# 2021 Estimated Water Use

*in the*

## Northwest Florida Water Management District

# SUMMARY REPORT

**December 2022**

**TRS-23-1**

# Background and Methods

Pursuant to Florida Statutes,[1] quantifying existing legal uses of water or estimating water use is foundational data for Northwest Florida Water Management District (NWFWMD or District) water supply assessments, regional water supply plans, groundwater models and MFL technical assessments, and consumptive use permitting. Existing water use is the baseline data to develop water demand projections and future reasonable-beneficial water use needs.

As noted in Rule 62-40.540(6), F.A.C., *"The Districts shall implement a strategy for measuring, estimating, and reporting withdrawal and use of water by permitted and exempted users. … The Districts are encouraged to summarize and analyze water use in the District at least annually."* Also by rule (62-40.531, F.A.C.), water use estimates and projections are to be provided for the following use classes:

1. Public Supply,
2. Domestic Self-Supply (DSS),
3. Agricultural,
4. Recreational Irrigation (golf course, landscape),
5. Industrial-Commercial-Institutional (ICI), and
6. Thermoelectric (Power Generation).

Estimates are based on best available data and primarily rely on audited reports from permittees with Individual Water Use Permits (IWUPs) that have an average daily rate equal to or greater than 0.1 million gallons per day (mgd) of water use or permitted allocation or that have permit conditions requiring annual water use reporting, for example, due to being within a Water Resource Caution Area or Area of Resource Concern. Given numerous small communities and rural areas within the NWFWMD, about 30 percent of IWUPs are less than 0.1 mgd in an average year. Estimates include water withdrawals from groundwater aquifer systems and from surface water sources.

Public supply data include estimates of water withdrawals, transfers, and demand; estimates of populations served and per capita water use rates. Domestic self-supply is estimated based on population and per capita rate. Agricultural water use is reported, but the total estimate is based on the Florida Department of Agriculture and Consumer Services (FDACS) Florida Statewide Agricultural Irrigation Demand (FSAID) estimates. Recreational irrigation estimates are a combination of reported pumpage and additional estimated use.[2] Industrial-commercial-institutional (ICI) and power generation water uses are estimated from reported pumpage and adjusted for water returns. Water that is withdrawn for cooling purposes and returned to the source is not considered consumptive use.

Public supply reported pumpage and other supporting data include, by default, seasonal water use. Seasonal residents, which include migrant workers, are estimated to affect public supply and DSS water use in all sixteen counties. Therefore, population estimates for public supply, DSS, and by county include seasonal resident adjustments.

This report summarizes the District's reported and estimated water use in calendar year 2021. An overview of District land use and water supply planning regions is illustrated in Figure 1, below.

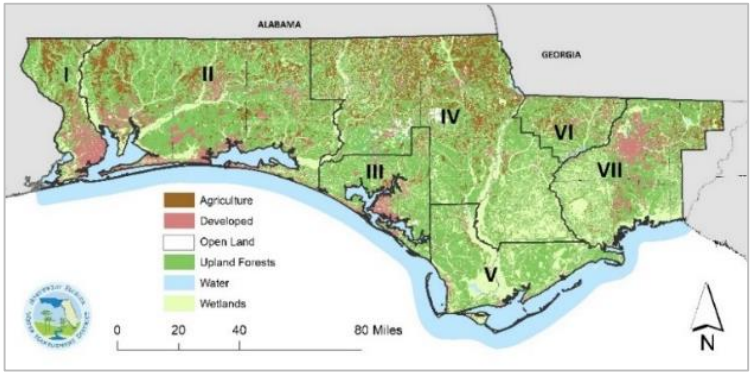


**Figure 1. NWFWMD Land Use and Planning Regions**

[1] Sections 373.036 and 373.709, Florida Statutes (F.S.).

[2] Additional water use estimates include IWUPs and other small-scale recreational wells with General Water Use Permits (GWUPs) with no reporting requirements.

# 2021 Water Use Summary

As illustrated in Figure 1, the District's sixteen counties are organized into seven water supply planning regions:

I. Escambia County
II. Okaloosa, Santa Rosa, and Walton counties
III. Bay County
IV. Calhoun, Holmes, Jackson, Liberty, and Washington counties
V. Franklin and Gulf counties
VI. Gadsden County
VII. Leon, Wakulla, and (NWF portion of) Jefferson counties

District water use in 2021 totaled more than 329 mgd and is summarized by region and water use category in Table 1 and Figure 2.

Escambia County (Region I) accounted for 24 percent of all District estimated water use in 2021, more than 80 mgd. Region II was the second largest user with 75 mgd or 23 percent. Bay County was the third largest in water use, followed by regions IV and VII.

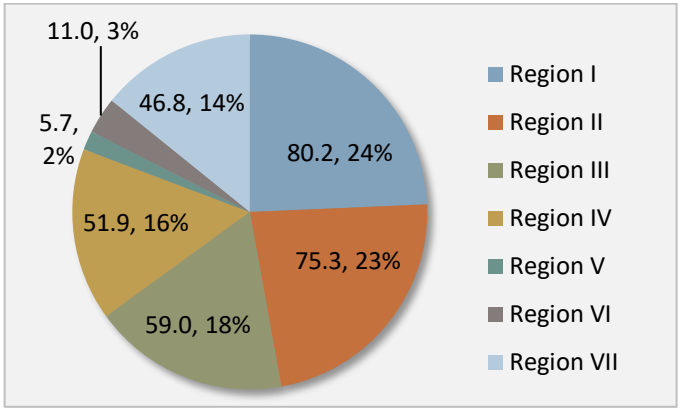


**Figure 2. Estimated Water Use by Planning Region (mgd)**

In 2021, public supply accounted for more than half of all Districtwide water use (167 mgd), followed by ICI at 65 mgd, and then agriculture (49 mgd). Recreation, DSS, and power generation range from two to six percent of total water use (Table 1 and Figure 4).

Public supply has consistently been the largest water use category Districtwide since 1995 (see Appendix, page A.20). Public supply water use is concentrated in urbanized portions of regions I, II, III, and VII (Table 1 and Figure 2). Region IV, predominately rural and agricultural, had 36 percent of all DSS and 73 percent of all agricultural water use. Region II had 55 percent of all recreational water use. Region I had 51 percent of all industrial-commercial-institutional (ICI) self-supplied water use while regions III and VII had 37 percent and 33 percent, respectively, of power generation water use.

**Table 1. Estimated Water Use by Category and by Region (mgd)**

| Planning Region | Public Supply | Domestic Self-Supply | Agriculture | Recreation | ICI | Power Generation | TOTAL WATER USE (mgd) |
|---|---|---|---|---|---|---|---|
| **Region I** | 38.55 | 1.64 | 3.00 | 2.18 | 33.50 | 1.30 | **80.16** |
| **Region II** | 53.69 | 2.17 | 2.92 | 11.44 | 5.08 | - | **75.30** |
| **Region III** | 27.73 | 1.99 | 0.88 | 2.09 | 23.31 | 3.02 | **59.02** |
| **Region IV** | 5.46 | 6.57 | 36.12 | 0.92 | 1.64 | 1.20 | **51.91** |
| **Region V** | 4.62 | 0.34 | 0.30 | 0.27 | 0.18 | - | **5.71** |
| **Region VI** | 4.27 | 1.19 | 4.91 | 0.15 | 0.43 | - | **10.95** |
| **Region VII** | 33.04 | 4.39 | 1.62 | 3.81 | 1.20 | 2.71 | **46.79** |
| **TOTALS** | **167.36** | **18.29** | **49.76** | **20.86** | **65.35** | **8.22** | **329.83** |

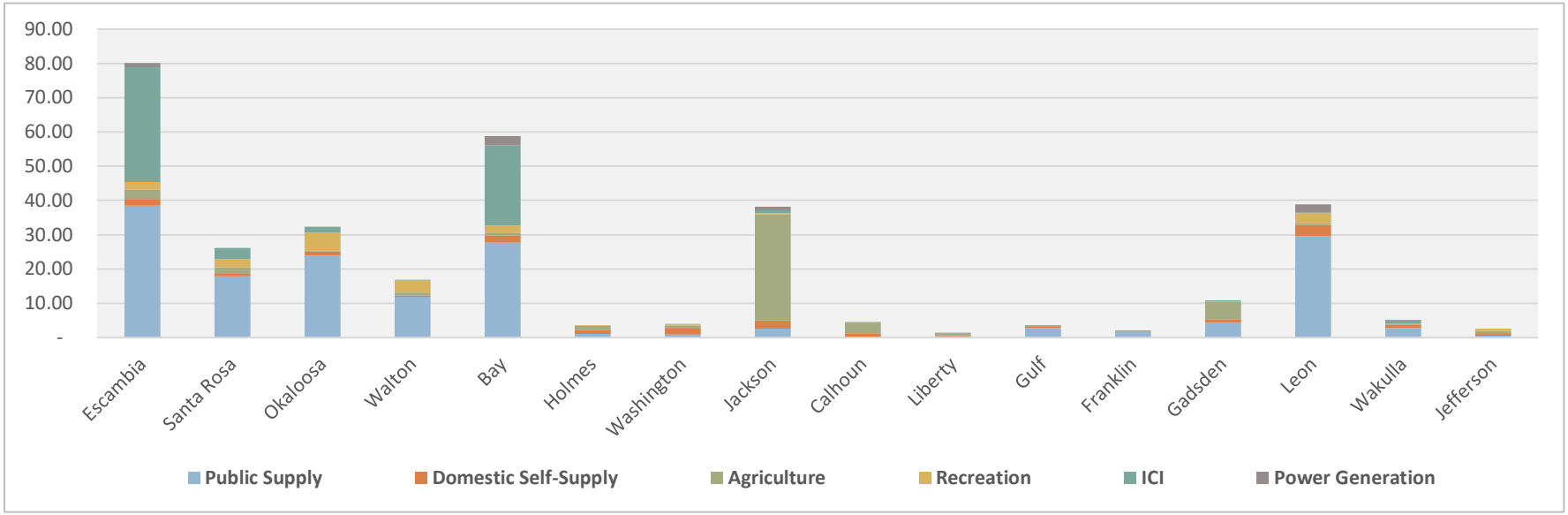


**Figure 3. Total Water Use by County and Water Use Category (mgd)**

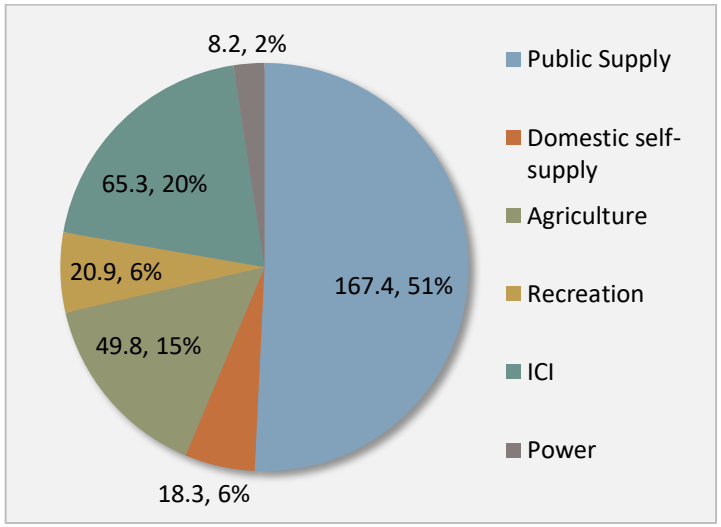


**Figure 4. Total Water Use by Category (mgd)**

## Population Estimates

The University of Florida, Bureau of Business and Economic Research (BEBR), estimated 2021 District population to be 1,510,330 (Table 2).

**Table 2. Population Estimates**

| REGION | BEBR Permanent Populations | Seasonal Adjustments | TOTAL[2] Population Estimates |
|---|---|---|---|
| **Region I** | 324,458 | 10,383 | 334,841 |
| **Region II** | 483,056 | 61,218 | 544,274 |
| **Region III** | 178,282 | 21,394 | 199,676 |
| **Region IV** | 113,005 | 3,445 | 116,450 |
| **Region V** | 27,188 | 8,083 | 35,271 |
| **Region VI** | 43,813 | 1,052 | 44,865 |
| **Region VII[1]** | 340,528 | 3,556 | 344,084 |
| **TOTALS** | **1,510,330** | **109,129** | **1,619,459** |

[1] Estimated NWFWMD share of Jefferson County only.
[2] Total population estimates, including seasonal adjustments.

The effects of seasonality were estimated to add an equivalent of 109,129 residents for a total adjusted population estimate of 1,619,459. Approximately 86 percent of District residents are estimated to be served by public supply utilities.

The 2021 BEBR Districtwide population estimate is 17,455 more than 2020, following trends seen before the slight decrease in the 2019 estimate likely due to continued recovery from Hurricane Michael.

**Table 3. BEBR Population Estimates 2020-2021**

| | BEBR Population Estimates | | 2020-2021 Change | |
|---|---|---|---|---|
| | 2021 | 2020 | Population | Percent |
| Escambia | 324,458 | 323,714 | 744 | 0.2% |
| Okaloosa | 213,204 | 203,951 | 9,253 | 4.5% |
| Santa Rosa | 191,911 | 184,653 | 7,258 | 3.9% |
| Walton | 77,941 | 74,724 | 3,217 | 4.3% |
| Bay | 178,282 | 174,410 | 3,872 | 2.2% |
| Calhoun | 13,683 | 14,489 | (806) | -5.6% |
| Holmes | 19,665 | 20,001 | (336) | -1.7% |
| Jackson | 47,198 | 46,587 | 611 | 1.3% |
| Liberty | 7,464 | 8,575 | (1,111) | -13.0% |
| Washington | 24,995 | 25,334 | (339) | -1.3% |
| Franklin | 12,364 | 11,864 | 500 | 4.2% |
| Gulf | 14,824 | 14,724 | 100 | 0.7% |
| Gadsden | 43,813 | 46,226 | (2,413) | -5.2% |
| Jefferson(NWF Only) | 10,296 | 10,158 | 138 | 1.4% |
| Leon | 295,921 | 299,484 | (3,563) | -1.2% |
| Wakulla | 34,311 | 33,981 | 330 | 1.0% |
| **TOTALS** | **1,510,330** | **1,492,875** | **17,455** | **1.2%** |

## Rainfall and Drought

Precipitation varies regionally with more rain naturally occurring in the western panhandle and lower rainfall levels typical in northeastern parts of the District (Figure 5). The 2021 annual average rainfall Districtwide of nearly 71.7 inches was above the normal annual average of 60.7 inches (Figure 85).

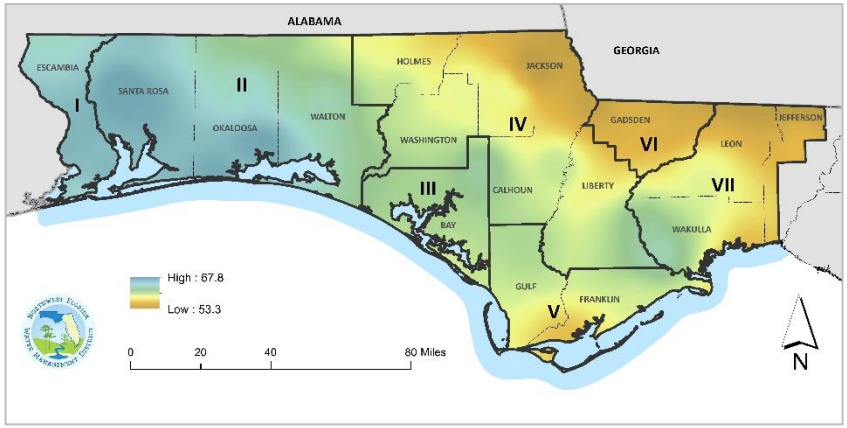


**Figure 5. Normal Average Annual Precipitation (1981-2010) In/Yr[3]**

Agriculture and recreation are the two water use categories most affected by rainfall and drought. More precipitation information is in the Agricultural and Recreational Irrigation section.

Water use in Public Supply and Domestic Self-Supply typically increases by an estimated seven percent in dry years. Power Generation and ICI drought year demands are not anticipated to differ from water demands during an average rainfall year.

[3] Source: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu. Data created July 10, 2012.

# Public Supply and Domestic Self-Supply

Public supply water use in 2021 was estimated to be 167.36 mgd, more than half of all water use Districtwide. With seasonal adjustments, estimated public supply populations served totaled 1.39 million. Approximately 57 percent of all public supply water use was in the District's three most urbanized counties: Escambia, Bay, and Leon; and nearly 92 percent was in regions I, II, III and VII.

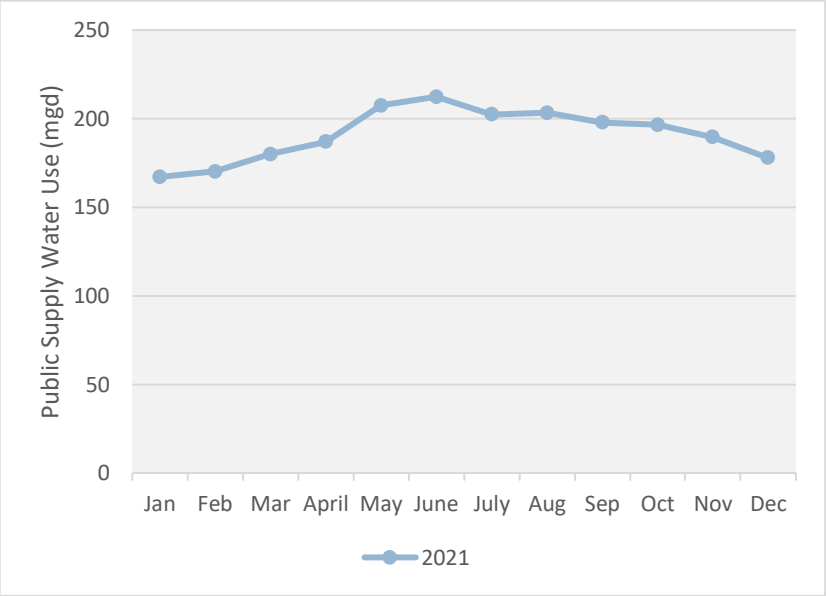


**Figure 6. Monthly Average Public Supply Water Use (mgd)**

Districtwide monthly average public supply water use during 2021 is illustrated in Figure 6. Lowest water use generally occurs during winter months. Higher water consumption from May through October is likely due to landscape irrigation needs or the impacts from seasonal residents in some communities, or both.

The estimated 2021 DSS population was 206,237. With a domestic per capita water use rate of 88.67 gpcd[4] (USGS, 2014), the estimated domestic self-supply (DSS) water use was approximately 18.3 mgd.

Together, public supply and DSS comprised 56 percent of all water use Districtwide in 2021.

## Per Capita Water Use Rates

The 2021 Districtwide public supply per capita water use rates were 119.1 gpcd gross and 73.0 gpcd residential. Gross per capita rates have been in a general downward trend and residential rates relatively constant (Figure 7). See Appendix, page A.19, for more information.

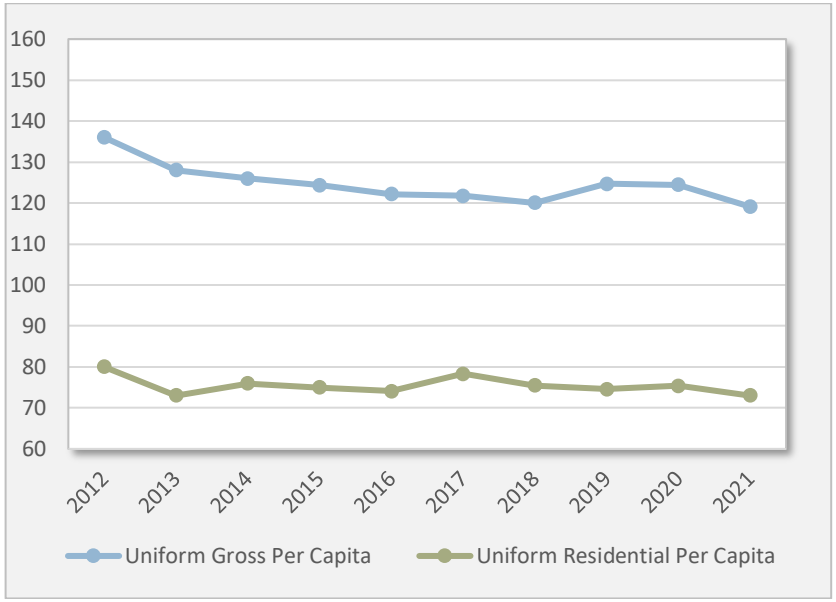


**Figure 7. Trends in Per Capita Water Use Rates 2012-2021 (gpcd)**

Five-year average per capita rates over the period 2017-2021 are:

- Average Uniform Gross Per Capita: 122.0 gpcd
- Average Uniform Residential Per Capita: 75.4 gpcd

[4] Gallons per capita per day (gpcd).

# Agricultural and Recreational Irrigation

The Districtwide annual average rainfall in 2021 was above average (Figure 8). From 2011 to 2021, data appears to indicate an inverse relationship between reported agricultural water use and annual average precipitation though this is dependent on the time of year that precipitation occurs.

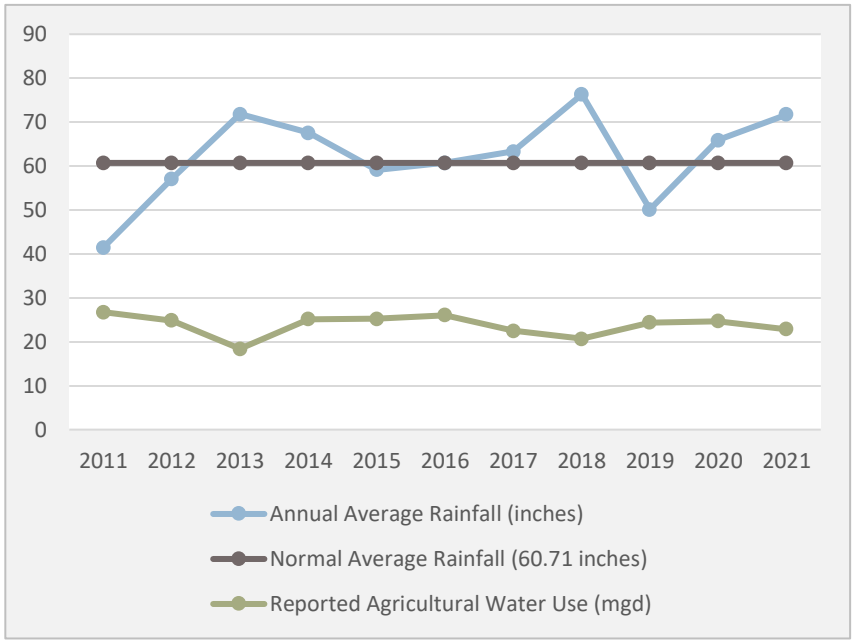


**Figure 8. Rainfall and Agricultural Reported Water Use 2011-2021**

The reported agricultural water use in 2021 was 22.9 mgd, approximately 46 percent of the most recent FSAID total agricultural estimate of 49.8 mgd (2020 data). Ninety-four percent of reported agricultural water withdrawals are from groundwater. Eighty-eight percent of the reported surface water withdrawals were in Gadsden County.

Monthly average reported agricultural water use during calendar years 2019, 2020, and 2021 is illustrated in Figure 9.

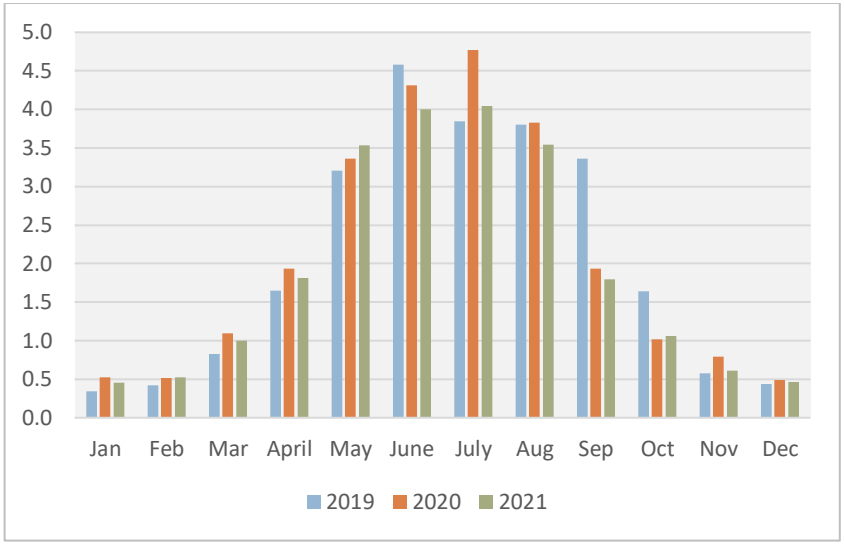


**Figure 9. Reported Agricultural Water Use by Month (mgd)**

Recreational water uses include golf course and landscape irrigation, and water-based recreation. About 70 percent of small-scale irrigation GWUP wells in NWFWMD are estimated to be in Region II. Also, Region II had 56 percent of the reported and 55 percent of the total estimated recreational water use Districtwide.

The total estimated recreational water use in 2021 was 20.9 mgd. Reported recreational water use was 12.2 mgd or 58 percent of the total. The sources of reported recreational water use are approximately 55-45 ground to surface water. Other sources of water may include reuse of reclaimed water or co-mingling of surface, ground, and reuse waters, which were not analyzed at the time of this report.

Collectively, agricultural and recreational irrigation were estimated to comprise 21 percent of all water use Districtwide in 2021.

# Power Generation and ICI

Thermoelectric power generation and ICI self-supplied water use estimates in 2021, adjusted for recirculation, were approximately 8.2 mgd and 65.3 mgd respectively. Power generation and ICI together were 22 percent of all 2021 water use Districtwide.

Eighty-seven percent of ICI self-supply water use was in Escambia and Bay counties, eight percent in Region II, and five percent in the remaining District counties. Additional ICI water users are served by public supply utilities. Of the total ICI self-supplied water use, 64 percent was groundwater and 36 percent surface waters.

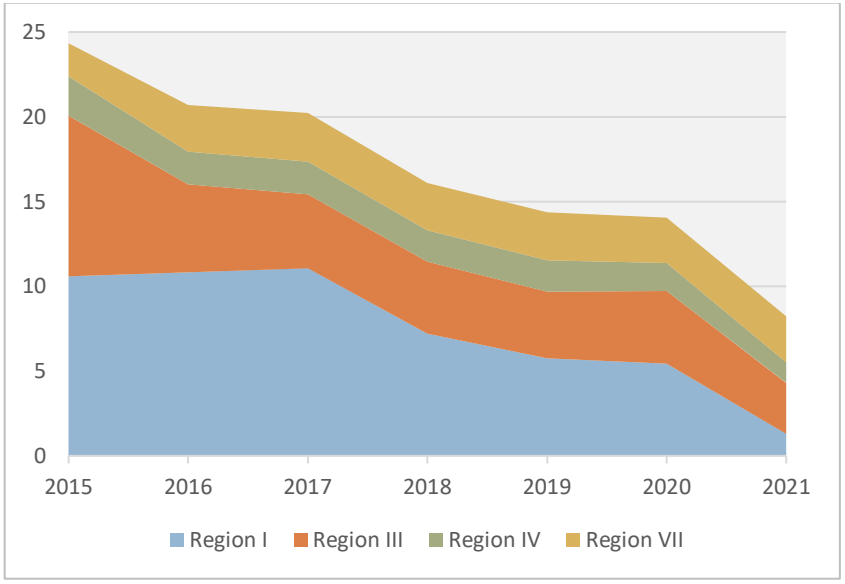


**Figure 10. Trends in Power Water Use 2015-2021 (mgd)**

Figure 10 illustrates total power water use from 2015 to 2021 in regions that have thermoelectric power generation facilities. Factors contributing to declining water use trends may include conservation, system efficiencies, and fuel conversions.

# Water Withdrawals by Water Source

Primary groundwater resources are the Floridan aquifer across much of northwest Florida and the sand-and-gravel aquifer in western parts of the District. A major surface water resource is Deer Point Lake Reservoir in Bay County.

Approximately 65 percent of water withdrawals in 2021 were from groundwater, 19 percent from surface waters, and 16 percent "Other Water" – which are unknown or uncertain sources of water attributed to DSS and to additional agricultural and recreational water use estimates (Figure 11). Withdrawals from the Floridan aquifer accounted for an estimated 35 percent of all water use and over half of all groundwater withdrawals. Approximately 45 percent of groundwater withdrawals were from the sand-and-gravel aquifer. Less than one percent of groundwater pumped was from other aquifers, including the intermediate, Claiborne, and surficial aquifer systems.

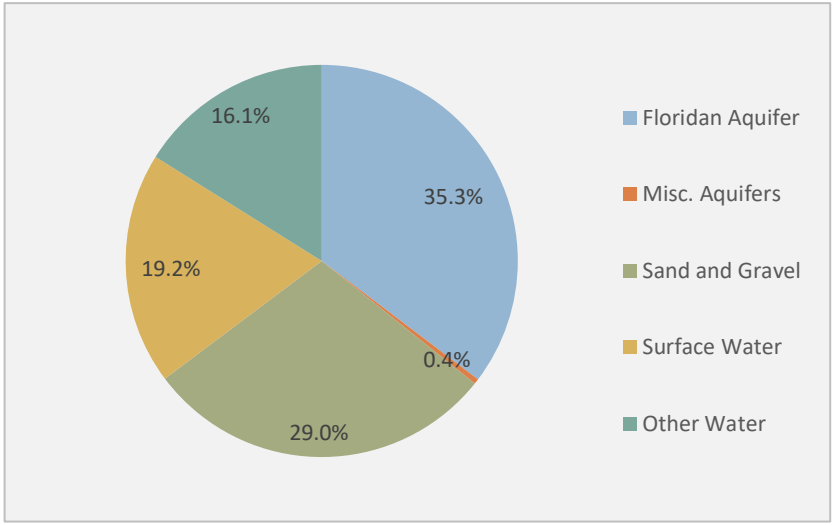


**Figure 31. NWFWMD 2021 Water Use by Water Source**

# Data Quality and Uncertainty Analysis

In 2021, 83 percent (273 mgd) of all estimated water use was from reported and audited compliance data submitted by permittees that have an Individual Water Use Permit (IWUP). Public Supply and ICI estimates are from reported and audited pumping reports. The remaining water use estimates are generated or affected by the following:

- Domestic Self-Supply (DSS) – One hundred percent estimated from population that is not served by public supply and a domestic per capita water use rate provided by USGS.
- Agriculture – Forty-six percent of the total FDACS/FSAID[5] estimate is NWFWMD reported and audited pumping reports.
- Recreation – Fifty-eight percent of the recreational estimate was from audited pumping reports. The total includes water use estimated from small-scale irrigation wells.
- Power – Some power generating facilities with DEP Site Certifications do not have an IWUP or have limited IWUP compliance reporting conditions. Nearly 2.7 mgd of power estimates reflect this uncertainty.

Also, changes in regulatory criteria, type and frequency of compliance reports submitted by permittees, and changes in the number of permittees with reporting requirements can all affect the availability and quality of water use and population data.

The District continues refining data and methods to enhance population estimates for public supply and DSS, including how to account for ICI institutional residents and limited public supply populations in overall population analyses.

Inmate populations are included in BEBR estimates. In 2021, BEBR estimated that NWFWMD had close to seven percent of the total state population and 29 percent of Florida's inmate population. Share of inmate populations by county are in Table 4.

Correctional facility IWUPs often provide water for multiple use categories (e.g., agriculture, heating and cooling, landscape irrigation) and may still be separately dependent on a public supply utility for potable water supplies.

**Table 4. BEBR 2021 Total and Inmate Population Estimates**

| COUNTY | Total BEBR Estimate | Inmates Estimate | Net Total (less inmates) | Inmates as a % of Total BEBR | Inmates % of Net Total |
|---|---|---|---|---|---|
| **LIBERTY** | 7,464 | 1,144 | 6,320 | 15.3% | 18.1% |
| **JACKSON** | 47,198 | 4,974 | 42,224 | 10.5% | 11.8% |
| **CALHOUN** | 13,683 | 1,422 | 12,261 | 10.4% | 11.6% |
| **GULF** | 14,824 | 1,179 | 13,645 | 7.9% | 8.6% |
| **WAKULLA** | 34,311 | 2,503 | 31,808 | 7.3% | 7.9% |
| **FRANKLIN** | 12,364 | 841 | 11,523 | 6.8% | 7.3% |
| **WASHINGTON** | 24,995 | 1,424 | 23,571 | 5.7% | 6.0% |
| **GADSDEN** | 43,813 | 2,638 | 41,175 | 6.0% | 6.4% |
| **HOLMES** | 19,665 | 1,006 | 18,659 | 5.1% | 5.4% |
| **SANTA ROSA** | 191,911 | 4,390 | 187,521 | 2.3% | 2.3% |
| **WALTON** | 77,941 | 1,264 | 76,677 | 1.6% | 1.7% |
| **ESCAMBIA** | 324,458 | 2,028 | 322,430 | 0.6% | 0.6% |
| **BAY** | 178,282 | 1,120 | 177,162 | 0.6% | 0.6% |
| **OKALOOSA** | 213,204 | 1,243 | 211,961 | 0.6% | 0.6% |
| **LEON** | 295,921 | 1,095 | 294,826 | 0.4% | 0.4% |
| **JEFFERSON(NWF)** | 10,296 | 0 | 10,296 | 0.0% | 0.0% |
| **TOTALS** | 1,510,330 | 28,271 | 1,482,059 | 1.8% | 1.9% |

[5] The FDACS/FSAID agriculture estimates are typically completed by June following water management district annual estimates, in this case, FSAID IX released in June 2022 was prepared with 2020 water use data. The water demand estimates are modeled based on average hypothetical rainfall.

## Acronyms

| | |
|---|---|
| BEBR | Bureau of Business and Economic Research |
| DSS | Domestic Self-Supply |
| F.A.C. | Florida Administrative Code |
| FDACS | Florida Department of Agriculture and Consumer Services |
| F.S. | Florida Statutes |
| FSAID | Florida Statewide Agricultural Irrigation Demand |
| gpcd | Gallons per Capita per Day |
| GWUP | General Water Use Permit |
| ICI | Industrial-Commercial-Institutional |
| IWUP | Individual Water Use Permit |
| mgd | Million Gallons per Day |
| MFLs | Minimum Flows and Minimum Water Levels |
| USGS | United States Geological Survey |

## References and Additional Information


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**Summary Data Tables by Water Use Category**:



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