South Florida Water Management District
2018 Estimated Water Use Report

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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 2018, 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 Water use is defined as any consumptive use of water that reduces the supply from which it is withdrawn or diverted.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 2018, approximately 2,765 million gallons per day (mgd) of surface water and groundwater were used in the following categories (**Figure ES-1**):

- Public Water Supply (1,103 mgd)
- Domestic and Small Public Supply (40 mgd)
- Industrial/Commercial/Institutional (135 mgd)
- Agricultural Irrigation (1,174 mgd)
- Recreational/Landscape Irrigation (303 mgd)
- Power Generation (10 mgd)

Of the 2,765 mgd, approximately 1,638 mgd were derived from groundwater and 1,127 mgd were derived from surface water sources, with 2,596 mgd being freshwater and 169 mgd considered saline water. Additionally, approximately 235 mgd of reclaimed water were used primarily for landscape irrigation and, to a lesser extent, industrial and power generation uses.

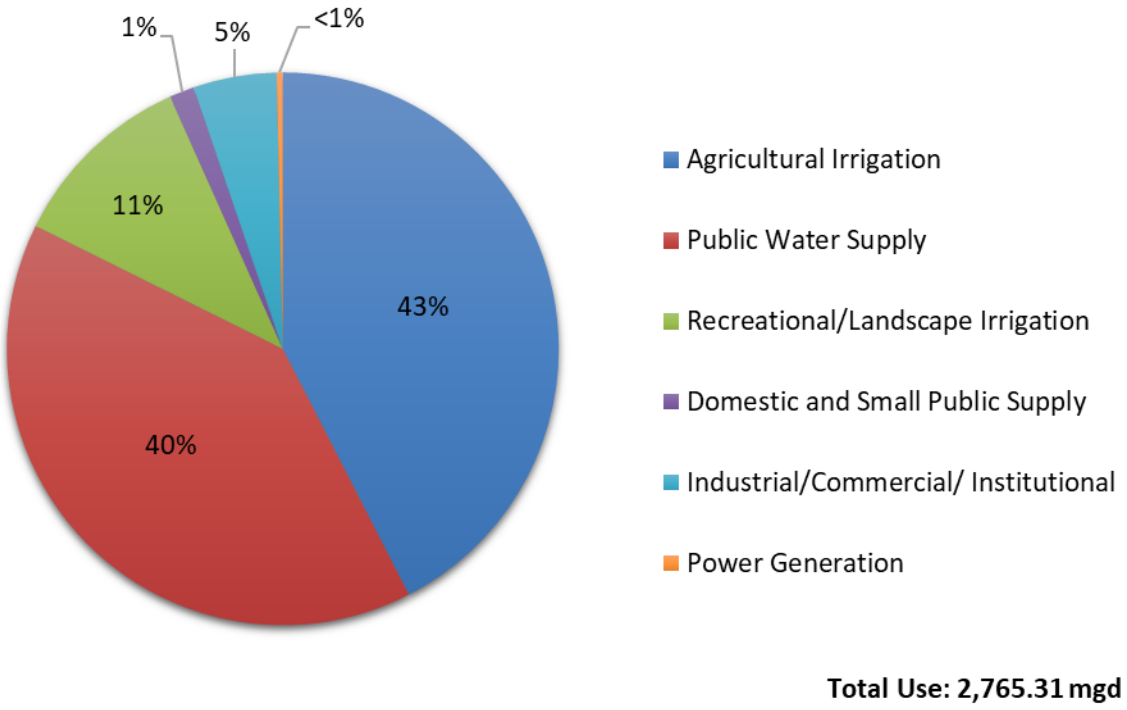

Figure ES-1. Percentage Water Use by Category

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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

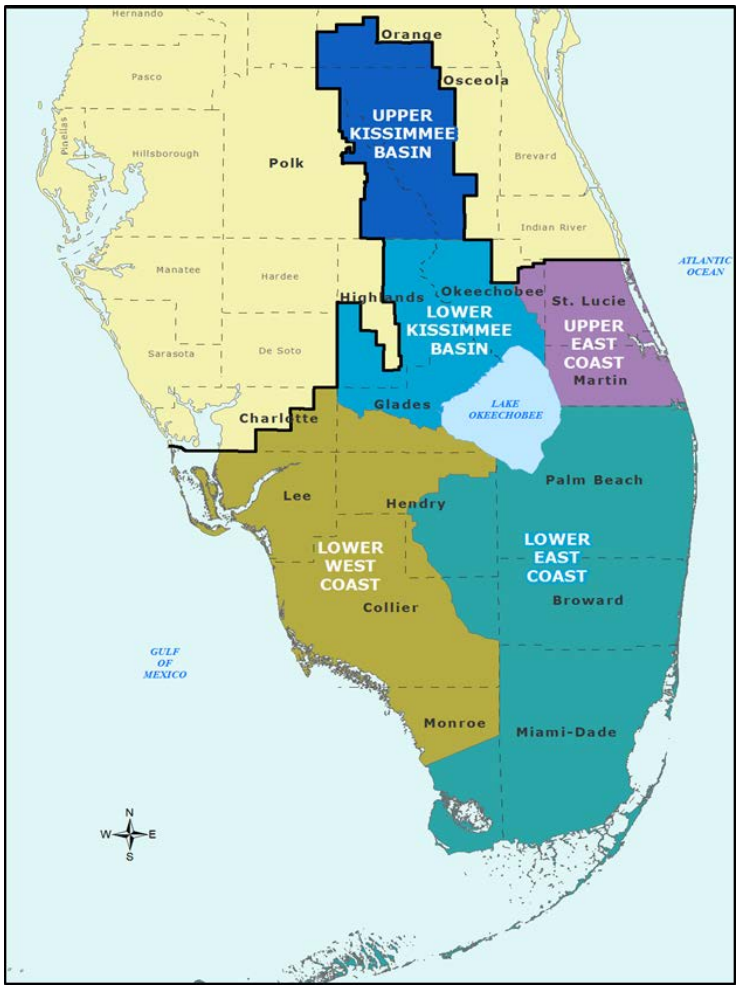
The South Florida Water Management District (SFWMD or District) is a regional government agency responsible for managing and protecting the water resources of South Florida by balancing and improving water quality, flood control, natural systems, and water supply. The District encompasses all or part of 16 counties from Orlando to the Florida Keys and serves a population of approximately 8.7 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 2018. 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 21 percent of the overall volume was estimated, rather than reported, this 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: Portions of Osceola, 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. They 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 2018. 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, 29 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 2018 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). Water use permits are typically issued for a 20-year duration, and account for projected increases in population or irrigated acreages over that period. 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 over the duration of the permit. 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 (assumes all acreage is planted and projected population is being served). Water use in 2018 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 2018 report was the same as the 2017 report process. Each permit's allocation utilization ratio (of those that reported) was calculated. For each water use category, outlier ratios less than the 10^{th} percentile and greater than the 90^{th} percentile were removed, and the remainder were averaged to calculate the allocation utilization ratios for each water use category. 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 using the average ratio of groundwater to surface water reported use (for permittees with both groundwater and surface water facilities) for each use class. 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 partially 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 (in the estimation report) 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 require water quality testing to determine salinity. Therefore, the volumes reported as saline water are mostly 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.

Additionally, 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. Within the District, there are a total of 58 D&I permits. 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 described 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.

2018 WEATHER

Average historical (1915 to 2018) annual rainfall within the District is 52.16 inches. **Figure 2** presents the annual deviation from average rainfall over the past century. From 2008 to 2018, average annual rainfall within the District varied by 16.6 inches; the driest year was 2018 with 47.08 inches (10 percent below average), and the wettest year was 2017 with 63.68 inches (22 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**). Remarkably, even though 2018 was 10 percent below average rainfall for the year, May 2018 was the wettest May ever recorded at 11.45 inches (263% above the May average of 4.35 inches). **Figure 4** presents the rainfall amounts received by each basin within the District for 2018. Note that **Figure 4** utilizes a 30-year annual rainfall average of 51.83 inches related to percent and inches deviation from "average".

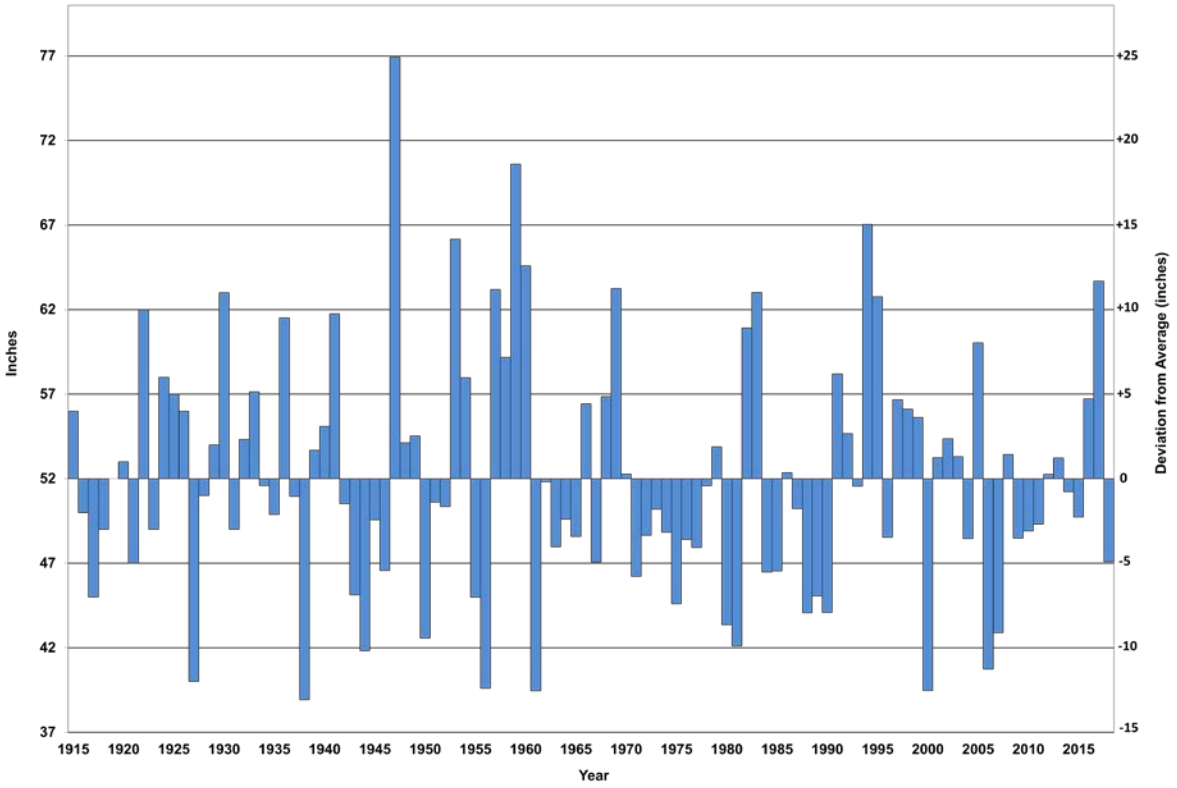


Figure 2. SFWMD Annual Difference from Average Rainfall (1915-2018)

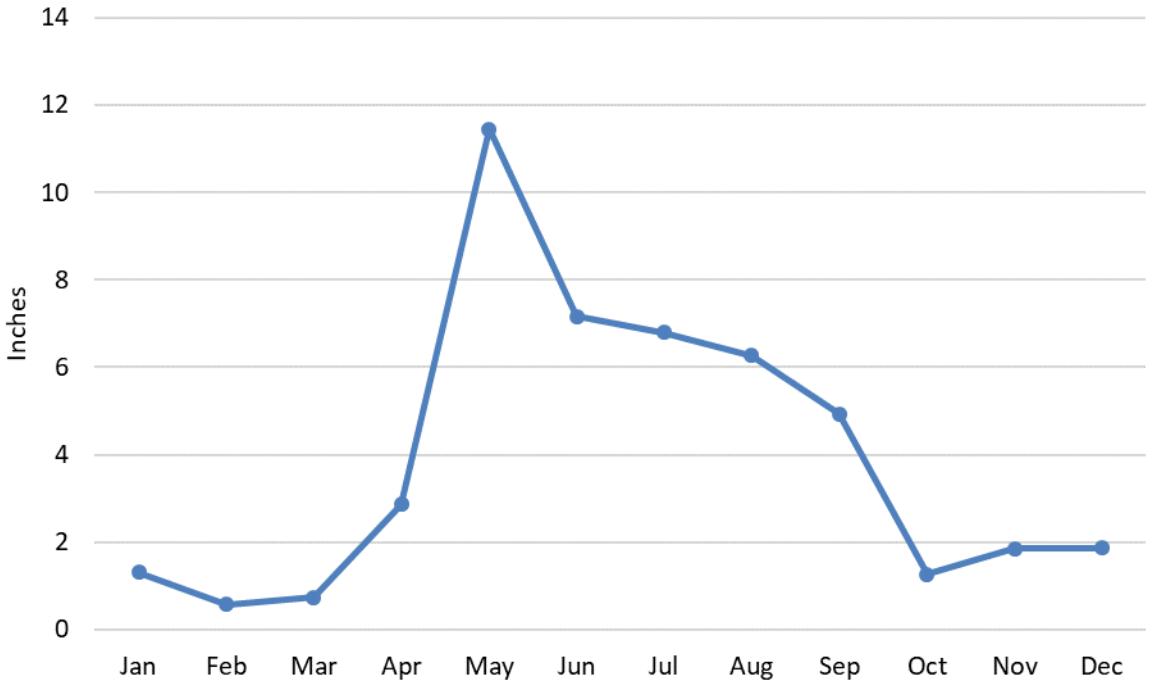


Figure 3. 2018 Average District Monthly Rainfall Distribution

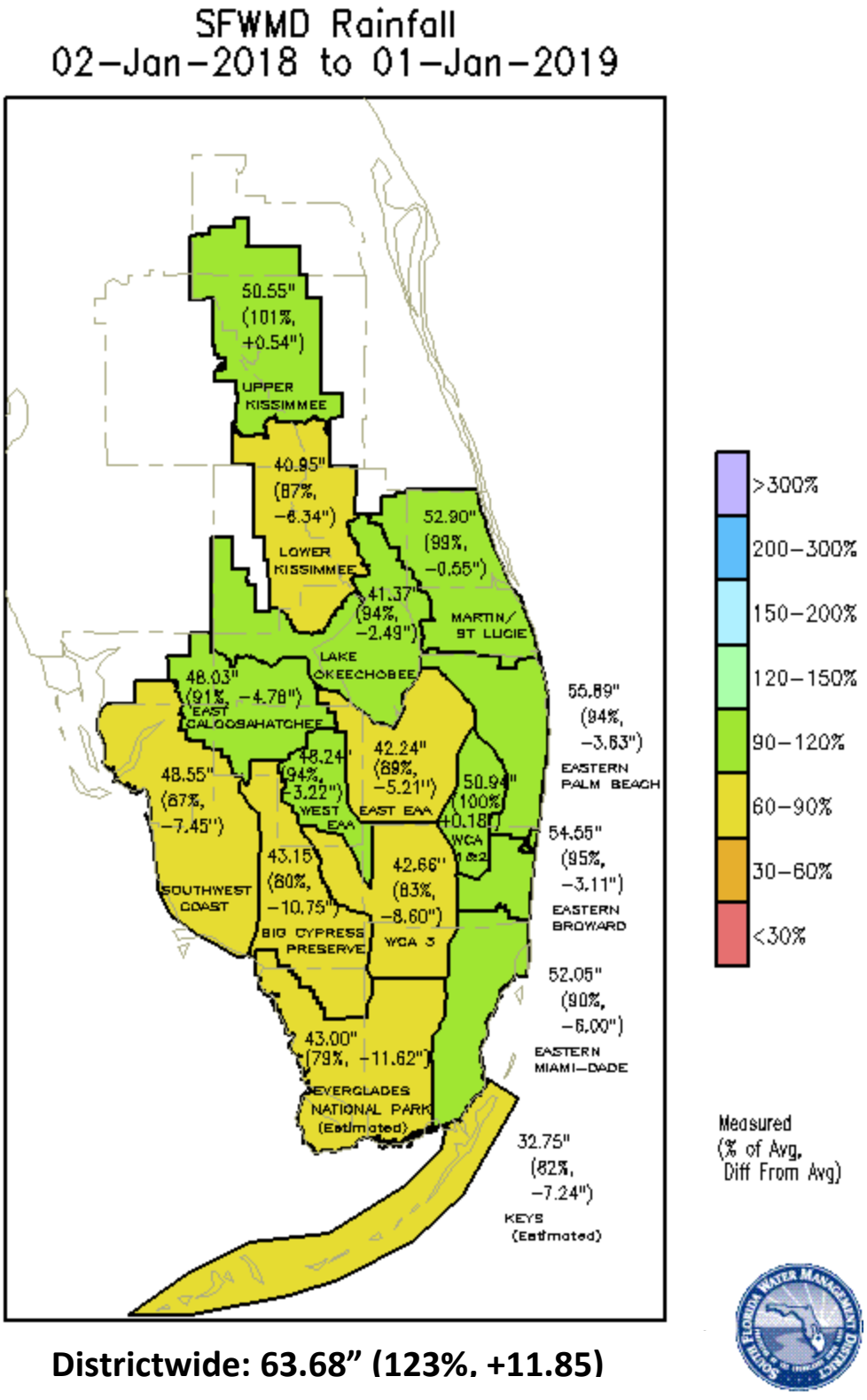


Figure 4. SFWMD 2018 Rainfall Distribution Map Compared to 30-Year Historical Average

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 as discussed above. 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, data for all use categories were obtained for active permits from January 1, 2018 through December 31, 2018. Analysis of reported water use was performed by specialists within the SFWMD's Water Supply Bureau to compile the best available data. Work on this report typically begins in September, which allows time for the SFWMD's Water Use Bureau to receive semiannual data (June reporting of December data) and to contact permittees regarding absent and outlier data. For this report, the SFWMD's Water Supply Bureau must do additional manipulation and validation of the data to determine the surface water to groundwater and saline to freshwater source ratios. Water use estimates in this report are based on a final RegDB query performed on December 5, 2019. It should be noted that 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.

2018 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 2018, there were 119 active PWS permits (0.10 mgd or greater) serving an estimated 8.03 million people (95 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 2018, the total water use for PWS was 1,103.06 mgd, with 88 percent coming from freshwater sources and 12 percent coming from saline water sources. Groundwater contributed 96 percent of the water, and surface water accounted for the remaining 4 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	218.65	12.29	0.00	230.94	**230.94**	26
Charlotte	0.20	0.00	0.00	0.20	**0.20**	3
Collier	40.34	15.67	5.13	50.88	**56.01**	9
Glades	0.57	0.00	0.00	0.57	**0.57**	2
Hendry	0.65	3.51	0.00	4.16	**4.16**	3
Highlands	0.36	0.00	0.00	0.36	**0.36**	2
Lee	51.79	21.21	1.14	71.86	**73.00**	13
Martin	8.25	12.12	0.00	20.37	**20.37**	8
Miami-Dade	338.33	11.83	0.00	350.16	**350.16**	7
Monroe[2]	0.00	0.00	0.00	0.00	**0.00**	0
Okeechobee	2.26	0.00	2.15	0.11	**2.26**	2
Orange	33.37	6.59	0.00	39.96	**39.96**	4
Osceola	49.44	0.00	3.88	45.56	**49.44**	7
Palm Beach	212.18	27.90	29.64	210.44	**240.08**	19
Polk	2.83	0.00	0.00	2.83	**2.83**	5
St. Lucie	8.45	24.27	0.00	32.71	**32.71**	9
Total	**967.66**	**135.40**	**41.94**	**1,061.12**	**1,103.06**	**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 (17.88 mgd of groundwater [17.64 mgd fresh and 0.24 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 subdivision 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 1,075 permits for public water supply with an allocation less than 0.10 mgd in 2018.

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 2018 DSS county populations by the 2018 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 2018 total water use for DSS was estimated to be 39.82 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	0.84	0.00	0.00	0.84	0.84	27
Charlotte	0.00	0.00	0.00	0.00	0.00	10
Collier	4.07	0.00	0.00	4.07	4.07	62
Glades	0.47	0.00	0.00	0.47	0.47	30
Hendry	1.07	0.00	0.00	1.07	1.07	69
Highlands	0.28	0.00	0.00	0.28	0.28	25
Lee	12.01	0.00	0.00	12.01	12.01	135
Martin	0.91	0.00	0.00	0.91	0.91	106
Miami-Dade	1.75	0.00	0.00	1.75	1.75	103
Monroe	0.00	0.00	0.00	0.00	0.00	0
Okeechobee	1.25	0.00	0.00	1.25	1.25	95
Orange	0.58	0.00	0.00	0.58	0.58	86
Osceola	6.64	0.00	0.00	6.64	6.64	17
Palm Beach	5.61	0.00	0.00	5.61	5.61	150
Polk	1.47	0.00	0.00	1.47	1.47	23
St. Lucie	2.88	0.00	0.00	2.88	2.88	137
Total	**39.82**	**0.00**	**0.00**	**39.82**	**39.82**	**1,075**

[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

The Industrial/Commercial/Institutional (ICI) category 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 0.32 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 2018 was estimated by multiplying the average allocation utilization ratio of 0.32 by the permit allocations.

The ICI category includes 23 mining and 60 industrial permits that have an allocation of 0.10 mgd or greater, and 544 permits with an allocation less than 0.10 mgd. The total 2018 water use for ICI was 135.29 mgd, with fresh groundwater contributing 54 percent and fresh surface water contributing 46 percent. Industrial use accounted for 38.09 mgd (28 percent) and mining use accounted for 97.20 mgd (72 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	2.65	0.00	0.03	2.62	2.65	81
Charlotte	0.31	0.00	0.24	0.08	0.31	10
Collier	6.68	0.14	6.17	0.65	6.82	67
Glades	18.74	0.00	18.58	0.17	18.74	10
Hendry	4.55	0.00	0.00	4.55	4.55	40
Highlands	1.23	0.00	0.00	1.22	1.23	14
Lee	21.21	0.00	20.31	0.90	21.21	88
Martin	1.34	0.00	0.92	0.42	1.34	35
Miami-Dade	65.57	0.00	20.29	45.28	65.57	79
Monroe	0.00	0.00	0.00	0.00	0.00	1
Okeechobee	0.17	0.00	0.00	0.17	0.17	21
Orange	2.10	0.00	0.00	2.10	2.10	14
Osceola	0.09	0.00	0.00	0.09	0.09	21
Palm Beach	8.55	0.00	4.79	3.76	8.55	113
Polk	0.03	0.00	0.00	0.03	0.03	2
St. Lucie	1.92	0.00	1.74	0.18	1.92	31
Total	**135.15**	**0.14**	**73.06**	**62.23**	**135.29**	**627**

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

Agricultural Irrigation

The Agricultural Irrigation (AGR) category 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 class, 686 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 – 12.6%;
    - Lower Kissimmee Basin – 14.3%;
    - Upper East Coast – 12%;
    - Lower West Coast – 27%; and
    - Lower East Coast – 25%.

- For the aquaculture permitting use class, 5 users in 2 of the 5 planning regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 9.5 percent based on those permittees that did report.
- For the nursery permitting use class, 45 out of 888 users in all 5 planning regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 39.7 percent based on those permittees that did report.
- For the livestock permitting use class, 14 out of 553 users in 3 of the 5 regions reported. Permittees that did not report were estimated using an allocation utilization ratio of 47.5 percent based on those permittees that did report.

The AGR category is made up of 3,869 permits, including 2,317 for agriculture (107 of which are within the EAA), 888 for nursery, 553 for livestock, 85 for 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 is composed primarily 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. 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. Daily records of the water volumes from Lake Okeechobee into and out through primary canals are kept such that a surface water demand volume for the area can be estimated using a water balance method. The SFWMD's Everglades Technical Support Bureau produces flow volume data sets for this area (to be used in the EAA Regulatory Model as part of the annual total phosphorus load compliance assessment required by Chapter 40E-63, Florida Administrative Code), from which the irrigation water volume can be calculated. In calendar year 2018, 374 mgd of water were used by 473,776 acres of this primarily agricultural area. This acreage excludes lands that were part of the historical EAA acreage and are currently used by the District for water storage and treatment (**Figure 5**). For more information regarding the regulatory model please refer to Chapter 4, Appendix 4-1 of the South Florida Environmental Report which is published annually and available on the District's website.

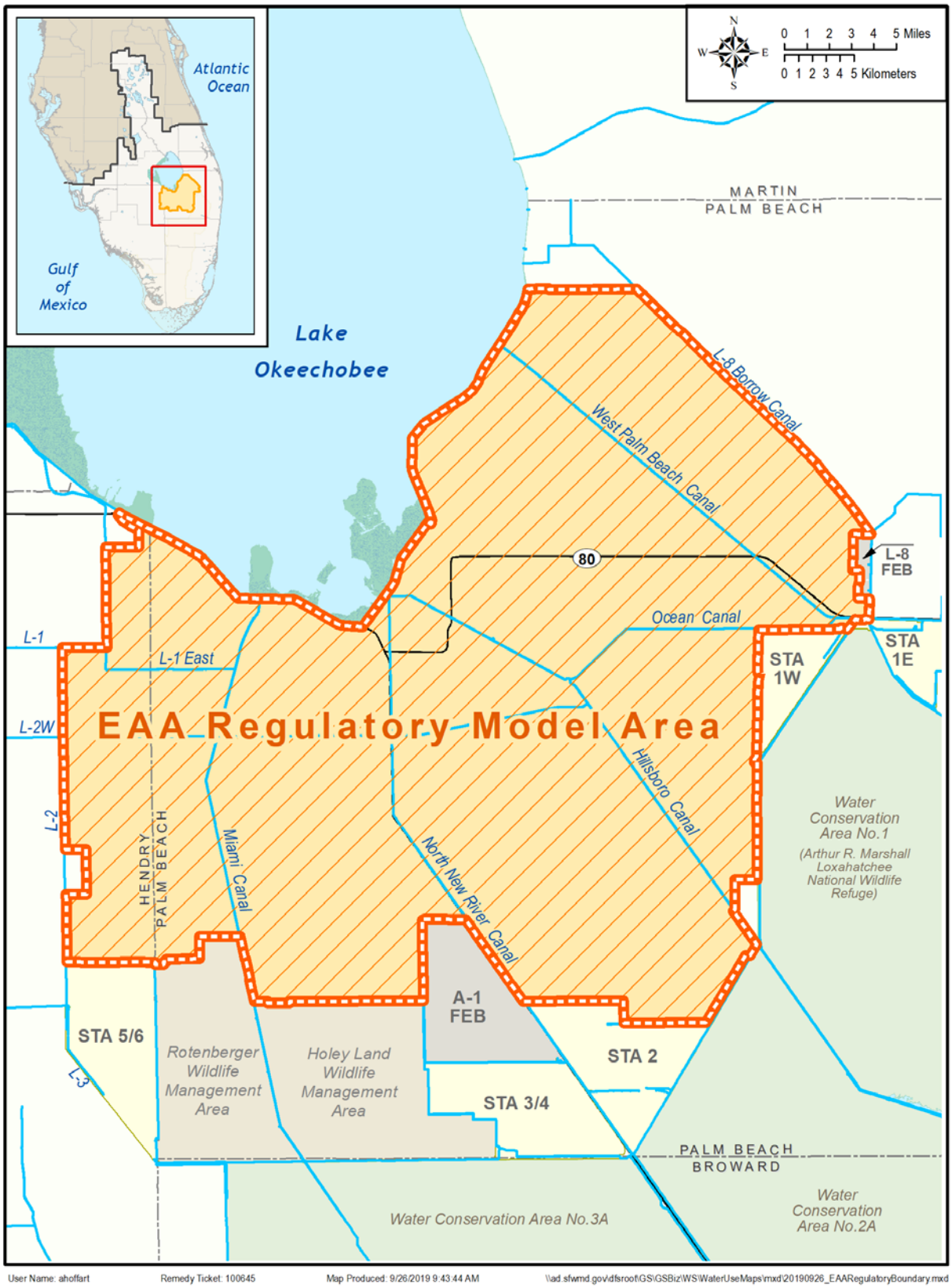


Figure 5. Map of the Everglades Agricultural Area Regulatory Model Area

Within the EAA regulatory model area, there are 3 agricultural permits in Hendry County and 89 permits in Palm Beach County using surface water sources. There is 1 D&I permit in Hendry County and 8 D&I permits in Palm Beach County. These D&I permits are primarily agricultural land, but three also include residential and commercial areas (e.g., the towns of Canal Point, Pahokee, Belle Glade, and South Bay). 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, the irrigation water volume for permittees located within the EAA Regulatory Model area are reported as being in Palm Beach County.

The total 2018 water use for AGR, including the EAA, was 1,174 mgd. Of this total volume, agriculture (crop irrigation) outside the EAA accounted for 569.31 mgd (48.5 percent); agriculture within the EAA was 373.82 mgd (31.8 percent); agriculture within D&I areas was 205.11 mgd (17.5 percent); and aquaculture, livestock, and nursery combined were 25.58 mgd (2.2 percent). The water was derived from 71 percent surface water and 29 percent groundwater sources and from 99 percent freshwater and 1 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	1.59	0.00	1.07	0.52	**1.59**	111
Charlotte	4.34	0.89	1.82	3.40	**5.22**	21
Collier	99.94	0.00	2.96	96.99	**99.94**	172
Glades	88.51	4.00	85.74	6.77	**92.51**	153
Hendry	321.51	0.00	211.76	109.75	**321.51**	290
Highlands	66.04	0.00	30.72	35.32	**66.04**	202
Lee	22.21	0.00	3.63	18.58	**22.21**	326
Martin	73.41	0.17	69.99	3.59	**73.58**	222
Miami-Dade	23.15	0.00	0.18	22.97	**23.15**	1117
Monroe	0.00	0.00	0.00	0.00	**0.00**	1
Okeechobee	17.76	0.00	6.73	11.02	**17.76**	244
Orange	0.23	0.00	0.07	0.16	**0.23**	23
Osceola	10.37	0.00	1.73	8.64	**10.37**	144
Palm Beach	398.34	0.00	394.02	4.32	**398.34**	459
Polk	2.39	0.00	0.80	1.59	**2.39**	31
St. Lucie	28.65	10.31	26.11	12.85	**38.96**	353
Total	**1,158.45**	**15.36**	**837.33**	**336.48**	**1,173.81**	**3,869**

[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 total volume reflects volumes of those permittees who reported plus an estimated volume for permittees who did not report. The average allocation utilization ratios of reporting REC permits were 0.57 for landscape and 0.51 for golf 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 2018 was estimated by multiplying the average allocation utilization ratio above by the permit allocations.

There were 13,457 permits for landscape irrigation and 371 permits for golf courses in 2018. An additional 9 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 303.48 mgd in 2018. Of this, landscape irrigation accounted for 193.90 mgd (64 percent), golf course irrigation was 104.52 mgd (34 percent), and reclaimed water supplementation for irrigation was 5.06 mgd (2 percent). Surface water was used for 58 percent of the total water use and groundwater accounted for the remaining 42 percent. There were 25 golf and 33 landscape permits, utilizing a total of 10.77 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	40.06	0.36	30.02	10.40	**40.42**	2,893
Charlotte	0.09	0.00	0.05	0.04	**0.09**	9
Collier	56.19	0.47	33.53	23.13	**56.66**	944
Glades	0.18	0.00	0.11	0.07	**0.18**	15
Hendry	0.66	0.00	0.22	0.44	**0.66**	107
Highlands	0.42	0.00	0.09	0.33	**0.42**	12
Lee	56.19	4.43	31.83	28.79	**60.62**	2,572
Martin	11.17	1.17	5.47	6.86	**12.34**	741
Miami-Dade	16.24	0.00	6.36	9.88	**16.24**	1,158
Monroe	0.74	1.79	0.45	2.08	**2.53**	3
Okeechobee	0.83	0.00	0.21	0.62	**0.83**	157
Orange	9.49	0.00	2.11	7.38	**9.49**	215
Osceola	6.79	0.00	1.31	5.48	**6.79**	188
Palm Beach	83.37	2.52	57.57	28.32	**85.89**	3,905
Polk	0.95	0.00	0.08	0.86	**0.95**	17
St. Lucie	9.36	0.04	5.10	4.30	**9.39**	911
Total	**292.71**	**10.77**	**174.51**	**128.97**	**303.48**	**13,847**

[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 2018 water use for PWR was 9.85 mgd, with 23 percent coming from freshwater sources and 77 percent coming from saline water sources. Groundwater contributed nearly all of the water, while surface water contributions were negligible. **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	0.38	0.00	0.00	0.38	**0.38**	2
Martin	0.13	0.00	0.01	0.12	**0.13**	2
Miami-Dade	0.00	7.56	0.00	7.56	**7.56**	1
Osceola	0.12	0.00	0.00	0.12	**0.12**	1
Palm Beach	0.10	0.07	0.00	0.17	**0.17**	2
St. Lucie	1.49	0.00	0.00	1.49	**1.49**	1
Total	**2.22**	**7.63**	**0.01**	**9.84**	**9.85**	**9**

[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 2018 water use reported to the SFWMD for once-through cooling in PWR was 3,363 mgd. Of this volume, 3,329 mgd were saline water, 19 mgd were fresh water, and 15 mgd were reclaimed water. Only 17 mgd of the total water were derived from groundwater, while 3,331 mgd were from surface water sources.

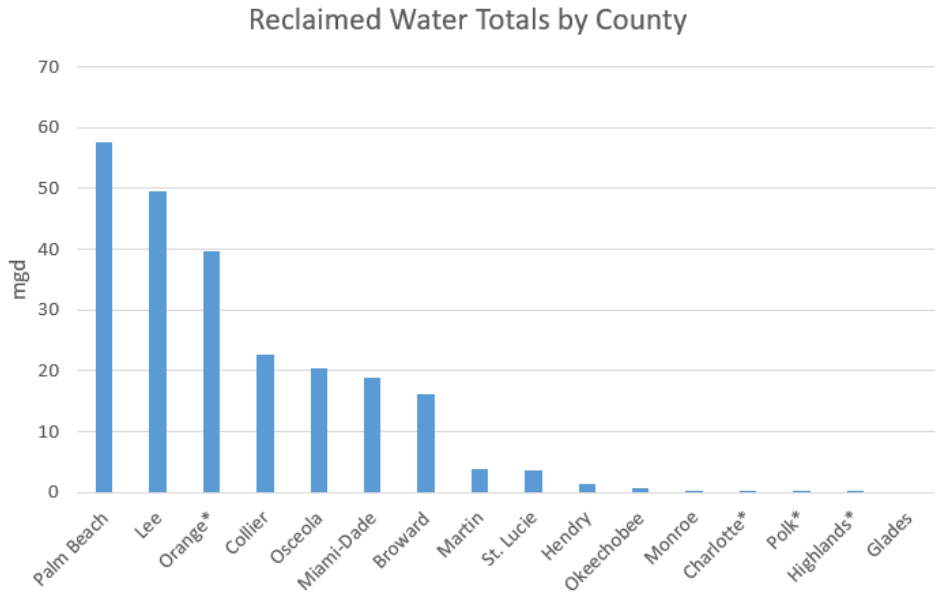
Reclaimed Water

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 2018, 282.44 mgd of reclaimed water were used in the District. Of this, 235.25 mgd were reused for four of the six water use categories, and 47.19 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 2019)

County	Reclaimed Water Flow[1]	Industrial/ Commercial/ Institutional Self-Supply[2]	Agricultural Irrigation Self-Supply[3]	Recreational/ Landscape Self-Supply[4]	Power Generation Self-Supply[5]
Broward	**16.17**	8.21	0.00	7.96	0.00
Charlotte	**0.14**	0.14	0.00	0.00	0.00
Collier	**22.59**	0.00	0.03	22.56	0.00
Glades	**0.00**	0.00	0.00	0.00	0.00
Hendry	**1.51**	0.00	1.51	0.00	0.00
Highlands	**0.06**	0.00	0.06	0.00	0.00
Lee	**49.59**	0.30	0.00	48.32	0.97
Martin	**3.78**	0.20	0.00	3.50	0.08
Miami-Dade	**18.89**	18.89	0.00	0.00	0.00
Monroe	**0.24**	0.02	0.00	0.22	0.00
Okeechobee	**0.67**	0.16	0.51	0.00	0.00
Orange	**39.71**	1.91	2.49	35.29	0.02
Osceola	**20.54**	0.01	0.57	17.90	2.06
Palm Beach	**57.60**	4.53	0.00	40.71	12.36
Polk	**0.11**	0.00	0.11	0.00	0.00
St. Lucie	**3.65**	0.11	0.00	3.54	0.00
Total	**235.25**	**34.48**	**5.28**	**180.00**	**15.49**

Note: Reclaimed water was not used for PWS or DSS.
[1] Annual average reclaimed water flows as reported in the FDEP 2018 Reuse Inventory from October 1, 2017 through September 30, 2018, not including 47.19 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 2018 Reuse Inventory.



*Only the portions of the county located within the SFWMD

Figure 6. Reclaimed Water Used by County

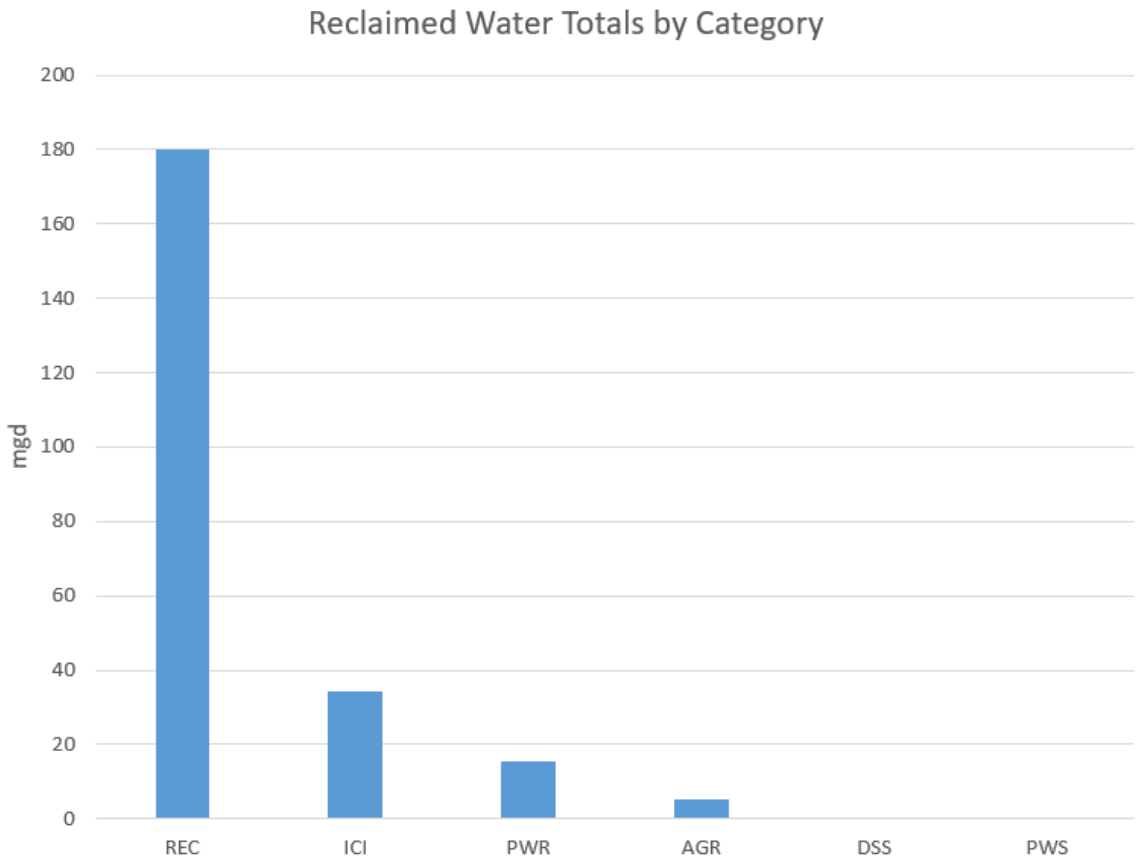


Figure 7. Reclaimed Water Used by Category

SUMMARY OF 2018 ESTIMATED WATER USE

The total amount of water withdrawn from groundwater and surface water resources in 2018 within the District was approximately 2,765 mgd (**Table 8**). The two largest water use categories were AGR and PWS, using 1,174 mgd and 1,103 mgd, respectively. These two categories constitute 82 percent of the total water use. Of the total use, 1,127 mgd (41 percent) came from surface water and 1,638 mgd (59 percent) came from groundwater sources. Approximately 2,596 mgd (94 percent) were withdrawn from fresh water sources and 169 mgd (6 percent) were derived from saline water sources. In addition, reclaimed water use totaled 235 mgd in 2018. Of the total 2,765 mgd, 21 percent (584 mgd) was estimated and 79 percent (2,181 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. A summary of the data presented by water supply planning region, an addition to the report this year, is contained in **Appendix D.**

Figure 8 depicts the distribution of water use (inclusive of reclaimed water) by source and category. **Figure 9** depicts the distribution of total water use by category (excluding reclaimed). **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	1,158.45	15.36	837.33	336.48	**1,173.81**	5.28	**1,179.09**
Public Water Supply	967.66	135.40	41.94	1,061.12	**1,103.06**	0.00	**1,103.06**
Recreational/Landscape Irrigation	292.71	10.77	174.51	128.97	**303.48**	180.00	**483.48**
Industrial/Commercial/Institutional	135.15	0.14	73.06	62.23	**135.29**	34.48	**169.77**
Power Generation	2.22	7.63	0.01	9.84	**9.85**	15.49	**25.34**
Domestic and Small Public Supply	39.82	0.00	0.00	39.82	**39.82**	0.00	**39.82**
Total	**2,596.01**	**169.31**	**1,126.85**	**1,638.46**	**2,765.32**	**235.25**	**3,000.57**

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

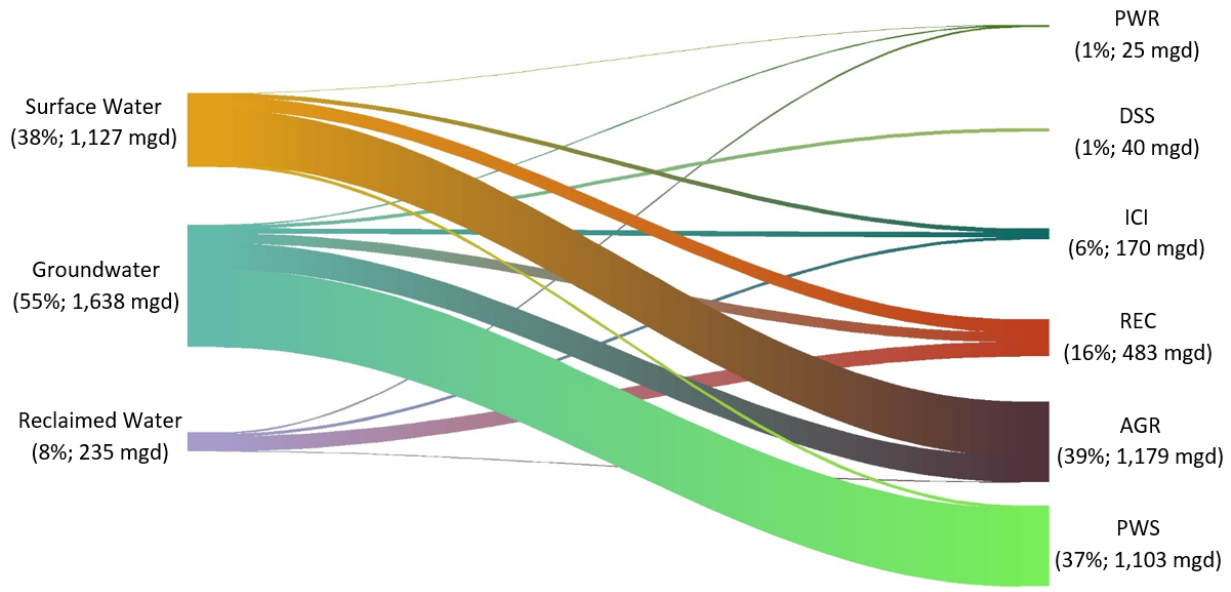


Figure 8. Water Use by Source and Category

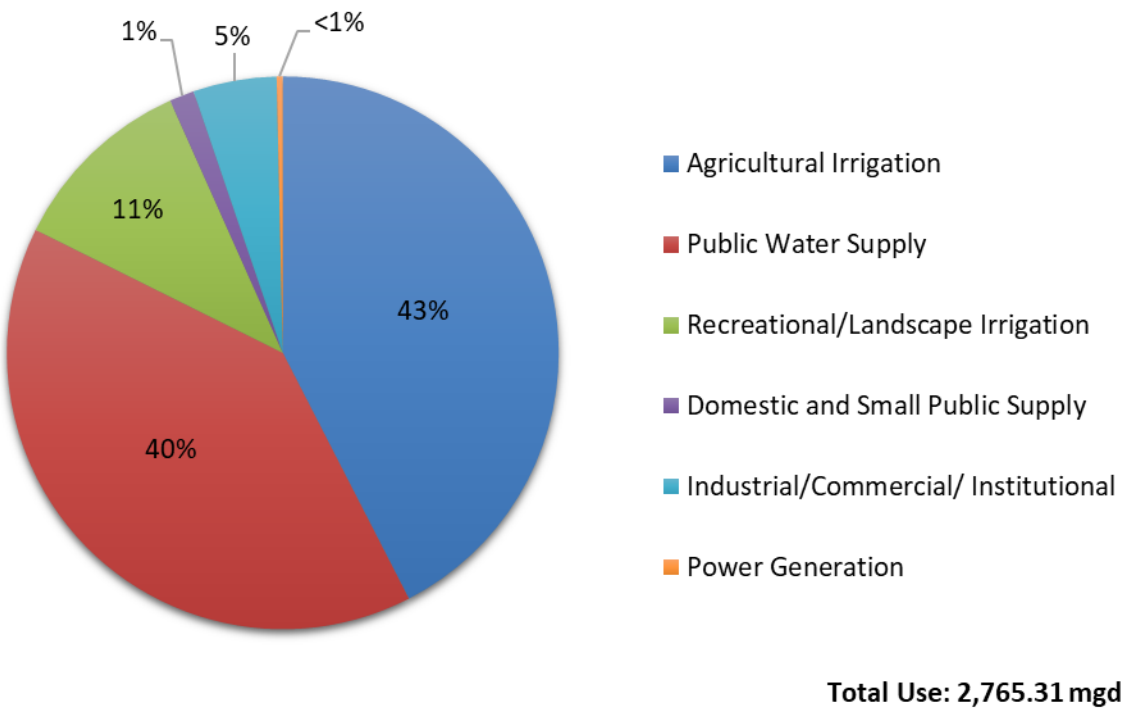


Figure 9. Percentage Water Use by Category (excluding reclaimed)

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	263.79	12.65	31.12	245.32	**276.44**	16.17	**292.61**
Charlotte	4.95	0.89	2.11	3.72	**5.83**	0.14	**5.97**
Collier	207.23	16.29	47.79	175.73	**223.51**	22.59	**246.10**
Glades	108.48	4.00	104.43	8.05	**112.48**	0	**112.48**
Hendry	328.43	3.51	211.97	119.97	**331.94**	1.51	**333.45**
Highlands	68.31	0.00	30.81	37.50	**68.31**	0.06	**68.37**
Lee	163.79	25.64	56.91	132.52	**189.43**	49.59	**239.02**
Martin	95.21	13.46	76.39	32.28	**108.67**	3.78	**112.45**
Miami-Dade	445.04	19.39	26.83	437.60	**464.43**	18.89	**483.32**
Monroe	0.75	1.79	0.45	2.08	**2.53**	0.24	**2.77**
Okeechobee	22.26	0.00	9.09	13.17	**22.26**	0.67	**22.93**
Orange	45.77	6.59	2.18	50.18	**52.36**	39.71	**92.07**
Osceola	73.45	0.00	6.92	66.53	**73.45**	20.54	**93.99**
Palm Beach	708.15	30.49	486.02	252.62	**738.64**	57.6	**796.24**
Polk	7.67	0.00	0.88	6.79	**7.67**	0.11	**7.78**
St. Lucie	52.74	34.61	32.94	54.41	**87.36**	3.65	**91.01**
Total	**2,596.01**	**169.31**	**1,126.85**	**1,638.46**	**2,765.32**	**235.25**	**3,000.57**

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

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

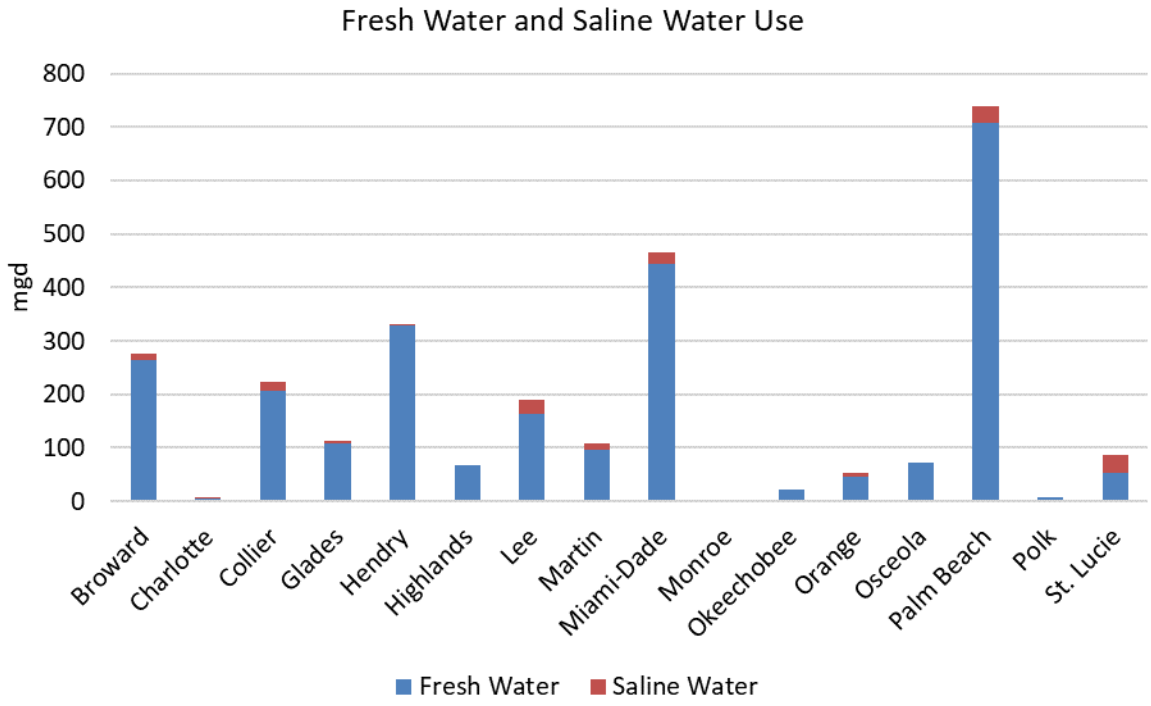


Figure 10. Fresh Water and Saline Water Use by County for All Use Categories

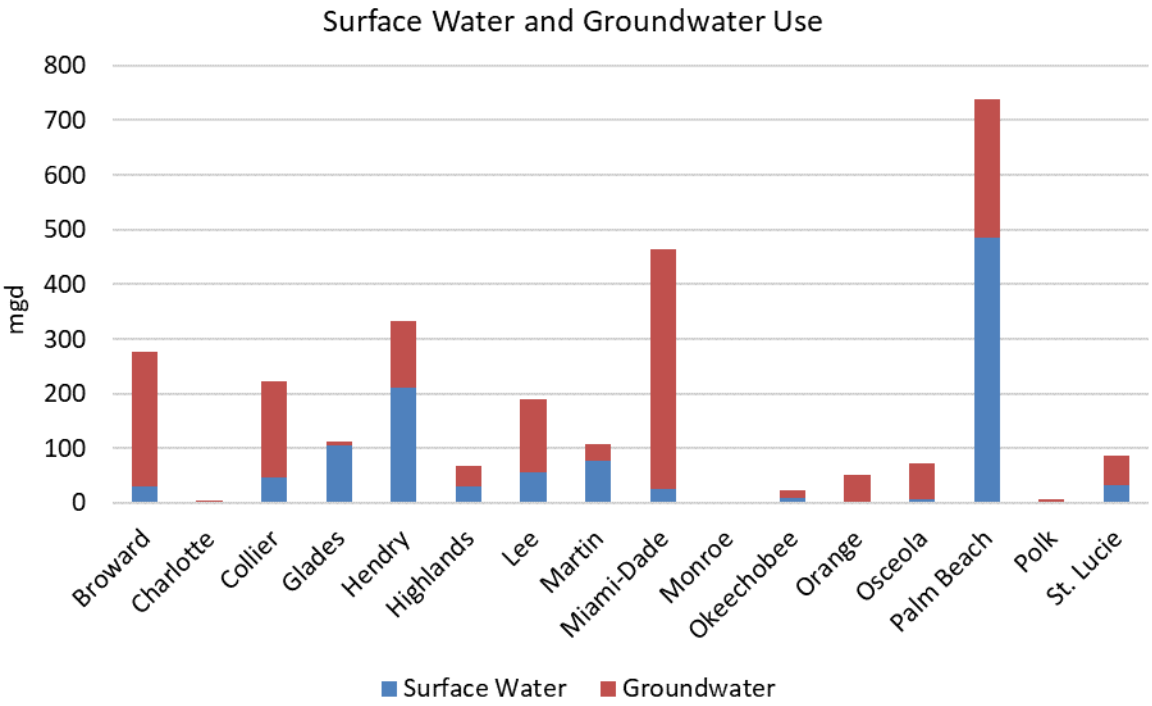


Figure 11. Surface Water and Groundwater Use by County for All Use Categories

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	1.59	2.65	0.84	40.42	0.00	230.94	**276.44**
Charlotte	5.22	0.31	0.00	0.09	0.00	0.20	**5.83**
Collier	99.94	6.82	4.07	56.66	0.00	56.01	**223.51**
Glades	92.51	18.74	0.47	0.18	0.00	0.57	**112.48**
Hendry	321.51	4.55	1.07	0.66	0.00	4.16	**331.94**
Highlands	66.04	1.23	0.28	0.42	0.00	0.36	**68.31**
Lee	22.21	21.21	12.01	60.62	0.38	73.00	**189.43**
Martin	73.58	1.34	0.91	12.34	0.13	20.37	**108.67**
Miami-Dade	23.15	65.57	1.75	16.24	7.56	350.16	**464.43**
Monroe	0.00	0.00	0.00	2.53	0.00	0.00	**2.53**
Okeechobee	17.76	0.17	1.25	0.83	0.00	2.26	**22.26**
Orange	0.23	2.10	0.58	9.49	0.00	39.96	**52.36**
Osceola	10.37	0.09	6.64	6.79	0.12	49.44	**73.45**
Palm Beach	398.34	8.55	5.61	85.89	0.17	240.08	**738.64**
Polk	2.39	0.03	1.47	0.95	0.00	2.83	**7.67**
St. Lucie	38.96	1.92	2.88	9.39	1.49	32.71	**87.36**
Total	**1,173.81**	**135.29**	**39.82**	**303.48**	**9.85**	**1,103.06**	**2,765.32**

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 fifth 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. There were no changes to the overall methodology since the last (2017) report. Refinements in the methodology could occur for future reports 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 inconsistent reporting 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 5 percent (from 2,629 to 2,765 mgd) between 2017 and 2018. A comparison of changes in water use between 2017 and 2018 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 16.5 inches less rain in 2018 than in 2017; however, May received the most rainfall ever recorded for the month (11.45 inches). The 2018 dry season (specifically January to March) received 1 inch less rainfall than 2017 for the same period.

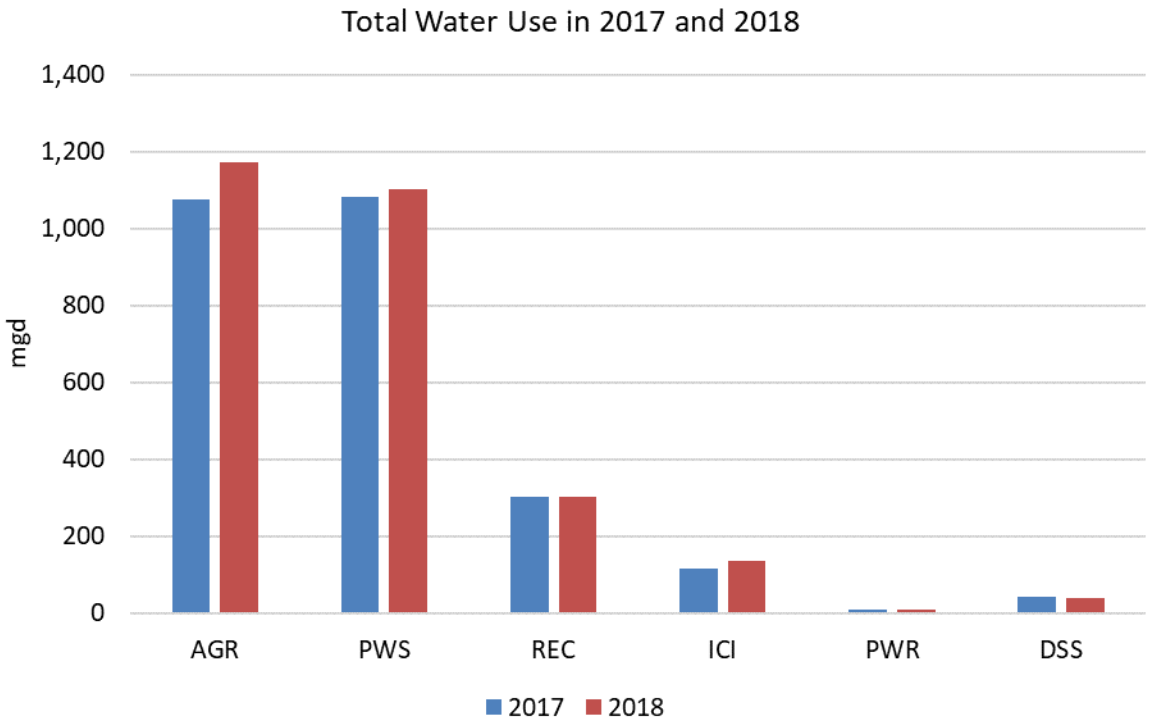


Figure 12. Comparison of 2017 to 2018 Total Estimated Water Use by Use Category

CONCLUSIONS

For 2018, 2,765 mgd of water were estimated to have been used throughout the District, distributed among the six water use categories. Approximately 1,638 mgd were derived from groundwater and 1,126 mgd were derived from surface water sources, with 2,596 mgd being freshwater and 169 mgd considered saline water. This is 136 mgd more than was used in 2017.

REFERENCES

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APPENDIX A: DSS POPULATION AND DEMAND METHODOLOGY

Population

Population estimates are intended for planning purposes only. The 2018 county population estimates of permanent residents are from the Bureau of Economic and Business Research (BEBR; Rayer and Wang 2019). 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). PWS and DSS totals were derived by combining data published in the most recent water supply plans.

Demand Estimates

The DSS water use estimates were calculated by multiplying the 2018 DSS population by the 2018 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 2018 Districtwide, population-weighted residential PCUR of 79.40 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

County	PWS Total Population	DSS Total Population	Total Population	% DSS/ Total	2018 County Total Population BEBR[1]	PWS Population for Report	DSS Population for Report (% × County BEBR)	DSS[2] (mgd)
Broward	1,844,174	10,340	1,854,514	0.6%	1,897,976	1,887,394	10,582	0.84
Charlotte[3]	1,968	72	2,040	3.5%	1,512	1,459	53	0.00
Collier	289,738	47,045	336,783	14%	367,347	316,033	51,314	4.07
Glades	7,103	5,905	13,008	45%	13,002	7,100	5,902	0.47
Hendry	23,297	11,961	35,258	34%	39,586	26,157	13,429	1.07
Highlands	24,046	15,543	39,589	39%	8,881	5,394	3,487	0.28
Lee	512,504	137,797	650,301	21%	713,903	562,629	151,274	12.01
Martin	135,557	10,761	146,318	7%	155,556	144,116	11,440	0.91
Miami-Dade	2,679,429	21,365	2,700,794	1%	2,779,322	2,757,336	21,986	1.75
Monroe	72,143	-	72,143	0%	73,940	73,940	-	0.00
Okeechobee	23,327	15,161	38,488	39%	40,056	24,277	15,779	1.25
Orange	331,634	6,529	338,163	2%	378,972	371,655	7,317	0.58
Osceola	201,922	63,238	265,160	24%	350,704	267,065	83,639	6.64
Palm Beach	1,323,103	68,636	1,391,739	5%	1,433,417	1,362,726	70,691	5.61
Polk	13,830	13,333	27,163	49%	37,695	19,192	18,503	1.47
St. Lucie	244,511	33,278	277,789	12%	302,432	266,202	36,230	2.88
Total	**7,728,286**	**460,964**	**8,189,250**	**6%**	**8,594,301**	**8,092,673**	**501,628**	**39.83**

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

[1] Medium BEBR county totals published in 2018.

[2] The 2018 Districtwide, population-weighted uniform residential per capita use rate = 79.40 gallons per day.

[3] Used calculation of SFWMD portion from 2017 LWC WSP [(2012/159,978)*164,469] for 2016 BEBR County Total.

References

Rayer, S. and Y. Wang. 2019. Projections of Florida Population by County, 2020–2045, with Estimates for 2018. Florida Population Studies Bulletin 184, June 2019. 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	0.83	0.16	0.00	0.02	0.00	0.04	0.24	0.30	0.00	0.00	0.00	0.00	**1.59**
Charlotte	1.82	3.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**5.22**
Collier	2.81	96.63	0.00	0.01	0.00	0.01	0.15	0.34	0.00	0.00	0.00	0.00	**99.94**
Glades	62.60	6.28	0.00	0.00	0.00	0.47	0.00	0.02	23.14	0.00	0.00	0.00	**92.51**
Hendry	68.05	109.16	0.00	0.19	0.00	0.24	0.03	0.16	143.68	0.00	0.00	0.00	**321.51**
Highlands	30.65	33.29	0.01	0.02	0.01	0.64	0.05	1.37	0.00	0.00	0.00	0.00	**66.04**
Lee	0.50	18.10	0.00	0.02	0.00	0.07	0.89	0.39	2.24	0.00	0.00	0.00	**22.21**
Martin	51.85	2.86	0.00	0.00	0.00	0.16	0.40	0.55	17.74	0.02	0.00	0.00	**73.58**
Miami-Dade	0.13	11.39	0.00	0.49	0.00	0.01	0.05	11.08	0.00	0.00	0.00	0.00	**23.15**
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	6.73	8.50	0.00	0.02	0.00	2.26	0.00	0.26	0.00	0.00	0.00	0.00	**17.76**
Orange	0.07	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.23**
Osceola	1.73	8.20	0.00	0.05	0.00	0.13	0.00	0.26	0.00	0.00	0.00	0.00	**10.37**
Palm Beach	4.37	1.74	0.00	0.01	0.01	0.02	0.92	2.55	14.90	0.00	373.82	0.00	**398.34**
Polk	0.80	1.54	0.00	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	**2.39**
St. Lucie	22.65	12.30	0.00	0.01	0.00	0.34	0.08	0.21	3.38	0.00	0.00	0.00	**38.96**
Total	**255.60**	**313.70**	**0.01**	**0.84**	**0.01**	**4.42**	**2.81**	**17.50**	**205.08**	**0.02**	**373.82**	**0.00**	**1,173.81**
% of Total	**22%**	**27%**	**0%**	**0%**	**0%**	**0%**	**0%**	**1%**	**17%**	**0%**	**32%**	**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	1.00	0.00	0.02	0.00	0.04	0.00	0.53	0.00	0.00	0.00	0.00	0.00	**1.59**
Charlotte	4.34	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**5.22**
Collier	99.44	0.00	0.01	0.00	0.01	0.00	0.48	0.00	0.00	0.00	0.00	0.00	**99.94**
Glades	64.88	4.00	0.00	0.00	0.47	0.00	0.02	0.00	23.14	0.00	0.00	0.00	**92.51**
Hendry	177.21	0.00	0.19	0.00	0.24	0.00	0.19	0.00	143.68	0.00	0.00	0.00	**321.51**
Highlands	63.94	0.00	0.02	0.00	0.65	0.00	1.42	0.00	0.00	0.00	0.00	0.00	**66.04**
Lee	18.59	0.00	0.02	0.00	0.07	0.00	1.28	0.00	2.24	0.00	0.00	0.00	**22.21**
Martin	54.54	0.17	0.00	0.00	0.16	0.00	0.95	0.00	17.76	0.00	0.00	0.00	**73.58**
Miami-Dade	11.52	0.00	0.49	0.00	0.01	0.00	11.13	0.00	0.00	0.00	0.00	0.00	**23.15**
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	15.23	0.00	0.02	0.00	2.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	**17.76**
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	9.94	0.00	0.05	0.00	0.13	0.00	0.26	0.00	0.00	0.00	0.00	0.00	**10.37**
Palm Beach	6.11	0.00	0.01	0.00	0.02	0.00	3.47	0.00	14.90	0.00	373.82	0.00	**398.34**
Polk	2.34	0.00	0.00	0.00	0.03	0.00	0.02	0.00	0.00	0.00	0.00	0.00	**2.39**
St. Lucie	24.64	10.31	0.01	0.00	0.34	0.00	0.29	0.00	3.38	0.00	0.00	0.00	**38.96**
Total	**553.94**	**15.36**	**0.84**	**0.00**	**4.43**	**0.00**	**20.31**	**0.00**	**205.11**	**0.00**	**373.82**	**0.00**	**1,173.81**
% of Total	**47%**	**1%**	**0%**	**0%**	**0%**	**0%**	**2%**	**0%**	**17%**	**0%**	**32%**	**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	0.03	2.62	0.00	0.00	**2.65**
Charlotte	0.22	0.08	0.01	0.00	**0.31**
Collier	4.31	0.65	1.86	0.00	**6.82**
Glades	0.03	0.03	18.54	0.13	**18.74**
Hendry	0.00	4.55	0.00	0.00	**4.55**
Highlands	0.00	1.22	0.00	0.00	**1.23**
Lee	0.08	0.43	20.23	0.48	**21.21**
Martin	0.26	0.42	0.65	0.00	**1.34**
Miami-Dade	0.06	14.70	20.23	30.58	**65.57**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.00	0.17	0.00	0.00	**0.17**
Orange	0.00	2.10	0.00	0.00	**2.10**
Osceola	0.00	0.09	0.00	0.00	**0.09**
Palm Beach	0.30	3.76	4.48	0.00	**8.55**
Polk	0.00	0.03	0.00	0.00	**0.03**
St. Lucie	1.74	0.18	0.00	0.00	**1.92**
Total	**7.05**	**31.04**	**66.01**	**31.19**	**135.29**
% of Total	**5%**	**23%**	**49%**	**23%**	**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	2.65	0.00	0.00	0.00	**2.65**
Charlotte	0.30	0.00	0.01	0.00	**0.31**
Collier	4.81	0.14	1.86	0.00	**6.82**
Glades	0.06	0.00	18.68	0.00	**18.74**
Hendry	4.55	0.00	0.00	0.00	**4.55**
Highlands	1.23	0.00	0.00	0.00	**1.23**
Lee	0.51	0.00	20.70	0.00	**21.21**
Martin	0.69	0.00	0.65	0.00	**1.34**
Miami-Dade	14.76	0.00	50.81	0.00	**65.57**
Monroe	0.00	0.00	0.00	0.00	**0.00**
Okeechobee	0.17	0.00	0.00	0.00	**0.17**
Orange	2.10	0.00	0.00	0.00	**2.10**
Osceola	0.09	0.00	0.00	0.00	**0.09**
Palm Beach	4.06	0.00	4.48	0.00	**8.55**
Polk	0.03	0.00	0.00	0.00	**0.03**
St. Lucie	1.92	0.00	0.00	0.00	**1.92**
Total	**37.94**	**0.14**	**97.20**	**0.00**	**135.29**
% of Total	**28%**	**0%**	**72%**	**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	6.31	1.62	23.71	8.78	0.00	0.00	**40.42**
Charlotte	0.00	0.00	0.05	0.04	0.00	0.00	**0.09**
Collier	19.87	10.67	13.31	11.19	0.35	1.28	**56.66**
Glades	0.03	0.02	0.08	0.05	0.00	0.00	**0.18**
Hendry	0.00	0.00	0.22	0.44	0.00	0.00	**0.66**
Highlands	0.09	0.27	0.00	0.06	0.00	0.00	**0.42**
Lee	11.03	7.48	20.80	21.28	0.00	0.03	**60.62**
Martin	1.98	2.85	3.49	4.01	0.00	0.00	**12.34**
Miami-Dade	3.20	1.14	3.16	8.74	0.00	0.00	**16.24**
Monroe	0.45	2.06	0.00	0.01	0.00	0.00	**2.53**
Okeechobee	0.02	0.00	0.18	0.62	0.00	0.00	**0.83**
Orange	1.00	2.77	1.10	1.97	0.00	2.64	**9.49**
Osceola	0.48	3.41	0.82	1.64	0.01	0.43	**6.79**
Palm Beach	18.57	6.05	38.95	21.99	0.05	0.28	**85.89**
Polk	0.08	0.72	0.00	0.15	0.00	0.00	**0.95**
St. Lucie	1.84	0.49	3.25	3.80	0.00	0.00	**9.39**
Total	**64.98**	**39.54**	**109.12**	**84.78**	**0.41**	**4.65**	**303.48**
% of Total	**21%**	**13%**	**36%**	**28%**	**0%**	**2%**	**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	7.93	0.00	32.13	0.36	0.00	0.00	**40.42**
Charlotte	0.00	0.00	0.09	0.00	0.00	0.00	**0.09**
Collier	30.41	0.13	24.15	0.34	1.62	0.00	**56.66**
Glades	0.05	0.00	0.14	0.00	0.00	0.00	**0.18**
Hendry	0.00	0.00	0.66	0.00	0.00	0.00	**0.66**
Highlands	0.35	0.00	0.06	0.00	0.00	0.00	**0.42**
Lee	16.91	1.59	39.25	2.84	0.03	0.00	**60.62**
Martin	3.78	1.05	7.38	0.12	0.00	0.00	**12.34**
Miami-Dade	4.34	0.00	11.90	0.00	0.00	0.00	**16.24**
Monroe	0.73	1.79	0.01	0.00	0.00	0.00	**2.53**
Okeechobee	0.03	0.00	0.80	0.00	0.00	0.00	**0.83**
Orange	3.77	0.00	3.08	0.00	2.64	0.00	**9.49**
Osceola	3.90	0.00	2.45	0.00	0.44	0.00	**6.79**
Palm Beach	23.75	0.87	59.29	1.65	0.33	0.00	**85.89**
Polk	0.80	0.00	0.15	0.00	0.00	0.00	**0.95**
St. Lucie	2.34	0.00	7.02	0.04	0.00	0.00	**9.39**
Total	**99.09**	**5.42**	**188.56**	**5.35**	**5.06**	**0.00**	**303.48**
% of Total	**32.7%**	**1.8%**	**62.1%**	**1.8%**	**1.7%**	**0.0%**	**100.0%**

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	250.65	25.79	9%	**276.44**
Charlotte	5.44	0.39	7%	**5.83**
Collier	205.89	17.62	8%	**223.51**
Glades	111.27	1.21	1%	**112.48**
Hendry	316.39	15.55	5%	**331.94**
Highlands	65.79	2.52	4%	**68.31**
Lee	160.40	29.03	15%	**189.43**
Martin	102.31	6.36	6%	**108.67**
Miami-Dade	432.28	32.15	7%	**464.43**
Monroe	1.79	0.75	29%	**2.53**
Okeechobee	18.64	3.62	16%	**22.26**
Orange	49.30	3.06	6%	**52.36**
Osceola	59.34	14.11	19%	**73.45**
Palm Beach	320.09	418.54*	57%	**738.64**
Polk	5.92	1.75	23%	**7.67**
St. Lucie	75.89	11.47	13%	**87.36**
Total	**2,181.38**	**583.94**	**21%**	**2,765.32**

mgd = million gallons per day.
* 374 mgd is estimated EAA volume.

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

Water Use Category	Reported	Estimated	% Estimated	**Total**
Agricultural Irrigation	750.76	423.05	36%	**1,173.81**
Industrial/Commercial/Institutional	119.73	15.56	12%	**135.29**
Domestic and Small Public Supply	0	39.82	100%	**39.822**
Power Generation	9.85	0	0%	**9.85**
Public Water Supply	1098.62	4.44	0%	**1,103.06**
Recreational/Landscape Irrigation	202.42	101.06	33%	**303.48**
Total	**2,181.38**	**583.94**	**21%**	**2,765.32**

mgd = million gallons per day.

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APPENDIX D: TOTAL WATER USE BY PLANNING REGION

Table D-1. Total Water Use by Category and Source (in mgd)

Water Use Category	Surface Water	Groundwater	Fresh Water	Saline Water	Total	Number of Permits
Lower East Coast (LEC)						
Agricultural Irrigation	416.55	112.94	529.49	0.00	529.49	1,754
Domestic and Small Public Supply	0.00	8.32	8.32	0.00	8.32	296
Industrial/Commercial/Institutional	25.11	51.67	76.78	0.00	76.78	276
Recreational/Landscape Irrigation	94.39	50.67	140.39	4.66	145.06	7,959
Power Generation	0.00	7.73	0.10	7.63	7.73	2
Public Water Supply	29.64	791.54	769.16	52.02	821.18	52
Total	**565.69**	**1,022.87**	**1,524.24**	**64.32**	**1,588.55**	**10,339**
Lower Kissimmee Basin (LKB)						
Agricultural Irrigation	61.85	49.74	107.89	3.70	111.59	484
Domestic and Small Public Supply	0.00	1.61	1.61	0.00	1.61	110
Industrial/Commercial/Institutional	5.14	1.50	6.64	0.00	6.64	39
Recreational/Landscape Irrigation	0.26	0.91	1.17	0.00	1.17	166
Power Generation	0.00	0.00	0.00	0.00	0.00	0
Public Water Supply	2.15	0.36	2.51	0.00	2.51	3
Total	**69.40**	**54.12**	**119.82**	**3.70**	**123.52**	**802**
Lower West Coast (LWC)						
Agricultural Irrigation	256.19	146.05	401.05	1.18	402.24	828
Domestic and Small Public Supply	0.00	17.41	17.41	0.00	17.41	281
Industrial/Commercial/Institutional	40.16	6.18	46.19	0.14	46.34	207
Recreational/Landscape Irrigation	65.73	52.49	113.32	4.90	118.22	3,645
Power Generation	0.00	0.38	0.38	0.00	0.38	1
Public Water Supply	6.27	127.68	93.55	40.40	133.95	30
Total	**368.35**	**350.18**	**671.91**	**46.62**	**718.53**	**4,992**
Upper East Coast (UEC)						
Agricultural Irrigation	100.14	17.36	107.01	10.48	117.49	606
Domestic and Small Public Supply	0.00	3.80	3.80	0.00	3.80	253
Industrial/Commercial/Institutional	2.65	0.66	3.31	0.00	3.31	68
Recreational/Landscape Irrigation	10.63	11.19	20.61	1.21	21.82	1657
Power Generation	0.01	1.61	1.62	0.00	1.62	2
Public Water Supply	0.00	53.19	16.80	36.39	53.19	18
Total	**113.43**	**87.80**	**153.15**	**48.08**	**201.22**	**2,604**
Upper Kissimmee Basin (UKB)						
Agricultural Irrigation	2.60	10.39	13.00	0.00	13.00	198
Domestic and Small Public Supply	0.00	8.69	8.69	0.00	8.69	135
Industrial/Commercial/Institutional	0.00	2.22	2.22	0.00	2.22	37
Recreational/Landscape Irrigation	3.50	13.72	17.22	0.00	17.22	420
Power Generation	0.00	0.12	0.12	0.00	0.12	1
Public Water Supply	3.88	88.35	85.64	6.59	92.23	16
Total	**9.99**	**123.49**	**126.89**	**6.59**	**133.48**	**807**
Grand Total	**1,126.85**	**1,638.46**	**2,596.01**	**169.31**	**2,765.32**	**19,544**

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