

Water Use

in the St. Johns River Water Management District

1998

Water Use

This document reports water use for all water withdrawals from ground or surface water sources, expressed in million gallons per day (mgd). Water withdrawal information is reported for seven categories of use: public supply, domestic self-supply, commercial/industrial self-supply, agricultural irrigation, recreational irrigation, thermoelectric power generation, and abandoned artesian wells. The total amount of water used in the St. Johns River Water Management District (SJRWMD) in 1998, including fresh and saline water, was 3,323 mgd (Table 1).

County	Freshwater			Saline Water Surface	Total Water Use
	Ground	Surface	Total		
*Alachua (AL)	36.6	0.2	36.8	0.0	36.8
Baker (BK)	4.9	0.5	5.4	0.0	5.4
Bradford (BF)	0.4	0.0	0.4	0.0	0.4
Brevard (BV)	220.3	28.2	248.5	1,137.6	1,386.1
Clay (CL)	21.9	0.4	22.3	0.0	22.3
Duval (DU)	151.1	0.8	151.9	697.9	849.8
Flagler (FL)	15.8	1.6	17.4	0.0	17.4
Indian River (IR)	77.2	122.0	199.2	40.2	239.4
*Lake (LK)	102.0	11.5	113.5	0.0	113.5
*Marion (MR)	41.3	1.4	42.7	0.0	42.7
Nassau (NS)	48.0	0.2	48.2	1.3	49.5
*Okeechobee (OK)	11.6	0.0	11.6	0.0	11.6
*Orange (OR)	155.4	33.5	188.9	0.0	188.9
*Osceola (OS)	8.4	14.8	23.2	0.0	23.2
Polk (PK)	4.0	0.2	4.2	0.0	4.2
Putnam (PT)	47.7	51.1	98.8	0.0	98.8
St. Johns (SJ)	51.8	1.0	52.8	0.0	52.8
Seminole (SM)	79.9	1.3	81.2	0.0	81.2
Volusia (VL)	90.4	8.2	98.6	0.0	98.6
Total	1,168.7	276.9	1,445.6	1,877.0	3,322.6

Table 1. Total water use by county, SJRWMD, 1998 (in mgd). Brevard and Indian River counties used the most freshwater in SJRWMD.

*Counties partially in SJRWMD

Category	Freshwater			Saline Water Surface
	Ground	Surface	Total	
Public supply	517.8	12.2	530.0	0.0
Domestic self-supply	91.7	0.0	91.7	0.0
Commercial/industrial use	97.3	34.5	131.8	1.3
Agricultural irrigation	417.3	197.3	614.6	0.0
Recreation/landscape irrigation	32.8	13.7	46.5	0.0
Thermoelectric power generation	7.9	19.2	27.1	1,875.7
Abandoned artesian wells	3.9	0.0	3.9	0.0
Total	1,168.7	276.9	1,445.6	1,877.0

Table 2. Total water use in SJRWMD, 1998 (in mgd). Fresh groundwater accounted for most of the freshwater used in SJRWMD.

Of that amount, 1,446 mgd was fresh, and 1,877 mgd was saline, used primarily for thermoelectric power generation (Table 2). Groundwater use totaled 1,169 mgd, and fresh surface water use totaled 277 mgd

(Figure 1). The largest use of fresh groundwater in SJRWMD in 1998 was for public supply, which totaled 518 mgd, or 44% of the total groundwater use. This was followed by agricultural irrigation, which used 417 mgd, or 36% of the total groundwater use.

Public Supply

The public supply category consists of water supplied to homes and industries by privately owned and publicly owned water supply utilities. It includes both residential and nonresidential uses. Utilities that serve 400 or more people or that withdraw more than 0.01 mgd from ground or surface water sources are included in this category. Water use data come from utility records and are estimated to the nearest 0.01 mgd.

The St. Johns River Water Management District water use program has published water use reports annually since 1978. The report is distributed to a wide variety of state and local government agencies and private organizations. Each report assesses the total quantities of water used arranged by source, category of use and county. SJRWMD is a cooperative agency with the U.S. Geological Survey, which compiles national estimates of water use every five years.



Physiographic Setting

The St. Johns River Water Management District, or SJRWMD, is one of five water management districts in Florida encompassing 12,300 square miles and includes all or part of 19 counties with more than 3.5 million people, or 25% of the northeastern part of the state.

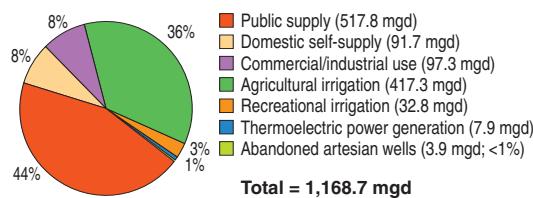
Within SJRWMD's boundaries are the entire St. Johns and Nassau river basins, the Indian River Lagoon and Northern Coastal basins, and Florida's portion of the St. Marys River Basin. SJRWMD's average annual rainfall for the period 1961–90 was 52 inches. The driest year of the period was 1990, with an average of 38.85 inches, or 25% below normal. Nearly 70% of rainfall is returned to the atmosphere through evapotranspiration, while the remaining 30% is run off to surface waters or recharged to aquifers (Water Resources Atlas of Florida 1998).



In 1998, 305 public supply utilities served an estimated 3,185,112 people, or 86% of the total population in SJRWMD. Total water use from both ground and surface water sources was 530 mgd, nearly 17% above the average annual use of 455 mgd for the 10-year period from 1989 to 1998. The average per capita use, based on the population served by public supply, was 166 gallons per day (gpd) compared to the average per capita use of 158 gpd for the same 10-year period. Public supply water use typically fluctuates during

the year in response to seasonal rainfall and temperature variation. Water use tends to increase during the warm season (April through October) when outdoor use is highest. In 1998, water use ranged from a low of 413 mgd (130 gallons/person/day) in February to a high of 716 mgd (225 gallons/person/day) in June. Of the water withdrawn for public supply, 98% was groundwater.

Fresh Groundwater



Fresh Surface Water

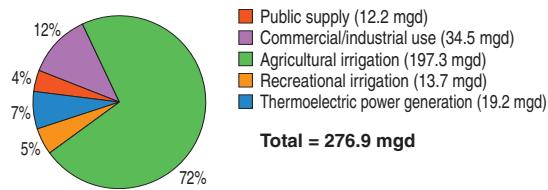


Figure 1. Total freshwater use, 1998. Most of the freshwater used in SJRWMD came from groundwater sources. Fresh surface water is used primarily for agricultural irrigation and commercial/industrial use.



Approximately 89% of the groundwater was withdrawn from the Floridan aquifer; the remaining 11% was withdrawn from the intermediate and surficial aquifers.

The counties with the largest public supply water use in SJRWMD were Orange County

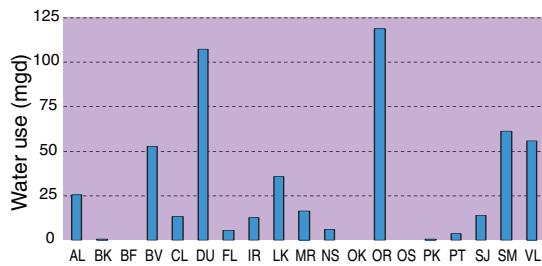


Figure 2. Freshwater use for public supply in SJRWMD 1998. Duval and Orange counties were the largest water users in SJRWMD.

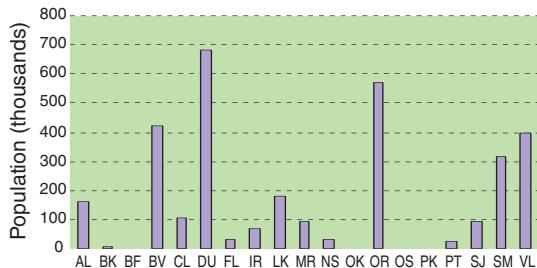


Figure 3. Population served by public supply in SJRWMD, 1998. Duval and Orange counties were the largest in population in SJRWMD.

(119 mgd serving 573,078 people) and Duval County (107 mgd serving 680,606 people). Together, these counties represented about 43% of the public supply water use and about 40% of the public supply water use population (Figures 2 and 3). There is no public supply water use in the portions of Osceola and Okeechobee counties within SJRWMD.



Domestic Self-Supply

The domestic self-supply category includes water withdrawn from individual domestic wells or provided by utilities that serve less than 400 people. Water use from these facilities is not inventoried, so water use in

this category is estimated from population and per capita water use figures.

In 1998, an estimated 537,124 people used 92 mgd of domestic self-supply water, or 8% of the total fresh groundwater use in SJRWMD. All of the domestic self-supply water was assumed to be groundwater. Marion County had the largest self-supplied population with 94,006 people; Duval County had the second largest with 73,217 people, followed by Orange County with 61,475 people.

Domestic self-supply water use has fluctuated over the 10-year period between 90 mgd in 1989 and 92 mgd in 1998. The average for this 10-year period is 87 mgd; water use in 1998 was about 6% above the average.

Commercial/Industrial Self-Supply

The commercial/industrial self-supply use category consists of the larger (more than 0.01 mgd) commercial and industrial users not served by public supply utilities. The commercial category includes businesses and institutions, such as government facilities, military installations, schools, prisons, and hospitals. The industrial category includes mining, processing, and manufacturing facilities; it does not include water used for power generation by thermoelectric power plants. Water used for transporting materials from the mine pit to the plant and for dewatering mine pits is considered conveyance and also is not included in estimates of water use. Seventy-six commercial users, including 71 institutions, and 61 industrial users are included in this report of 1998 water use.

The total freshwater use in the commercial/industrial category was 132 mgd, or 9% of the total freshwater use in SJRWMD. Of this total, 97 mgd was groundwater and 35 mgd was fresh surface water. In addition, more than 1 mgd of saline water was used.

Most of the water withdrawn for commercial/industrial purposes supplied the pulp and paper industries in Putnam, Nassau, and Duval counties. In 1998, water use for pulp and paper production included 67 mgd of

fresh groundwater, 32 mgd of fresh surface water, and just over 1 mgd of saline surface water. The second largest water user in this category was the mining industry, which accounted for 9 mgd of fresh groundwater and 3 mgd of fresh surface water. Together, pulp and paper production and mining accounted for 111 mgd of freshwater, or 84% of the commercial/industrial freshwater use.

Commercial/industrial self-supply water use was highest in 1989 (149 mgd) and lowest in 1997 (119 mgd). The average for the 10-year period 1989 to 1998 is 135 mgd; water use in 1998 was 2% below the average. Commercial/industrial freshwater use in 1998 varied from a low of 107 mgd in March to a high of 158 mgd in June.

Agricultural Irrigation

The agricultural irrigation category consists of estimated water withdrawals from ground and surface sources for supplemental crop irrigation. Estimates of the acreage planted in various crops are multiplied by estimates of the quantity of water per acre necessary to irrigate those crops. Water use for irrigation is assessed by crop, because crops have specific consumptive use requirements.

Total freshwater use for agricultural irrigation was estimated at 615 mgd, or 43% of the total freshwater use in SJRWMD in 1998. Of this total, 417 mgd, or 68% of the total water used for agricultural irrigation, was groundwater. It was assumed that most groundwater used for agricultural irrigation came from the Upper and Lower Floridan aquifers.

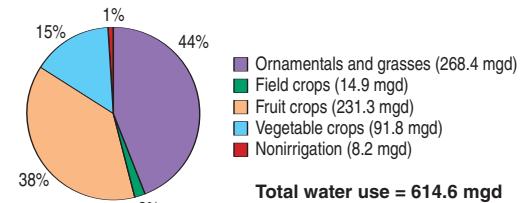
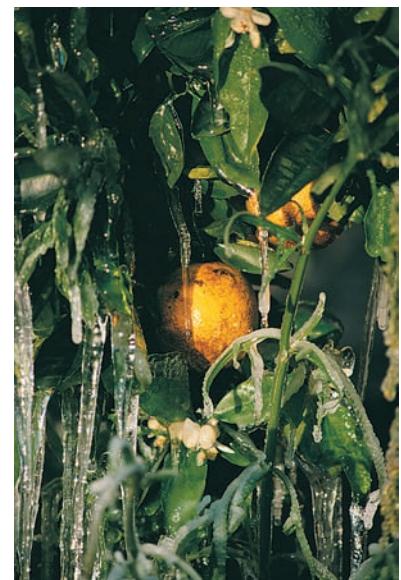


Figure 4. Agricultural irrigation water use in SJRWMD for five crop types, 1998. *Ornamentals and grasses accounted for 44 percent of the agricultural irrigation water use in 1998.*

An estimated 878,163 acres were farmed in SJRWMD in 1998, of which 327,627 acres were irrigated. Of the total acreage irrigated, 229,783 acres were irrigated by flood systems, 56,977 acres were irrigated by low-pressure/low-volume systems, and 40,867 acres were irrigated by sprinkler systems.

The largest water use for agricultural irrigation by county occurred in Brevard County—179 mgd of freshwater, or 29% of the agricultural irrigation by county. Most of this amount was groundwater. The second largest water use for agricultural irrigation by county was in Indian River County—175 mgd, most of which was fresh surface water. The combined water use in these two counties was 354 mgd, or 58% of the total agricultural irrigation water use.

The largest water use for a crop type was for ornamentals and grasses, which accounted for 268 mgd, or 44% of the agricultural irrigation water use (Figure 4).



The largest water use for a single crop was for citrus irrigation, which accounted for 226 mgd, or 37% of the agricultural irrigation water use.



Recreational Irrigation

The recreational irrigation category includes water used to irrigate turf grass for golf courses. An estimated 15,508 of 24,932 acres were irrigated using sprinkler systems. Water used in the recreational irrigation category totaled 47 mgd, or about 3% of the total freshwater use in 1998. Of this amount, 33 mgd was groundwater. The largest water uses by county for recreational irrigation occurred in Volusia County (8 mgd) and Seminole County (6 mgd).

Between 1989 and 1998, combined agricultural and recreational irrigation water use was highest in 1998 (661 mgd) and lowest in 1997 (399 mgd). The average for this 10-year period was 575 mgd; water use in 1998 for this category was 15% above the average.



Agricultural and recreational combined irrigation water use in 1998 had a greater seasonal fluctuation than any other water use category, from a low of 20 mgd in February to a high of 2,332 mgd in June. These fluctuations are typical of irrigation water use and are inversely correlated to rainfall. In June 1998, water was in very high demand due to the extreme drought conditions throughout the state.

Thermoelectric Power Generation

The thermoelectric power generation category consists of water used by power plants primarily for cooling. In 1998, water use data were collected for 12 self-supplied thermoelectric power plants. Total water use accounted for 1,876 mgd of saline surface water, 19 mgd of fresh surface water, and 8 mgd of fresh groundwater. The largest amount of saline water used by county for thermoelectric power generation was in Brevard County (1,138 mgd), while the largest amount of freshwater used was in Putnam County (17 mgd).

Thermoelectric power generation freshwater use in 1998 fluctuated from a low of 17 mgd in March to a high of 44 mgd in June. Fluctuations in water use are related to power plant shutdowns for maintenance or increased power demands during periods of extremely high or low temperatures.



Abandoned Artesian Wells

The abandoned artesian wells category consists of water flowing from abandoned artesian wells. According to available data, all abandoned artesian wells are supplied by

the Floridan aquifer system. In 1998, there were 414 wells on the SJRWMD inventory of wells under investigation for permanent abandonment. The overwhelming majority of these wells have valves or temporary plugs,

which effectively stop or greatly reduce the flow from the wells. The estimated actual total flow from these wells (districtwide) was approximately 4 mgd.

SUMMARY

Increases in population, development and tourism have played a significant role in changes in water use in SJRWMD. The trend in freshwater use since 1978, when SJRWMD first published the annual water use survey, has been a gradual increase in demand. The public supply population within SJRWMD has more than doubled since 1978, and water use for public supply has also more than doubled.



Note: Annual water use survey 1997 (Technical Publication SJ2000-3), although published and distributed, was subsequently withdrawn from distribution due to inaccuracies. The revised 1997 water use fact sheet is available in its place.



Water Management

The primary goal of Florida's water management districts is the protection of water resources. Their mission is to manage water resources to ensure the continued availability of those resources while maximizing environmental and economic benefits. This is accomplished through regulation of consumptive uses; assistance to federal, state and local governments; operation and maintenance of control works; land acquisition and management; and applied research.

For additional information or specific water use data, contact the following:

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