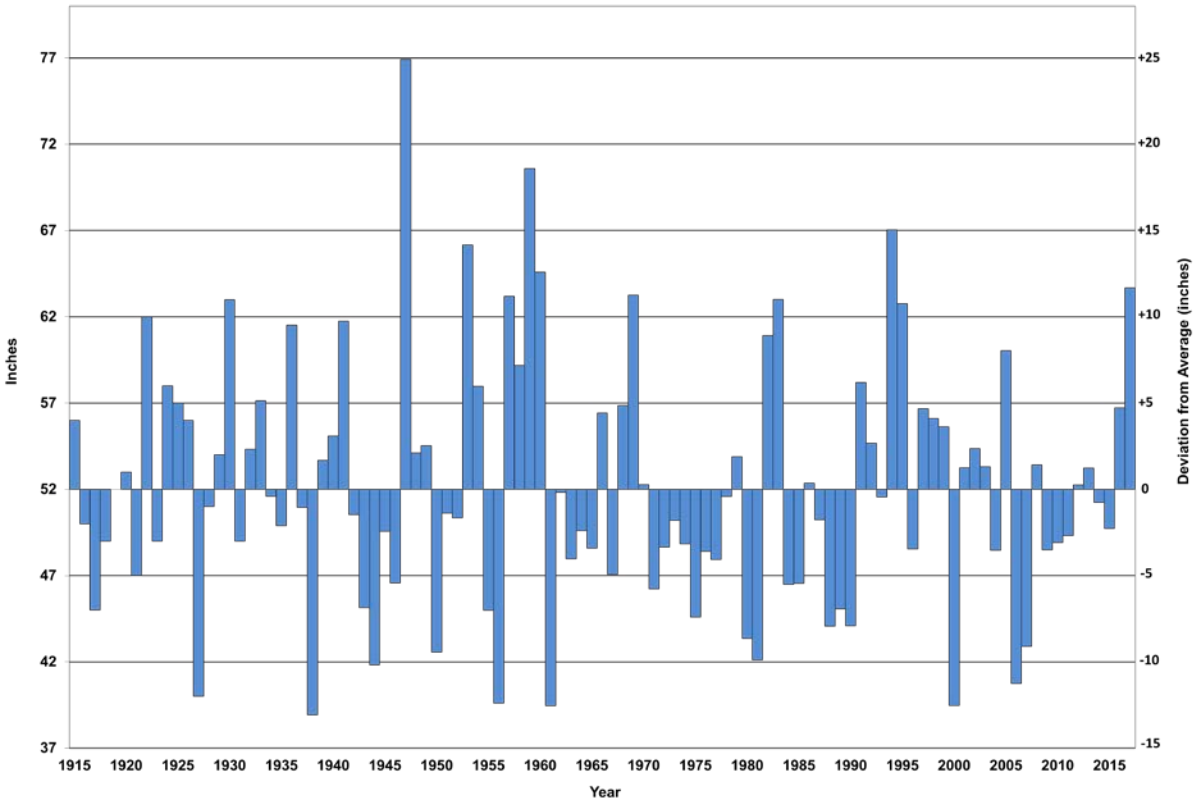


Figure 2. SFWMD Annual Difference from Average Rainfall (1915-2017)

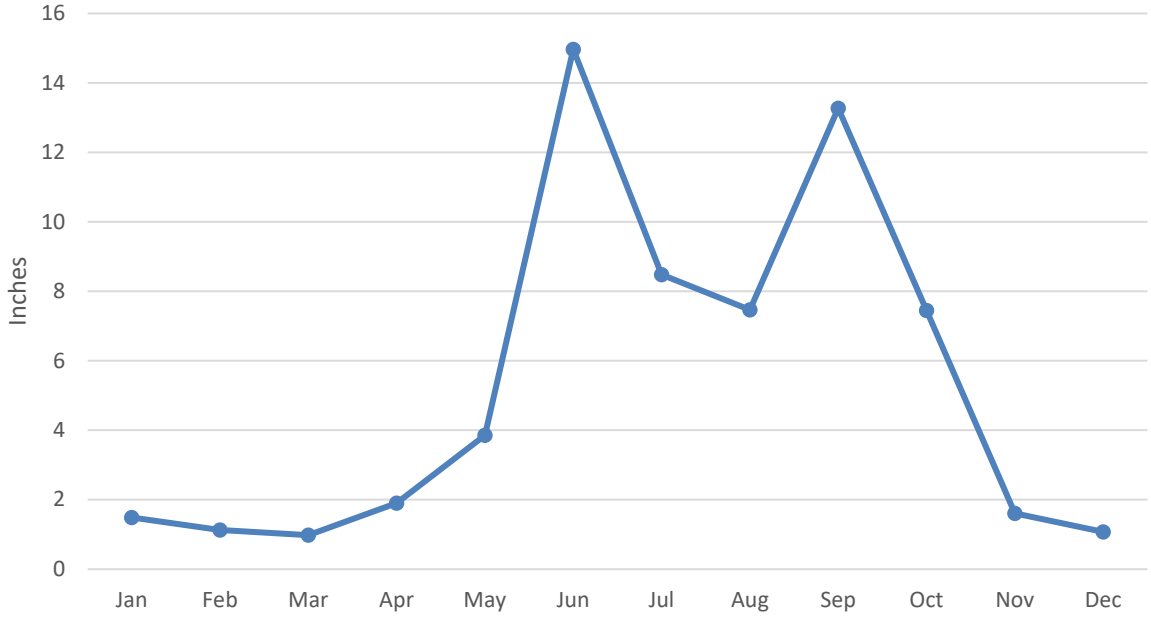
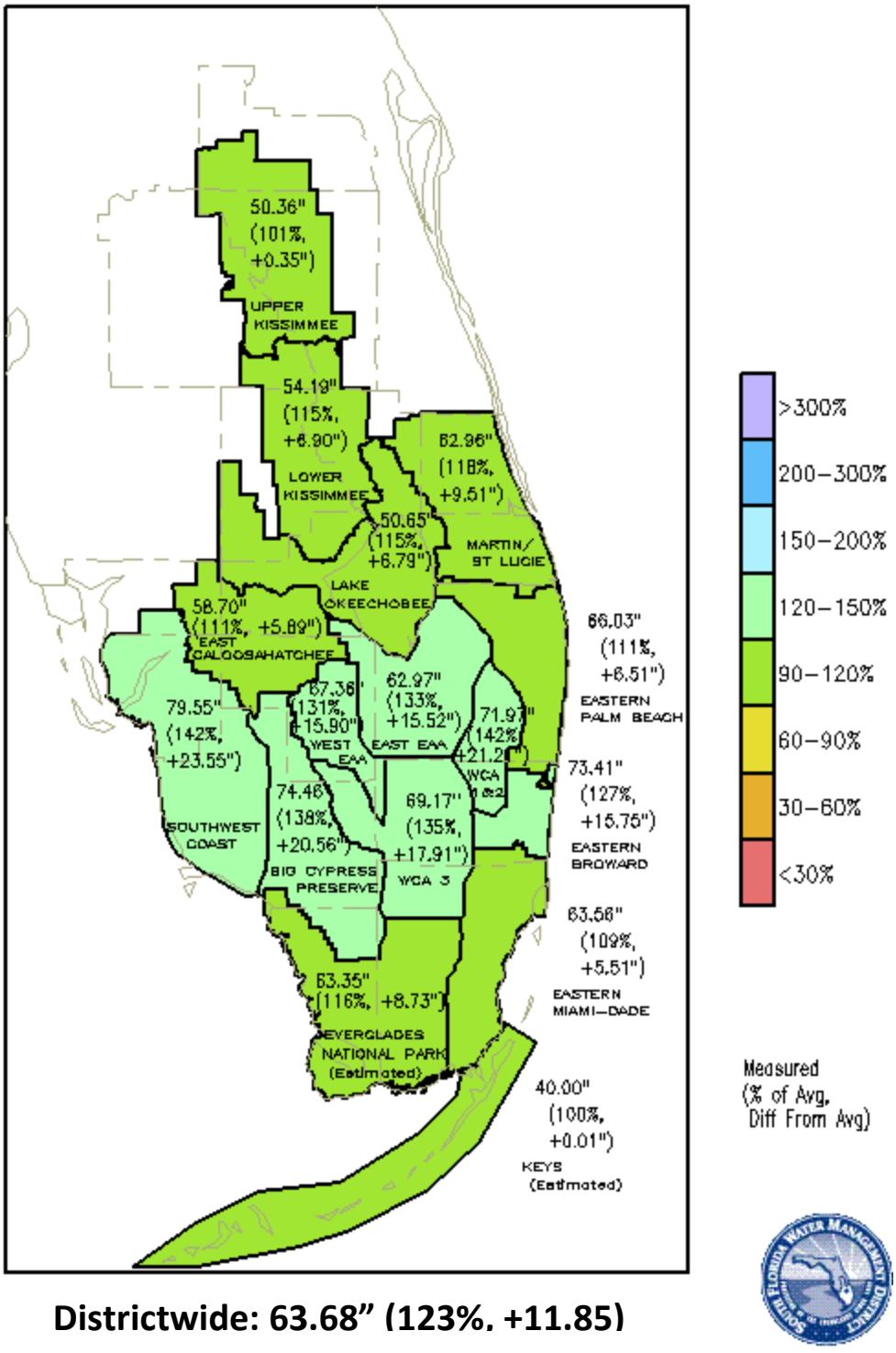


Figure 3. 2017 Average District Monthly Rainfall Distribution

SFWMD Rainfall
January 2, 2017 to January 1, 2018



Districtwide: 63.68" (123%, +11.85)

GrADS: COLA/IGES

Figure 4. SFWMD 2017 Rainfall Distribution Map Compared to 30-Year Historical Average

DATA SOURCES

The primary sources of data for this report are permittee-reported monthly pumpage volumes recorded in the SFWMD's regulatory database (RegDB). Quarterly and semi-annual reporting of monthly data generally is required for all permittees with permit quantities of 0.10 mgd or greater. Monthly pumpage data are collected using calibrated flowmeters or other approved water use accounting methods. Estimates of water use were made for permittees who had not reported based on the assumptions described in the methodology section earlier and in the specific use category sections that follow. Rainfall data were provided by the SFWMD's Operations Section.

For this report, water use estimates are based on RegDB queries performed on October 10, 2018. Data for all use categories were obtained for active permits from January 1, 2017 through December 31, 2017. Analysis of reported water use was performed by specialists within the SFWMD's Water Supply Development Section to compile the best available data. However, the SFWMD cannot guarantee the validity of the reported data or that permittees have used consistent measurement techniques or quality control standards in their data collection and reporting. Additionally, sources of data used for this report may be updated after publication.

2017 ESTIMATED WATER USE BY CATEGORY

Water use was estimated by category from fresh, saline, and reclaimed water sources and reported as an average (in mgd, unless noted otherwise).

Public Water Supply

Water withdrawn, treated, and delivered to service areas within the SFWMD by privately and publicly owned water supply utilities (or systems) is defined as Public Water Supply (PWS). This encompasses water supplied by water treatment facilities for potable use (i.e., drinking quality) with projected average pumpage rates of 0.10 mgd or greater. The reported volumes represent gross (raw) water withdrawn before treatment and distribution losses. In 2017, there were 119 active PWS permits (0.10 mgd or greater) serving an estimated 7.96 million people (94 percent of the total District population). PWS utilities and individuals using less than 0.10 mgd are included in the DSS category. PWS demand often fluctuates during the year in response to seasonal rainfall and variations in temperature as well as seasonal and tourist populations. For 2017, the total water use for PWS was 1,084.21 mgd, with 86 percent coming from freshwater sources and 14 percent coming from saline water sources. Groundwater contributed 97 percent of the water, and surface water accounted for the remaining 3 percent. **Table 1** presents total water use Districtwide and by county for fresh and saline water from groundwater and surface water sources in the PWS category.

Table 1. Public Water Supply (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	218.75	10.09	0.00	228.85	**228.85**	26
Charlotte	0.13	0.00	0.00	0.13	**0.13**	3
Collier	40.11	14.18	4.67	49.63	**54.30**	9
Glades	0.49	0.00	0.00	0.49	**0.49**	2
Hendry	0.69	2.94	0.00	3.62	**3.62**	4
Highlands	0.26	0.00	0.00	0.26	**0.26**	2
Lee	23.64	44.11	0.00	67.75	**67.75**	13
Martin	8.34	12.01	0.00	20.35	**20.35**	8
Miami-Dade	333.04	10.43	0.00	343.47	**343.47**	7
Monroe[2]	0.00	0.00	0.00	0.00	**0.00**	0
Okeechobee	2.82	0.00	2.63	0.20	**2.83**	2
Orange	33.83	6.14	0.00	39.97	**39.97**	4
Osceola	44.25	0.00	0.00	44.25	**44.25**	6
Palm Beach	214.45	29.29	29.63	214.11	**243.74**	19
Polk	2.91	0.00	0.00	2.91	**2.91**	5
St. Lucie	7.90	23.40	0.00	31.30	**31.30**	9
Total	**931.62**	**152.59**	**36.93**	**1,047.28**	**1,084.21**	**119**

[1] Values are only for the portions of the counties located within the SFWMD.

[2] The Florida Keys Aqueduct Authority (FKAA) serves the Florida Keys in Monroe County. Because the FKAA's wellfields are located in Miami-Dade County, the volume delivered to Monroe County (17.33 mgd of groundwater [17.15 mgd fresh and 0.18 mgd saline]) is included in the Miami-Dade County totals.

Domestic and Small Public Supply

Domestic and Small Public Supply (DSS) is primarily for individual residences located in rural areas without access to a PWS system, and often is provided by small shallow private wells. Domestic consumption at single-family and duplex residences is exempt from water use permitting and reporting. Landscape irrigation at a single-family dwelling or duplex is granted a General permit by rule. For reporting purposes, the DSS category includes PWS utilities and users classified as public water supply withdrawing less than 0.10 mgd. These typically serve a limited number of households (e.g., a small subdivison or mobile home park). Other small self-supply permits classified as public water supply are for domestic indoor use (and possibly landscape irrigation) at a single structure such as a sales trailer, small office, or convenience store. There were 1,069 permits for public water supply with an allocation less than 0.10 mgd in 2017.

Because DSS residential users are not required to report their use, estimations for the DSS category are based on county population data and the PWS per capita use within each county. The DSS demand estimate was calculated by multiplying the 2017 DSS county populations by the 2017 PWS Districtwide uniform residential per capita use rate (PCUR), which was derived from water use reported by utilities to the SFWMD as part of their annual reporting required pursuant to Section 373.709(6), Florida Statutes. **Appendix A** contains further information regarding population, PCURs, and self-supplied use calculations.

The 2017 total water use for DSS was estimated to be 40.65 mgd, with 100 percent coming from fresh groundwater sources. **Table 2** presents total water use by county for fresh and saline water from groundwater and surface water sources in the DSS category.

Table 2. Domestic and Small Public Supply (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits[2]
Broward	0.86	0.00	0.00	0.86	**0.86**	23
Charlotte	0.00	0.00	0.00	0.00	**0.00**	7
Collier	4.12	0.00	0.00	4.12	**4.12**	65
Glades	0.49	0.00	0.00	0.49	**0.49**	30
Hendry	1.09	0.00	0.00	1.09	**1.09**	66
Highlands	0.50	0.00	0.00	0.50	**0.50**	25
Lee	12.20	0.00	0.00	12.20	**12.20**	137
Martin	0.93	0.00	0.00	0.93	**0.93**	108
Miami-Dade	1.79	0.00	0.00	1.79	**1.79**	96
Monroe	0.00	0.00	0.00	0.00	**0.00**	0
Okeechobee	1.30	0.00	0.00	1.30	**1.30**	85
Orange	0.59	0.00	0.00	0.59	**0.59**	18
Osceola	6.60	0.00	0.00	6.60	**6.60**	93
Palm Beach	5.75	0.00	0.00	5.75	**5.75**	153
Polk	1.50	0.00	0.00	1.50	**1.50**	24
St. Lucie	2.94	0.00	0.00	2.94	**2.94**	139
Total	**40.65**	**0.00**	**0.00**	**40.65**	**40.65**	**1,069**

[1] Values are only for the portions of the counties located within the SFWMD.
[2] Public water supply permits less than 0.10 mgd.

Industrial/Commercial/Institutional

Industrial/Commercial/Institutional (ICI) consists of self-supplied water consumed by business operations. Industrial facility uses include processing and manufacturing, dust control, maintenance, cleaning, and washing. Groundwater remediation projects also are classified as an industrial use. Commercial facilities under the ICI category include office complexes, hotels, restaurants, gas stations, car washes, laundromats, theme parks, and zoos, among others. Some larger institutions such as schools, hospitals, and prisons also are included in the ICI category primarily for heating, ventilation, and cooling (HVAC) system operations. Water use for ICI facilities receiving water from PWS utilities (i.e., not self-supplied) are included in the PWS category. ICI does not include water used for power generation.

Mining is included in the ICI use category. The mining uses reported herein include dust suppression, non-recycled water use as part of on-site mining processes, water entrained within commercial products, and minor volumes for potable/sanitary use by on-site employees. The volumes reported do not include recycled surface water or dewatering volumes, which are separately permitted under the dewatering use class and not included in this report.

The average allocation utilization ratio of reporting ICI permits was 0.24 after removing permits below the 10th percentile and above the 90th percentile allocation utilization ratios. Water use for ICI permits that did not report in 2017 was estimated by multiplying the average allocation utilization ratio of 0.24 by the permit allocations.

The ICI category includes 27 mining and 54 industrial permits that have an allocation of 0.10 mgd or greater, and 540 permits with an allocation less than 0.10 mgd. The total 2017 water use for ICI was 116.10 mgd, with fresh groundwater contributing 54 percent and fresh surface water contributing 46 percent. Industrial use accounted for 18.55 mgd (16 percent) and mining use accounted for 97.60 mgd (84 percent) of the total ICI use. **Table 3** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the ICI category. Further detail is provided in **Appendix B**.

Table 3. Industrial/Commercial/Institutional (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	1.72	0.00	0.02	1.69	**1.72**	80
Charlotte	0.38	0.00	0.32	0.06	**0.38**	10
Collier	6.60	0.00	5.98	0.62	**6.60**	73
Glades	10.86	0.00	10.46	0.40	**10.86**	10
Hendry	4.66	0.00	0.00	4.65	**4.66**	39
Highlands	0.95	0.00	0.01	0.94	**0.95**	16
Lee	24.15	0.00	20.67	3.47	**24.15**	85
Martin	0.58	0.00	0.17	0.41	**0.58**	35
Miami-Dade	55.57	0.00	9.73	45.85	**55.57**	76
Monroe	0.00	0.00	0.00	0.00	**0.00**	1
Okeechobee	0.13	0.00	0.01	0.12	**0.13**	21
Orange	2.03	0.00	0.00	2.03	**2.03**	14
Osceola	0.05	0.00	0.00	0.05	**0.05**	19
Palm Beach	8.32	0.00	5.68	2.64	**8.32**	109
Polk	0.02	0.00	0.00	0.02	**0.02**	2
St. Lucie	0.15	0.00	0.00	0.15	**0.15**	31
Total	**116.15**	**0.00**	**53.05**	**63.10**	**116.15**	**621**

[1] Values are only for the portions of the counties located within the SFWMD.

Agricultural Irrigation

Agricultural Irrigation (AGR) includes water used for commercial crop irrigation, nurseries, livestock watering, pasture, and aquaculture. AGR estimates were based on the methodology described in the *Water Use Estimation Methodology* section earlier in this report, with the following exceptions:

- For the agriculture permitting use classes, 666 users in all 5 planning regions of the SFWMD reported. The reported water use to permitted allocation ratios were determined by water supply planning regions to take regional weather effects into account. Statistical analysis (the Mann-Whitney *U* test) supported using unique allocation utilization ratios for each planning region rather than a single ratio for the entire use category. The AGR allocation utilization ratios for each planning region were:
    - Upper Kissimmee Basin – 0.18;
    - Lower Kissimmee Basin – 0.15;
    - Upper East Coast – 0.13;
    - Lower West Coast – 0.27; and
    - Lower East Coast – 0.23.

- For the aquaculture permitting use class, 4 users in 2 of the 5 planning regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 8 percent based on those permittees that did report.
- For the nursery permitting use class, 40 users in 4 of the 5 planning regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 40 percent based on those permittees that did report.
- For the livestock permitting use class, 10 users in 3 of the 5 regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 65 percent based on those permittees that did report.

The AGR category is made up of 3,786 permits, including 2,313 agriculture (107 of which are within the EAA), 860 nursery, 503 livestock, 84 aquaculture, and 26 D&I permits that serve agricultural operations.

Everglades Agricultural Area (EAA)

The EAA is located south of Lake Okeechobee and was created from drainage of the northern Everglades. The EAA encompasses approximately 700,000 acres (1,158 square miles) of highly productive agricultural land and land used by the District for water storage and treatment (e.g., stormwater treatment areas). The agricultural land is mostly sugarcane interspersed with winter vegetables, sod, and rice. The EAA extends south from Lake Okeechobee to the northern levee/boundary of Water Conservation Area 3A, from its eastern boundary at the L-8 Canal to the western boundary along the L-1, L-2, and L-3 levees (**Figure 5**). Four major canals (West Palm Beach, Hillsboro, North New River, and Miami) pass through the EAA and supply agricultural irrigation, mainly through gravity release from Lake Okeechobee. The primary irrigation method in the EAA is seepage irrigation. Farmers utilize a set of secondary and tertiary canals to distribute surface water from gated culverts and pumps to their respective fields. Flows from Lake Okeechobee into the canals are from structures S-351, S-352, and S-354. Runoff (outflow from the EAA) from the four canals to the stormwater treatment areas are discharged through pump structures S-5A, S-6, G-370, G-372, G-434, and G-435.

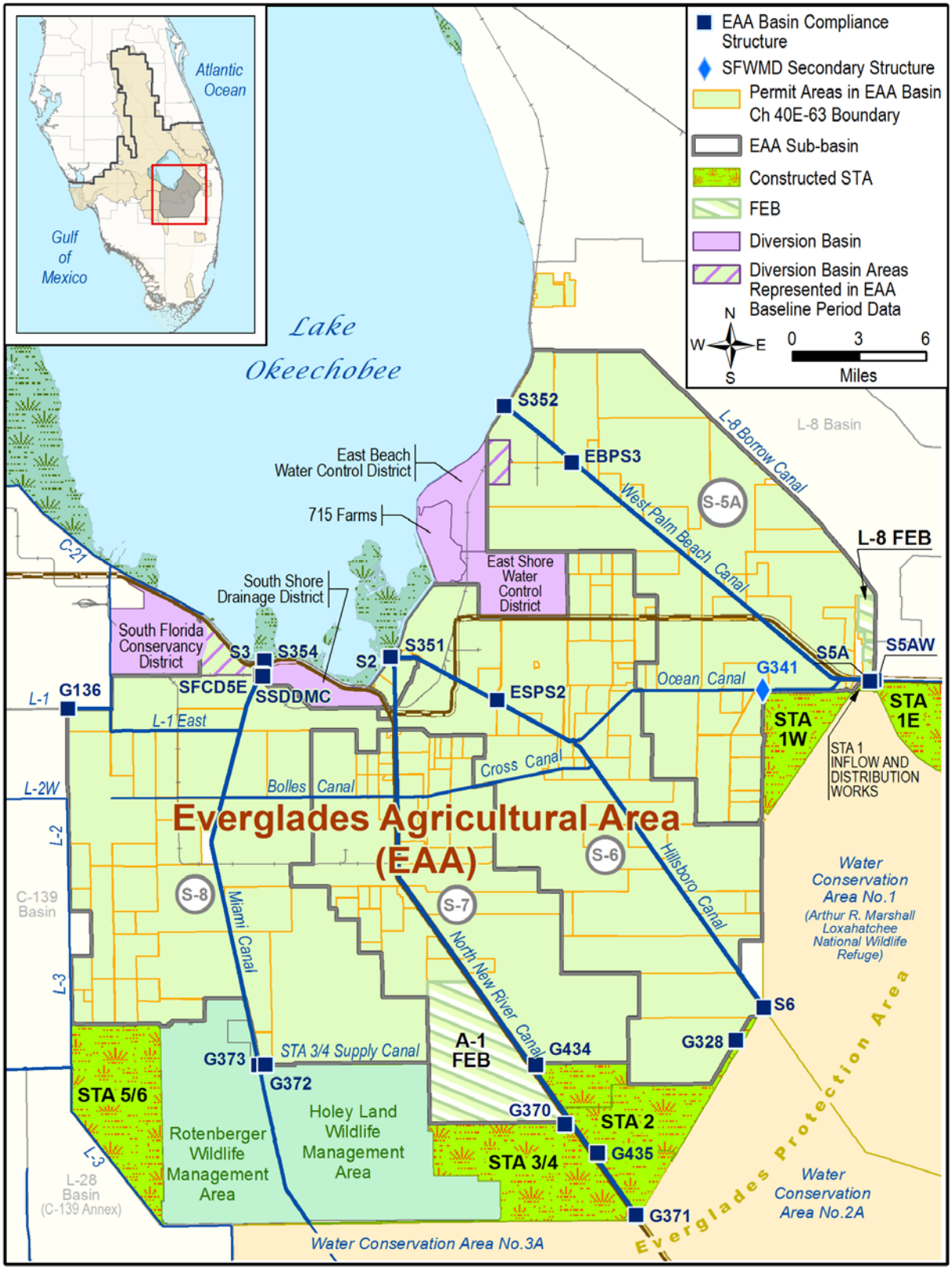


Figure 5. Map of the Everglades Agricultural Area

Daily records of the water volumes into and out of these structures are kept such that a surface water demand volume of the EAA can be estimated using a water balance method. The Engineering Support Unit of the SFWMD's Everglades Technical Support Bureau calculated total water use within the EAA as 318.29 mgd for 2017. Within the EAA, there are 3 agricultural permits in Hendry County and 89 permits in Palm Beach County utilizing surface water sources, serving 359,485 acres (562 square miles) of agriculture. There is 1 D&I permit in the EAA in Hendry County and 8 D&I permits in Palm Beach County, serving 99,290 acres (155 square miles) of primarily agricultural land. Also included in this surface water delivery volume are 19 permits for industrial, golf, and landscaped areas. Agricultural permits within the EAA that only draw from groundwater sources are not included in this estimated volume but are included in the overall AGR water use estimates. For simplification, all permits located within the EAA are reported as being in Palm Beach County.

The total 2017 water use for AGR, including the EAA, was 1,076 mgd. Of this total volume, agriculture (crop irrigation) outside the EAA accounted for 527.89 mgd (49 percent); agriculture within the EAA was 318.29 mgd (30 percent); agriculture within D&I areas was 200.77 mgd (19 percent); and aquaculture, livestock, and nursery combined were 29.06 mgd (3 percent). The water was derived from 68 percent surface water and 32 percent groundwater sources and from 98 percent freshwater and 2 percent saline water sources. **Table 4** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the AGR category. Further detail is provided in **Appendix B**.

Table 4. Agricultural Irrigation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	1.95	0.00	1.41	0.54	**1.95**	109
Charlotte	4.39	1.75	1.26	4.88	**6.14**	21
Collier	87.18	0.00	0.70	86.47	**87.18**	174
Glades	72.83	4.93	69.54	8.21	**77.75**	150
Hendry	317.46	0.01	207.93	109.54	**317.47**	284
Highlands	41.73	0.00	2.89	38.84	**41.73**	202
Lee	29.63	0.00	3.40	26.23	**29.63**	315
Martin	72.49	0.15	69.15	3.49	**72.64**	216
Miami-Dade	22.95	1.27	0.12	24.09	**24.21**	1,100
Monroe	0.00	0.00	0.00	0.00	**0.00**	1
Okeechobee	20.38	0.00	4.90	15.48	**20.38**	224
Orange	0.23	0.00	0.02	0.21	**0.23**	24
Osceola	13.76	0.00	2.24	11.51	**13.76**	140
Palm Beach	341.55	0.00	337.38	4.17	**341.55**	455
Polk	2.05	0.00	0.77	1.28	**2.05**	30
St. Lucie	30.36	8.97	25.28	14.04	**39.32**	341
Total	**1,058.94**	**17.07**	**727.02**	**348.98**	**1,076.01**	**3,786**

[1] Values are only for the portions of the counties located within the SFWMD.

Recreational/Landscape Irrigation

Recreational/Landscape Irrigation (REC) is water used for irrigation of golf courses, parks, cemeteries, large common areas (such as homeowners' associations and commercial developments), and other self-supplied irrigation uses with demands of 0.10 mgd or greater. The volumes reflect those reported plus an estimated volume based on the ratio (percentage) of reported pumpage to allocation for permittees who did report multiplied by the allocation of the permits that did not report. The average allocation utilization ratio of reporting REC permits was 0.58 after removing permits below the 10th percentile and above the 90th percentile allocation utilization ratios. Water use for REC permits that did not report in 2017 was estimated by multiplying the average allocation utilization ratio of 0.58 by the permit allocations.

There were 13,253 permits for landscape irrigation and 357 permits for golf courses in 2017. An additional 10 permits, classified as PWS, were used for augmentation of reclaimed water (or other water sources) for landscape irrigation use and are included in the REC category. Total water use for REC was 302.69 mgd in 2017. Of this, landscape irrigation accounted for 202.12 mgd (67 percent), golf course irrigation was 92.82 mgd (31 percent), and reclaimed water supplementation for irrigation was 7.76 mgd (<3 percent). Surface water was used for 57 percent of the total water use and groundwater accounted for the remaining 43 percent. There were 22 golf and 28 landscape permits, utilizing a total of 7.82 mgd of saline water. **Table 5** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the REC category. Further detail is provided in **Appendix B**.

Table 5. Recreational/Landscape Irrigation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits
Broward	37.34	0.29	23.95	13.67	**37.63**	2,878
Charlotte	0.10	0.00	0.08	0.02	**0.10**	8
Collier	48.48	0.28	25.73	23.03	**48.76**	918
Glades	0.19	0.00	0.10	0.09	**0.19**	15
Hendry	0.68	0.00	0.24	0.44	**0.68**	108
Highlands	0.42	0.00	0.10	0.33	**0.42**	12
Lee	61.19	3.24	38.44	25.99	**64.43**	2,514
Martin	11.86	1.21	5.86	7.20	**13.06**	730
Miami-Dade	16.41	0.00	5.85	10.56	**16.41**	1,118
Monroe	0.94	0.28	0.93	0.29	**1.22**	3
Okeechobee	0.74	0.00	0.17	0.58	**0.74**	139
Orange	9.41	0.00	2.02	7.39	**9.41**	211
Osceola	9.32	0.00	4.64	4.68	**9.32**	189
Palm Beach	85.43	2.45	57.06	30.81	**87.88**	3,867
Polk	1.20	0.00	0.07	1.13	**1.20**	16
St. Lucie	11.16	0.08	6.50	4.75	**11.24**	894
Total	**294.86**	**7.82**	**171.75**	**130.94**	**302.69**	**13,620**

[1] Values are only for the portions of the counties located within the SFWMD.

Power Generation

Power Generation (PWR) is water consumed by power plants for use in the production of electricity. The volume reported is for a variety of on-site uses and does not include once-through cooling water. It can include both fresh and saline water but excludes the use of seawater and reclaimed water sources. The total 2017 water use for PWR was 9.60 mgd, with 23 percent coming from freshwater sources and 77 percent coming from saline water sources. Groundwater contributed 99 percent of the water, and surface water contributed the remaining 1 percent. **Table 6** presents total water use Districtwide and by county from groundwater and surface water sources for fresh and saline water in the PWR category.

Table 6. Power Generation (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Number of Permits[2]
Lee	0.34	0.00	0.00	0.34	**0.34**	2
Martin	0.18	0.00	0.05	0.13	**0.18**	2
Miami-Dade	0.00	6.44	0.00	6.44	**6.44**	1
Osceola	0.12	0.00	0.00	0.12	**0.12**	1
Palm Beach	0.09	0.98	0.00	1.07	**1.07**	1
St. Lucie	1.44	0.00	0.00	1.44	**1.44**	1
Total	**2.17**	**7.42**	**0.05**	**9.54**	**9.59**	**8**

[1] Values are only for the portions of the counties located within the SFWMD.
[2] Power generation facilities are permitted by the FDEP under the Power Plant Siting Act, ss.403.501-.518, Florida Statutes.

A substantial volume of saline/ocean water is used for once-through cooling at power plants, primarily in coastal areas of the District. The once-through cooling volumes are considered non-consumptive and are being provided for informational purposes only. The total 2017 water use reported to the SFWMD for once-through cooling in PWR was 3,568 mgd. Of this volume, 3,552 mgd were saline water and the remaining 16 mgd were fresh water. Only 18 mgd of the total water were derived from groundwater, while 3,550 mgd were from surface water sources.

Reclaimed Water

Reclaimed water is water flowing out of a domestic wastewater treatment facility that has received at least secondary treatment as well as basic disinfection and is reused for some beneficial purpose. The SFWMD requires all applicants for water use permits proposing to irrigate with more than 0.10 mgd of water and applicants within a municipal mandatory reuse zone to use reclaimed water if feasible. However, reclaimed water is not a regulated source for consumptive use. Annual wastewater and reclaimed water volumes are compiled by the FDEP and are reported here for informational purposes. In 2017, 296.33 mgd of reclaimed water were used in the District. Of this, 254.52 mgd were reused for four of the six water use categories, and 41.80 mgd were reused for groundwater recharge and other non-consumptive water use purposes. **Tables 7** to **9** as well as **Figures 6** and **7** present reclaimed water use by county and use category.

Table 7. Reclaimed Water Use (in mgd) by County and Use Types (From: FDEP 2018)

County	Reclaimed Water Flow[1]	Industrial/ Commercial/ Institutional[2]	Agricultural Irrigation[3]	Recreational/ Landscape[4]	Power Generation[5]
Broward	**17.15**	9.78	0.00	7.17	0.20
Charlotte	**0.13**	0.13	0.00	0.00	0.00
Collier	**24.60**	0.00	0.24	24.36	0.00
Glades	**0.00**	0.00	0.00	0.00	0.00
Hendry	**1.73**	0.00	1.73	0.00	0.00
Highlands	**0.04**	0.00	0.04	0.00	0.00
Lee	**49.14**	0.37	0.08	47.69	1.00
Martin	**4.37**	0.31	0.01	3.93	0.12
Miami-Dade	**17.68**	17.11	0.00	0.57	0.00
Monroe	**0.23**	0.01	0.00	0.22	0.00
Okeechobee	**0.56**	0.04	0.52	0.00	0.00
Orange	**47.31**	4.11	3.26	39.90	0.04
Osceola	**19.71**	0.01	0.03	17.27	2.40
Palm Beach	**67.97**	3.07	0.00	49.97	14.93
Polk	**0.10**	0.00	0.10	0.00	0.00
St. Lucie	**3.80**	0.17	0.00	3.63	0.00
Total	**254.52**	**35.11**	**6.01**	**194.71**	**18.69**

Note: Reclaimed water was not used for PWS or DSS.

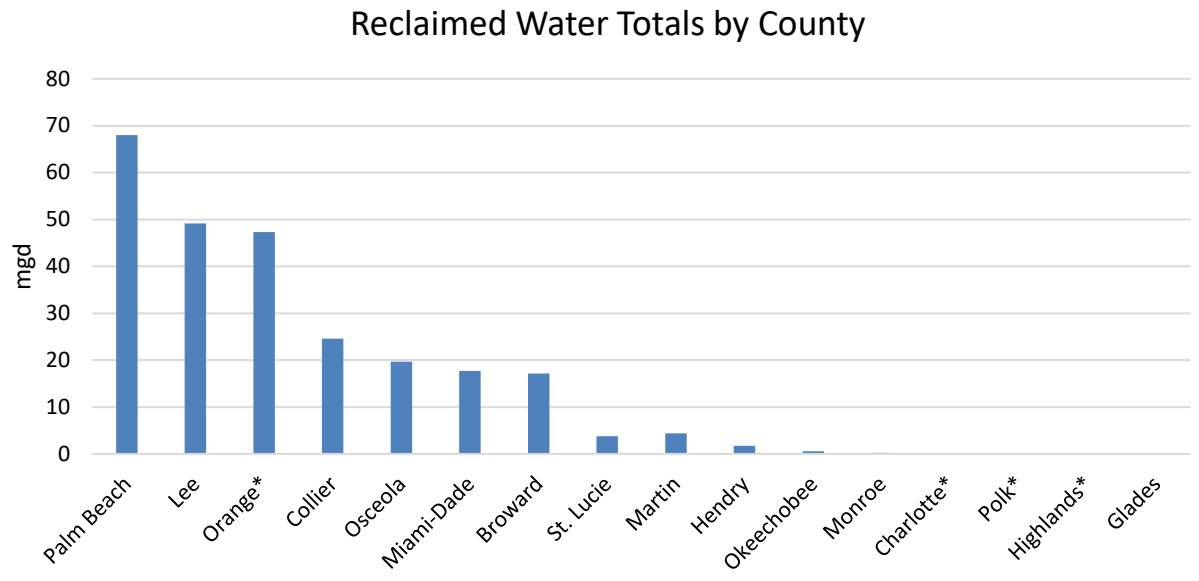
[1] Annual average reclaimed water flows as reported in the FDEP 2017 Reuse Inventory from October 1, 2016 through September 30, 2017, not including 41.80 mgd for groundwater recharge and other non-water-use purposes.

[2] Industrial reuse (excluding power generation).

[3] Edible and other crops.

[4] All public access areas and landscape irrigation.

[5] Reclaimed water flow to power generation facilities based on "at other facility" use type in the FDEP 2017 Reuse Inventory.



*Only the portions of the county located within the SFWMD

Figure 6. Reclaimed Water Use by County

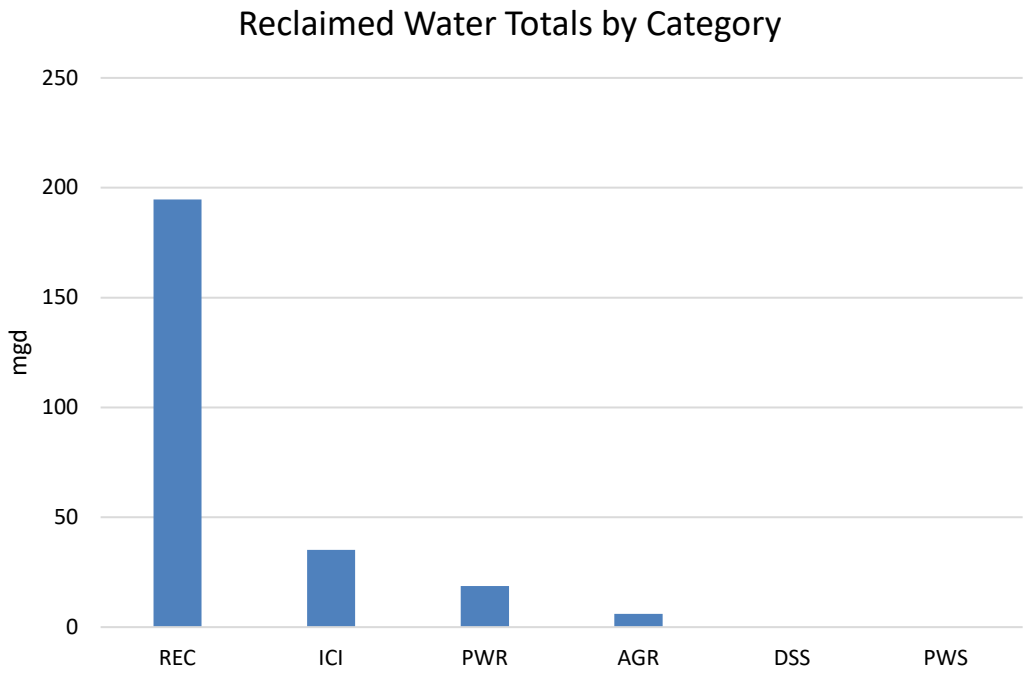


Figure 7. Reclaimed Water Use by Category

SUMMARY OF 2017 ESTIMATED WATER USE

The total amount of water withdrawn from groundwater and surface water resources in 2017 within the District was approximately 2,629 mgd (**Table 8**). The two largest water use categories were AGR and PWS, using 1,076 mgd and 1,084 mgd, respectively. These two categories constitute 82 percent of the total water use. Of the total use, 988 mgd (38 percent) came from surface water and 1,640 mgd (62 percent) came from groundwater sources (**Figure 8**). Approximately 2,444 mgd (93 percent) were withdrawn from fresh water sources and 185 mgd (7 percent) were derived from saline water sources. In addition, reclaimed water use totaled 254 mgd in 2017. Of the total 2,629 mgd, 20 percent (535 mgd) was estimated and 80 percent (2,094 mgd) was derived from reported pumpage (**Appendix C**). PWS is largest in Miami-Dade County, while Palm Beach County has the largest estimated AGR volume. Palm Beach County also has the greatest use of reclaimed water by volume.

Figure 9 depicts the distribution of total water use by category. **Table 9** presents the breakdown of water use by county of fresh, saline, surface, and groundwater. **Figure 10** depicts fresh water versus saline water use by county. **Figure 11** depicts surface water versus groundwater by county. **Table 10** presents the breakdown of water used by county and by use category (excluding reclaimed water).

Table 8. Total Water Use by Category and Source – Including Reclaimed Water (in mgd)[1]

Water Use Category	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Reclaimed Water	**Total Use with Reclaimed Water**
Agricultural Irrigation	1,058.94	17.07	727.02	348.98	**1,076.01**	6.01	**1,082.02**
Public Water Supply	931.62	152.59	36.93	1,047.28	**1,084.21**	0.00	**1,084.21**
Recreational/Landscape Irrigation	294.86	7.82	171.75	130.94	**302.69**	194.71	**497.40**
Industrial/Commercial/Institutional	116.15	0.00	53.05	63.10	**116.15**	35.11	**151.26**
Power Generation	2.17	7.42	0.05	9.54	**9.59**	18.69	**28.28**
Domestic and Small Public Supply	40.65	0.00	0.00	40.65	**40.65**	0.00	**40.65**
Total	**2,444.39**	**184.90**	**988.81**	**1,640.49**	**2,629.30**	**254.52**	**2,883.82**

Note: Minor discrepancies in table totals are due to rounding.
[1] Values are only for the portions of the county located within the SFWMD.

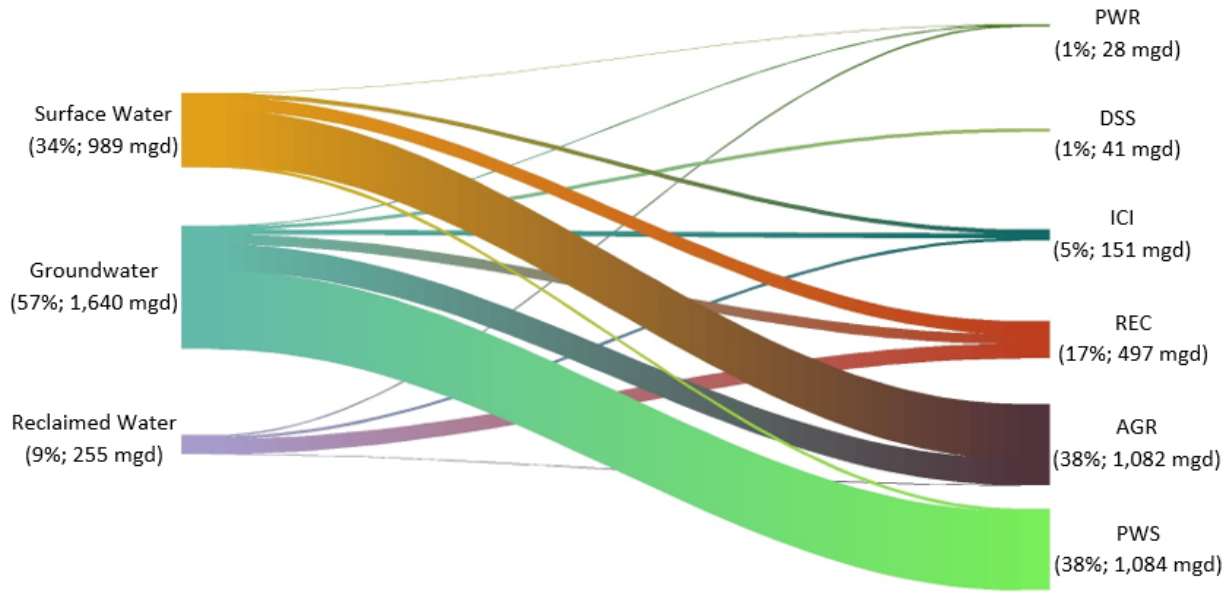


Figure 8. Water Use by Source and Category

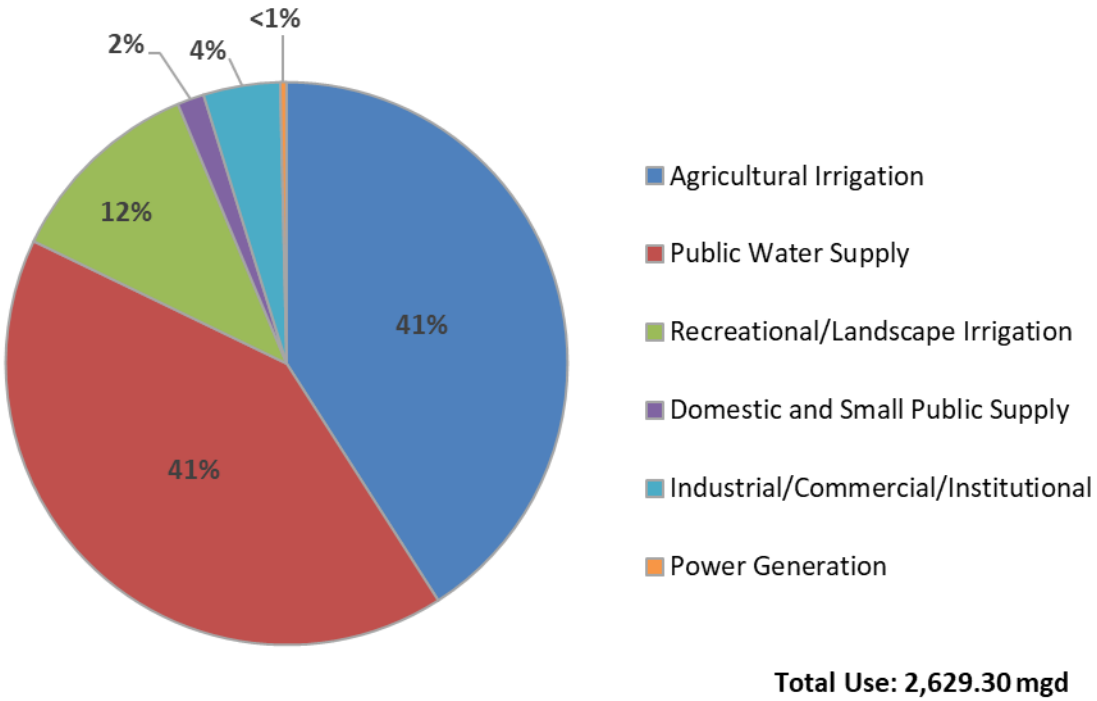


Figure 9. Percentage Water Use by Category

Table 9. Total Water Use by County and Source (in mgd)[1]

County	Fresh Water	Saline Water	Surface Water	Groundwater	**Total Use**	Reclaimed Water	**Total Use with Reclaimed Water**
Broward	260.62	10.38	25.39	245.61	**271.00**	17.15	**288.15**
Charlotte	5.00	1.75	1.66	5.09	**6.75**	0.13	**6.88**
Collier	186.48	14.46	37.09	163.86	**200.95**	24.60	**225.55**
Glades	84.86	4.93	80.09	9.69	**89.79**	0.00	**89.79**
Hendry	324.57	2.94	208.18	119.34	**327.52**	1.73	**329.25**
Highlands	43.87	0.00	3.00	40.87	**43.87**	0.04	**43.91**
Lee	151.14	47.35	62.51	135.98	**198.50**	49.14	**247.64**
Martin	94.37	13.37	75.24	32.50	**107.74**	4.37	**112.11**
Miami-Dade	429.76	18.14	15.70	432.20	**447.90**	17.68	**465.58**
Monroe	0.94	0.28	0.93	0.29	**1.22**	0.23	**1.45**
Okeechobee	25.38	0.00	7.71	17.67	**25.38**	0.56	**25.94**
Orange	46.08	6.14	2.04	50.18	**52.22**	47.31	**99.53**
Osceola	74.10	0.00	6.89	67.21	**74.10**	19.71	**93.81**
Palm Beach	655.59	32.71	429.76	258.55	**688.30**	67.97	**756.27**
Polk	7.68	0.00	0.85	6.84	**7.68**	0.10	**7.78**
St. Lucie	53.95	32.44	31.78	54.62	**86.40**	3.80	**90.20**
Total	**2,444.40**	**184.90**	**988.81**	**1,640.50**	**2,629.30**	**254.52**	**2,883.82**

Note: Minor discrepancies in table totals are due to rounding.

[1] Values are only for the portions of the counties located within the SFWMD.

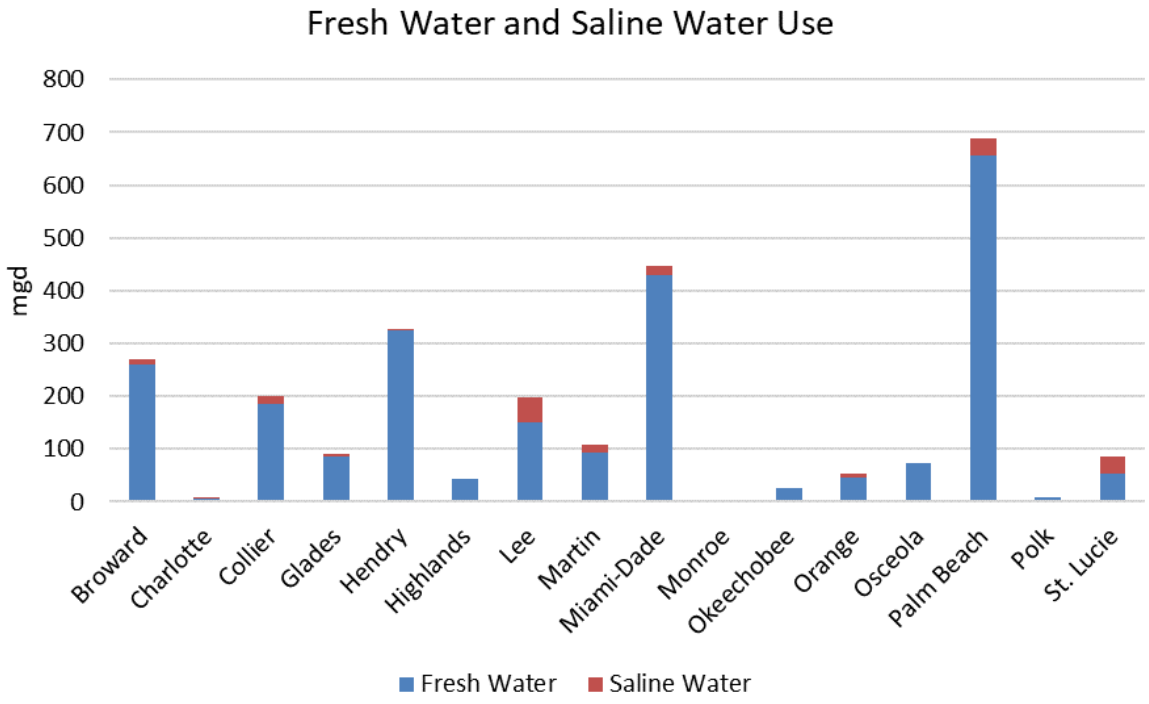


Figure 10. Fresh Water and Saline Water Use by County for All Use Categories

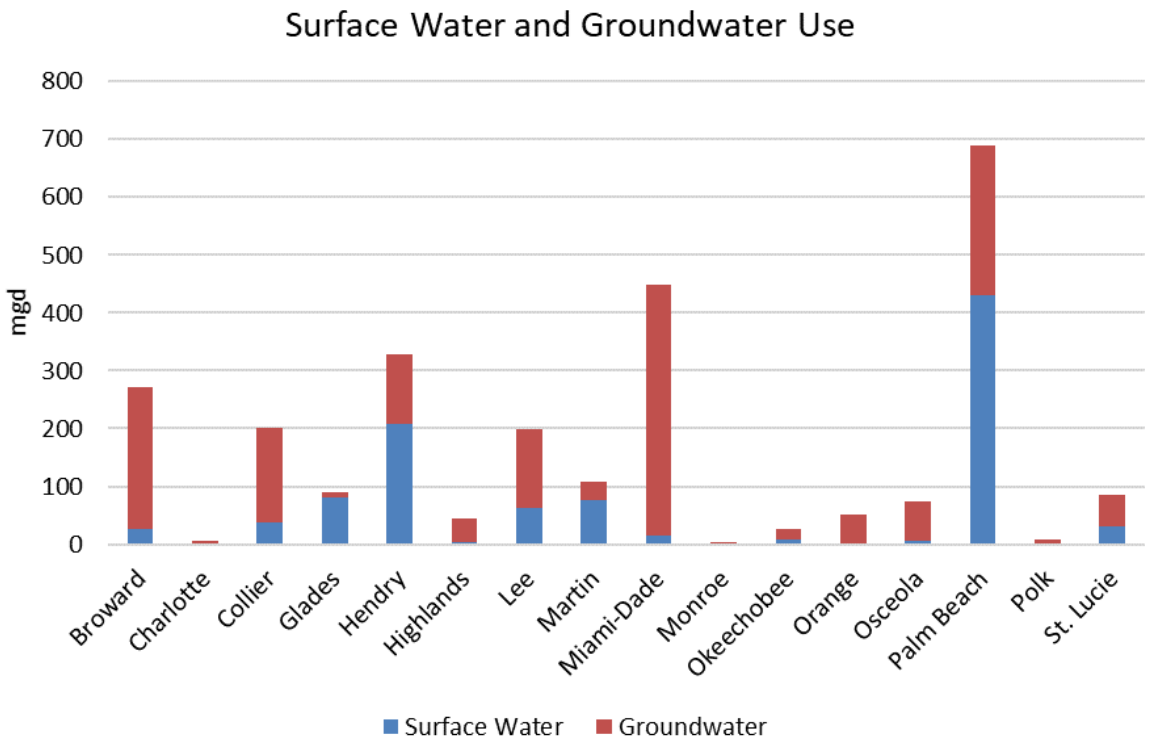


Figure 11. Surface Water and Groundwater Use by County for All Use Categories

Table 10. Total Water Use by County and Category – Excluding Reclaimed Water (in mgd)[1]

County	Agricultural Irrigation	Industrial/ Commercial/ Institutional	Domestic and Small Public Supply	Recreational/ Landscape Irrigation	Power Generation	Public Water Supply	**Total**
Broward	1.95	1.72	0.86	37.63	0.00	228.85	**271.00**
Charlotte	6.14	0.38	0.00	0.10	0.00	0.13	**6.75**
Collier	87.18	6.60	4.12	48.76	0.00	54.30	**200.95**
Glades	77.75	10.86	0.49	0.19	0.00	0.49	**89.79**
Hendry	317.47	4.66	1.09	0.68	0.00	3.62	**327.52**
Highlands	41.73	0.95	0.50	0.42	0.00	0.26	**43.87**
Lee	29.63	24.15	12.20	64.43	0.34	67.75	**198.50**
Martin	72.64	0.58	0.93	13.06	0.18	20.35	**107.74**
Miami-Dade	24.21	55.57	1.79	16.41	6.44	343.47	**447.90**
Monroe	0.00	0.00	0.00	1.22	0.00	0.00	**1.22**
Okeechobee	20.38	0.13	1.30	0.74	0.00	2.83	**25.38**
Orange	0.23	2.03	0.59	9.41	0.00	39.97	**52.22**
Osceola	13.76	0.05	6.60	9.32	0.12	44.25	**74.10**
Palm Beach	341.55	8.32	5.75	87.88	1.07	243.74	**688.30**
Polk	2.05	0.02	1.50	1.20	0.00	2.91	**7.68**
St. Lucie	39.32	0.15	2.94	11.24	1.44	31.30	**86.40**
Total	**1,076.01**	**116.15**	**40.65**	**302.69**	**9.59**	**1,084.21**	**2,629.30**

Note: Minor discrepancies in table totals are due to rounding.
[1] Values are only for the portions of the counties located within the SFWMD.

DISCUSSION OF RESULTS

This is the fourth year that the SFWMD has compiled an estimated water use report. Caution should be exercised when comparing water use estimates between this report and its predecessors as adjustments have been made to the water use estimation method from year to year. Notable changes to the methodology since the last report include the following:

- The allocation utilization ratios were calculated differently (as described in the *Water Use Estimation Methodology* section earlier), including the removal of some permits that would skew the results.
- For this year's report, only the AGR use class incorporated separate allocation utilization ratios for each planning region.
- The source split for estimated permits with both surface water and groundwater sources was calculated based on the percentage split on those with known sources reporting rather than an equal split. This gives a better characterization of permits that utilize sources of water for recharge purposes.

Refinements in the methodology likely will continue for future reports in an effort to improve the accuracy of water use estimates.

When considering water use estimates and changes between years, it is important to recognize that the quantity and quality of reported water use data can vary over time and between water use categories. The PWS and PWR use categories are unique in that nearly 100 percent of permittees

submit water use reports; estimates for other categories are calculated based on a much smaller proportion of permittees. Relying on a small and potentially non-representative portion of users inhibits the ability to make some conclusions with a high degree of confidence. This is particularly notable for the aquaculture, livestock, and nursery portions of the AGR use category. The impacts of non-universal reporting are further complicated by non-uniform compliance from year to year. Errors in data, inaccurate measurements, and the complexity of some permitted water systems introduce inaccuracies and biases that often are undetected (or extremely difficult to measure), hindering better analysis.

Water use within the District increased 4 percent (from 2,531 to 2,629 mgd) between 2016 and 2017. A comparison of changes in water use between 2016 and 2017 is provided in **Figure 12**. More detailed analyses of inter-year changes for use categories, water sources, and/or geographical areas are not provided due to the reasons mentioned above. The District received approximately 7 inches more rain in 2017 than in 2016; however, most rainfall occurred during the wet season. The 2017 dry season (specifically January to March) received 10.5 inches less than 2016 for the same period.

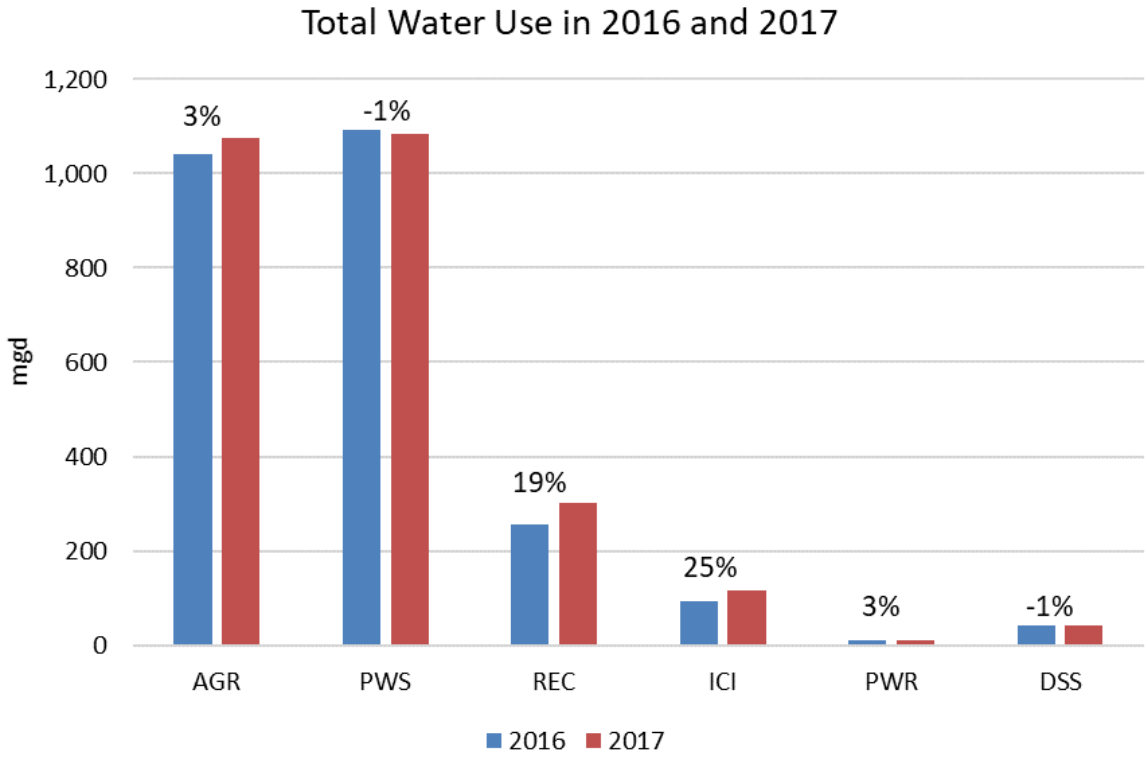


Figure 12. Comparison of 2016 to 2017 Total Estimated Water Use by Use Category

CONCLUSIONS

For 2017, 2,629 mgd of water were estimated to have been used throughout the District, distributed among the six water use categories. Approximately 1,640 mgd were derived from groundwater and 989 mgd were derived from surface water sources, with 2,444 mgd being freshwater and 185 mgd considered saline water. This is 98 mgd more than was used in 2016.

REFERENCES

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APPENDIX A: DSS POPULATION AND DEMAND METHODOLOGY

Population

Population estimates are intended for planning purposes only. The 2017 county population estimates of permanent residents are from the Bureau of Economic and Business Research (BEBR; Rayer and Wang 2018). For counties located within more than one water management district, the proportion of a county's residents within the South Florida Water Management District (SFWMD or District) was calculated using the results of the 2010 U.S. Census. The Domestic and Small Public Supply (DSS) population was estimated by multiplying the county population by the percentage of the population self-supplied (from the latest regional water supply plan updates).

Demand Estimates

The DSS water use estimates were calculated by multiplying the 2017 DSS population by the 2017 Public Water Supply (PWS) Districtwide uniform residential per capita use rate (PCUR), which was derived from uniform residential PCURs (treated water) voluntarily reported by utilities to the SFWMD as part of their annual reporting, required pursuant to Section 373.709(6), Florida Statutes. Based on the reported values, the SFWMD calculated a 2017 Districtwide, population-weighted residential PCUR of 82.41 gallons per day (treated water). Minimal treatment and distribution losses are anticipated in DSS and smaller scale utility systems such that the uniform residential PCUR and DSS PCUR are comparable. **Table A-1** provides the PWS and DSS populations and demand estimates.

Table A-1. Domestic and Small Public Supply Population and Demand by County[1]

County	PWS Total Population	DSS Total Population	Total Population	% DSS/ Total	2017 County Total Population BEBR[2]	PWS Population for Report	DSS Population for Report (% × County BEBR)	DSS (mgd)
Broward	1,844,174	10,340	1,854,513	0.6%	1,873,970	1,863,522	10,448	0.86
Charlotte[3]	1,968	72	2,040	3.5%	1,467	1,415	52	0.00
Collier	289,738	47,045	336,783	14.0%	357,470	307,535	49,935	4.12
Glades[4]	7,103	5,905	13,008	45.4%	13,087	7,146	5,941	0.49
Hendry[5]	23,297	11,961	35,258	33.9%	39,057	25,807	13,250	1.09
Highlands	3,230	7,258	10,488	69.2%	8,847	2,725	6,123	0.50
Lee	512,504	137,797	650,301	21.2%	698,468	550,465	148,003	12.20
Martin	135,557	10,761	146,318	7.4%	153,022	141,768	11,254	0.93
Miami-Dade	2,679,429	21,365	2,700,794	0.8%	2,743,095	2,721,395	21,700	1.79
Monroe	72,143	-	72,143	0.0%	76,889	76,889	-	0.00
Okeechobee[6]	23,327	15,161	38,488	39.4%	40,075	24,289	15,786	1.30
Orange	331,634	6,529	338,163	1.9%	368,943	361,819	7,123	0.59
Osceola	201,922	63,238	265,160	23.8%	335,898	255,789	80,108	6.60
Palm Beach	1,323,103	68,636	1,391,739	4.9%	1,414,144	1,344,403	69,741	5.75
Polk	13,830	13,333	27,163	49.1%	37,057	18,868	18,190	1.50
St. Lucie	244,511	33,278	277,789	12.0%	297,634	261,979	35,655	2.94
Total	**7,707,470**	**452,679**	**8,160,148**	**6.0%**	**8,459,124**	**7,965,814**	**493,309**	**40.65**

BEBR = Bureau of Economic and Business Research; DSS = Domestic and Small Public Supply; mgd = million gallons per day; PWS = Public Water Supply.

1 The 2017 Districtwide, population-weighted uniform residential per capita use rate = 82.41 gallons per day.

2 Medium BEBR county totals published in 2018.

3 Used calculation of SFWMD portion from 2017 Lower West Coast Water Supply Plan Update ([2012/159,978] × 164,469) for 2016 BEBR county total.

4 2010 base; Lower West Coast: 4,345 PWS and 4,672 DSS; Lower Kissimmee Basin: 2,758 PWS and 1,233 DSS.

5 Lower West Coast: 23,297 PWS and 10,641 DSS; Lower East Coast: 1,320 DSS.

6 2010 base; Upper East Coast 2010 DSS added Lower Kissimmee Basin DSS.

References

Rayer, S. and Y. Wang. 2018. Projections of Florida Population by County, 2020–2045, with Estimates for 2017. Florida Population Studies 51(180). January 2018. University of Florida, Bureau of Economic and Business Research, Gainesville, FL.

APPENDIX B: WATER USE CATEGORY BREAKDOWN BY PERMIT USE CLASS

Table B-1. Agricultural Irrigation by Use Class Quantity (in mgd)

County	Agriculture		Aquaculture		Livestock		Nursery		Agriculture D&I		Agriculture-EAA		**Total**
	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	
Broward	1.09	0.24	0.00	0.01	0.02	0.03	0.29	0.25	0.00	0.00	0.00	0.00	**1.95**
Charlotte	1.26	4.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**6.14**
Collier	0.57	86.02	0.00	0.01	0.00	0.01	0.14	0.44	0.00	0.00	0.00	0.00	**87.18**
Glades	46.21	7.67	0.00	0.00	0.00	0.52	0.00	0.02	23.33	0.00	0.00	0.00	**77.75**
Hendry	62.33	109.00	0.00	0.07	0.03	0.31	0.03	0.15	145.54	0.00	0.00	0.00	**317.47**
Highlands	2.82	36.40	0.01	0.04	0.01	0.73	0.06	1.67	0.00	0.00	0.00	0.00	**41.73**
Lee	0.43	25.80	0.00	0.01	0.00	0.09	0.62	0.33	2.35	0.00	0.00	0.00	**29.63**
Martin	55.89	2.74	0.00	0.00	0.00	0.19	0.36	0.51	12.90	0.04	0.00	0.00	**72.64**
Miami-Dade	0.07	10.97	0.00	1.79	0.00	0.01	0.05	11.32	0.00	0.00	0.00	0.00	**24.21**
Monroe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	4.82	10.94	0.00	0.02	0.01	4.30	0.06	0.23	0.00	0.00	0.00	0.00	**20.38**
Orange	0.02	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.23**
Osceola	2.24	11.21	0.00	0.04	0.00	0.15	0.00	0.11	0.00	0.00	0.00	0.00	**13.76**
Palm Beach	4.02	1.77	0.00	0.01	0.01	0.01	0.97	2.38	14.09	0.00	318.29	0.00	**341.55**
Polk	0.77	1.23	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	**2.05**
St. Lucie	22.71	13.55	0.00	0.00	0.00	0.31	0.06	0.18	2.51	0.00	0.00	0.00	**39.32**
Total	**205.26**	**322.63**	**0.01**	**2.00**	**0.08**	**6.71**	**2.65**	**17.61**	**200.73**	**0.04**	**318.29**	**0.00**	**1,076.01**
% of Total	**19%**	**30%**	**0%**	**0%**	**0%**	**1%**	**0%**	**2%**	**19%**	**0%**	**30%**	**0%**	**100%**

D&I = Diversion and Impoundment; EAA = Everglades Agricultural Area; GW = groundwater; mgd = million gallons per day; SW = surface water.

Table B-2. Agricultural Irrigation by Use Class Quality (in mgd)

County	Agriculture		Aquaculture		Livestock		Nursery		Agriculture D&I		Agriculture-EAA		**Total**
	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	
Broward	1.33	0.00	0.01	0.00	0.06	0.00	0.55	0.00	0.00	0.00	0.00	0.00	**1.95**
Charlotte	4.39	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**6.14**
Collier	86.58	0.00	0.01	0.00	0.01	0.00	0.58	0.00	0.00	0.00	0.00	0.00	**87.18**
Glades	48.95	4.93	0.00	0.00	0.52	0.00	0.02	0.00	23.33	0.00	0.00	0.00	**77.75**
Hendry	171.34	0.00	0.06	0.01	0.34	0.00	0.19	0.00	145.54	0.00	0.00	0.00	**317.47**
Highlands	39.22	0.00	0.04	0.00	0.74	0.00	1.73	0.00	0.00	0.00	0.00	0.00	**41.73**
Lee	26.23	0.00	0.01	0.00	0.09	0.00	0.95	0.00	2.35	0.00	0.00	0.00	**29.63**
Martin	58.48	0.15	0.00	0.00	0.19	0.00	0.87	0.00	12.94	0.00	0.00	0.00	**72.64**
Miami-Dade	11.04	0.00	0.53	1.27	0.01	0.00	11.38	0.00	0.00	0.00	0.00	0.00	**24.21**
Monroe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	15.76	0.00	0.02	0.00	4.31	0.00	0.29	0.00	0.00	0.00	0.00	0.00	**20.38**
Orange	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.23**
Osceola	13.46	0.00	0.04	0.00	0.15	0.00	0.11	0.00	0.00	0.00	0.00	0.00	**13.76**
Palm Beach	5.79	0.00	0.01	0.00	0.02	0.00	3.35	0.00	14.09	0.00	318.29	0.00	**341.55**
Polk	2.00	0.00	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	**2.05**
St. Lucie	27.29	8.97	0.00	0.00	0.31	0.00	0.24	0.00	2.51	0.00	0.00	0.00	**39.32**
Total	**512.09**	**15.79**	**0.73**	**1.27**	**6.79**	**0.00**	**20.26**	**0.00**	**200.77**	**0.00**	**318.29**	**0.00**	**1,076.00**
% of Total	**48%**	**1%**	**0%**	**0%**	**1%**	**0%**	**2%**	**0%**	**19%**	**0%**	**30%**	**0%**	**100%**

D&I = Diversion and Impoundment; EAA = Everglades Agricultural Area; mgd = million gallons per day.

Table B-3. Industrial/Commercial/Institutional by Use Class Quantity (in mgd)

County	Industrial		Mining		**Total**
	Surface Water	Groundwater	Surface Water	Groundwater	
Broward	0.02	1.69	0.00	0.00	**1.72**
Charlotte	0.00	0.06	0.32	0.00	**0.38**
Collier	0.08	0.62	5.90	0.00	**6.60**
Glades	0.02	0.02	10.44	0.38	**10.86**
Hendry	0.00	4.65	0.00	0.00	**4.66**
Highlands	0.01	0.94	0.00	0.00	**0.95**
Lee	0.07	0.29	20.61	3.19	**24.15**
Martin	0.01	0.41	0.17	0.00	**0.58**
Miami-Dade	0.12	4.37	9.60	41.48	**55.57**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.01	0.12	0.00	0.00	**0.13**
Orange	0.00	2.03	0.00	0.00	**2.03**
Osceola	0.00	0.05	0.00	0.00	**0.05**
Palm Beach	0.16	2.64	5.52	0.00	**8.32**
Polk	0.00	0.02	0.00	0.00	**0.02**
St. Lucie	0.00	0.15	0.00	0.00	**0.15**
Total	**0.50**	**18.05**	**52.55**	**45.05**	**116.15**
% of Total	**0%**	**16%**	**45%**	**39%**	**100%**

mgd = million gallons per day.

Table B-4. Industrial/Commercial/Institutional by Use Class Quality (in mgd)

County	Industrial		Mining		**Total**
	Fresh	Saline	Fresh	Saline	
Broward	1.72	0.00	0.00	0.00	**1.72**
Charlotte	0.06	0.00	0.32	0.00	**0.38**
Collier	0.70	0.00	5.90	0.00	**6.60**
Glades	0.04	0.00	10.82	0.00	**10.86**
Hendry	4.66	0.00	0.00	0.00	**4.66**
Highlands	0.95	0.00	0.00	0.00	**0.95**
Lee	0.35	0.00	23.79	0.00	**24.15**
Martin	0.41	0.00	0.17	0.00	**0.58**
Miami-Dade	4.49	0.00	51.08	0.00	**55.57**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.13	0.00	0.00	0.00	**0.13**
Orange	2.03	0.00	0.00	0.00	**2.03**
Osceola	0.05	0.00	0.00	0.00	**0.05**
Palm Beach	2.80	0.00	5.52	0.00	**8.32**
Polk	0.02	0.00	0.00	0.00	**0.02**
St. Lucie	0.15	0.00	0.00	0.00	**0.15**
Total	**18.55**	**0.00**	**97.60**	**0.00**	**116.15**
% of Total	**16%**	**0%**	**84%**	**0%**	**100%**

mgd = million gallons per day.

Table B-5. Recreational/Landscape Irrigation by Use Class Quantity (in mgd)

County	Golf Course		Landscape		PWS-Irrigation Supplement		**Total**
	Surface Water	Groundwater	Surface Water	Groundwater	Surface Water	Groundwater	
Broward	6.24	1.46	17.71	12.21	0.00	0.00	**37.63**
Charlotte	0.00	0.00	0.08	0.02	0.00	0.00	**0.10**
Collier	10.64	7.91	14.12	13.90	0.97	1.22	**48.76**
Glades	0.03	0.03	0.07	0.07	0.00	0.00	**0.19**
Hendry	0.00	0.00	0.24	0.44	0.00	0.00	**0.68**
Highlands	0.10	0.26	0.00	0.06	0.00	0.00	**0.42**
Lee	7.96	6.19	30.48	19.54	0.00	0.25	**64.43**
Martin	2.71	3.16	3.15	4.03	0.00	0.00	**13.06**
Miami-Dade	3.33	0.94	2.52	9.62	0.00	0.00	**16.41**
Monroe	0.93	0.28	0.00	0.01	0.00	0.00	**1.22**
Okeechobee	0.03	0.01	0.14	0.57	0.00	0.00	**0.74**
Orange	1.27	4.43	0.75	1.99	0.00	0.97	**9.41**
Osceola	0.37	2.26	0.67	1.98	3.60	0.44	**9.32**
Palm Beach	21.81	6.66	35.25	23.84	0.00	0.31	**87.88**
Polk	0.07	1.01	0.00	0.12	0.00	0.00	**1.20**
St. Lucie	1.86	0.87	4.64	3.87	0.00	0.00	**11.24**
Total	**57.35**	**35.47**	**109.83**	**92.29**	**4.57**	**3.19**	**302.69**
% of Total	**19%**	**12%**	**36%**	**30%**	**2%**	**1%**	**100%**

mgd = million gallons per day; PWS = Public Water Supply.

Table B-6. Recreational/Landscape Irrigation by Use Class Quality (in mgd)

County	Golf Course		Landscape		PWS-Irrigation Supplement		**Total**
	Fresh	Saline	Fresh	Saline	Fresh	Saline	
Broward	7.70	0.00	29.64	0.29	0.00	0.00	**37.62**
Charlotte	0.00	0.00	0.10	0.00	0.00	0.00	**0.10**
Collier	18.54	0.01	27.75	0.27	2.19	0.00	**48.76**
Glades	0.05	0.00	0.14	0.00	0.00	0.00	**0.19**
Hendry	0.00	0.00	0.68	0.00	0.00	0.00	**0.68**
Highlands	0.36	0.00	0.06	0.00	0.00	0.00	**0.42**
Lee	13.24	0.92	47.70	2.32	0.25	0.00	**64.43**
Martin	4.78	1.09	7.07	0.12	0.00	0.00	**13.06**
Miami-Dade	4.26	0.00	12.15	0.00	0.00	0.00	**16.41**
Monroe	0.93	0.28	0.01	0.00	0.00	0.00	**1.22**
Okeechobee	0.03	0.00	0.71	0.00	0.00	0.00	**0.74**
Orange	5.70	0.00	2.74	0.00	0.97	0.00	**9.41**
Osceola	2.64	0.00	2.64	0.00	4.04	0.00	**9.32**
Palm Beach	27.43	1.04	57.69	1.40	0.31	0.00	**87.88**
Polk	1.08	0.00	0.12	0.00	0.00	0.00	**1.20**
St. Lucie	2.70	0.03	8.46	0.05	0.00	0.00	**11.24**
Total	**89.45**	**3.37**	**197.66**	**4.45**	**7.76**	**0.00**	**302.69**
% of Total	**30%**	**1%**	**65%**	**1%**	**3%**	**0%**	**100%**

Note: Minor discrepancies in or between table totals are due to rounding.
mgd = million gallons per day; PWS = Public Water Supply.

APPENDIX C: METADATA TABLES

Table C-1. Reported Versus Estimated Use (in mgd) by County

County	Reported	Estimated	% Estimated	**Total**
Broward	246.85	24.15	9%	**271.00**
Charlotte	6.14	0.61	9%	**6.75**
Collier	182.61	18.33	9%	**200.95**
Glades	88.21	1.57	2%	**89.79**
Hendry	314.05	13.47	4%	**327.52**
Highlands	40.20	3.67	8%	**43.87**
Lee	166.57	31.92	16%	**198.50**
Martin	101.52	6.22	6%	**107.74**
Miami-Dade	415.12	32.78	7%	**447.90**
Monroe	1.21	0.01	1%	**1.22**
Okeechobee	20.02	5.36	21%	**25.38**
Orange	49.19	3.02	6%	**52.22**
Osceola	59.59	14.51	20%	**74.10**
Palm Beach	322.82	365.48	53%	**688.30**
Polk	5.88	1.80	23%	**7.68**
St. Lucie	73.84	12.55	15%	**86.40**
Total	**2,093.83**	**535.47**	**20%**	**2,629.30**

mgd = million gallons per day

Table C-2. Reported Versus Estimated Use (in mgd) by Water Use Category

Water Use Category	Reported	Estimated	% Estimated	**Total**
Agricultural Irrigation	698.04	377.96	35%	**1,076.01**
Industrial/Commercial/Institutional	101.10	15.05	13%	**116.15**
Domestic and Small Public Supply	0.00	40.65	100%	**40.65**
Power Generation	9.59	0.00	0%	**9.59**
Public Water Supply	1,083.99	0.22	0%	**1,084.21**
Recreational/Landscape Irrigation	201.11	101.58	34%	**302.69**
Total	**2,093.83**	**535.47**	**20%**	**2,629.30**

mgd = million gallons per day.

sfwmd.gov

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