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ESTIMATED WATER USE IN FLORIDA, 1965

by
R. W. Pride

Prepared by the
UNITED STATES GEOLOGICAL SURVEY
in cooperation with the
BUREAU OF GEOLOGY
FLORIDA DEPARTMENT OF NATURAL RESOURCES
TALLAHASSEE, FLORIDA
1970

INTRODUCTION

As part of the nationwide inventory of water use in 1965, estimates of water use in Florida were made by county, by source of water, and by principal use. The map shows the estimated water withdrawn in Florida in 1965 by counties by the major categories of public supply, self-supplied industrial, irrigation, and thermoelectric power generation. Rural domestic and livestock water is an important use, but the amount in Florida is not significant in comparison with other uses; hence, this use is given in tabular form for the total for the state, but not by counties. The statewide total for military use is also given in this table.

Nonwithdrawal uses, which include hydroelectric power generation, navigation, water-based recreation, propagation of fish and wildlife, and dilution and conveyance of sewage and other liquid and solid wastes are not tabulated in this report.

PUBLIC SUPPLIES

In 1965, a total of 528 public water-supply systems in Florida, most of which are publicly owned, served about 4.8 million people an average of 148 gallons per day per capita or about 708 mgd (million gallons per day).

Water used for public supplies includes all that is pumped into the system. This water may be used for fire protection, street flushing, irrigation of lawns and gardens, and by industry and commerce, as well as for domestic supply.

Most of the water for public supply was ground water—640 mgd for 4,320,000 people. Surface water supplied 68 mgd for 486,000 people.

Of the 708 mgd of water for public supplies, 620 was for domestic use and the remainder for industrial and commercial uses. An estimated 160 mgd or 23 percent of the water was consumed.

SELF-SUPPLIED INDUSTRIAL WATER

Industry used an average of 930 mgd of self-supplied water during 1965, not including that used in the generation of thermoelectric power. About 700 mgd of the self-supplied industrial water was ground water. In the coastal areas saline water supplied 60 of the 230 mgd obtained from surface-water sources. About 8 percent of the self-supplied water was consumed.

The greatest amount of ground water for industrial uses in 1965 was in the phosphate mining area in Polk and Hillsborough Counties with an estimated 350 mgd, which is 50 percent of the total industrial use of ground water in the state.

The processing of pulp wood in the manufacture of paper products requires large amounts of water, most of which is self-supplied. The large ground-water withdrawals in Bay, Duval, Escambia, Gulf, Nassau, Putnam, and Taylor counties were mostly for this use.

IRRIGATION

The major use of fresh water in Florida in 1965 was for irrigation with about 3,160 mgd (3,540,000 acre-feet per year) used to irrigate 1,250,000 acres. About 40 percent of the water used for irrigation was consumed.

Irrigation use is shown on the map in units of million gallons per day to be comparable with other types of use. To convert million gallons per day to acre-feet per year, multiply by a factor of 1,120.

About 63 percent of the water used for irrigation in the state was from surface-water sources. Nearly all irrigational use was in central and southern Florida, with the greatest use occurring in Hendry, Martin, Palm Beach, and St. Lucie counties and accounting for 57 percent of all irrigation water used during 1965. Excluding the four counties of greatest use, ground water supplied 58 percent of the irrigation water in the remainder of the state.

During 1965 more water was used for the irrigation of citrus than for any other crop in Florida. An estimated 490,000 acres of citrus were irrigated using 510,000 acre-feet of surface water and 650,000 acre-feet of ground water. The 260,000 acres of irrigated truck crops required 540,000 acre-feet of surface water and 250,000 acre-feet of ground water. About 1,170,000 acre-feet of surface water and 420,000 acre-feet of ground water were used to irrigate 500,000 acres of other crops, principally pasture and sugar cane.

Generally the number of acres irrigated in each county was determined from estimates supplied by the county agricultural agents. Irrigation use for 1965 in counties in northern and central Florida was estimated by using the irrigation requirements for average conditions as determined by the U.S. Department of Agriculture (1965) and increasing about 25 percent for conveyance losses. The water use rates for irrigation in the counties generally east and south of Lake Okeechobee (St. Lucie, Martin, Palm Beach, Hendry, Lee, Collier, Broward, and Dade) were estimated to be greater than those for the remainder of the state.

The following table shows the rates of water use for irrigated acreage that were used for the 1965 estimates.

Crop	Water withdrawn, feet per acre per year	
	North and central Florida	South Florida
Citrus	2.0	3.6-4.7
Pasture	2.9	-
Vegetables (truck crops)	.6	4.0-4.4
Other	.6-3.0	2.1-4.7

THERMOELECTRIC POWER

Thermoelectric power utilities used more water during 1965 than any other water user. Most generating plants in Florida are near the coast and use cooling water from saline surface-water sources. Consequently more than 75 percent of the water used to cool condensers was saline and was returned to the source.

The use of self-supplied cooling water during 1965 is shown by county and by source on the map. The total, about 8,100 mgd, is listed by source in table 1. Water for uses other than condenser cooling, such as boiler feed, sanitary services, irrigation of lawns, etc., totaling about 2 mgd was obtained from ground-water sources.

RURAL USES

Rural use of water totaled about 145 mgd, of which 25 mgd was for livestock and 120 mgd was for domestic use. Rural homes are defined as those not served by public water-supply systems; thus many suburban homes are included in this category.

About 135 mgd of the total rural use was obtained from wells and 10 mgd, primarily for livestock, was obtained from lakes, streams, and ponds. Because much of the water was evaporated or transpired after being discharged on or immediately below the surface of the ground, about 100 mgd was consumed by this use.

Rural water use was computed by multiplying per capita use by the human and livestock population. Of the 5.8 million people living in Florida in 1965, about 1 million used rural domestic supplies. Water for rural domestic use by homes with running water is estimated to be about 50-60 gpd (gallons per day) per capita in the United States (MacKichan, 1961; Murray, 1968). The corresponding average for homes without running water is only 10 gpd per capita. Quantities of rural domestic water in Florida were computed by using 10 gpd per capita for homes without running water and per capita rates ranging from 60 to 175 gpd (in Dade County) for homes with running water. The estimated average per capita use of rural domestic water in Florida was 120 gpd in 1965.

The quantity of water used by livestock in Florida was estimated using the following rates:

Livestock	Use per head (gpd)
Milk cows	20
Horses and mules	10
Beef cattle	10
Hogs	3
Chickens	.04
Turkeys	.06

SELF-SUPPLIED MILITARY USE

Military bases in Florida used about 30 mgd of self-supplied ground water during 1965 for domestic supply, fire protection, irrigation of lawns and golf courses, and industrial supply.

TRENDS IN WATER USE, 1950-65

The estimated amount of fresh water withdrawn in 1950, 1955, 1960, and 1965 for the major use categories is shown in figure 1. Water use data are from MacKichan (1951, 1957), MacKichan and Kammerer (1961), and Murray (1968). Population data are from the Florida Development Commission (1966).

The most significant increase in water use in 1965 was for irrigation, which increased nearly fivefold from 1960 to 1965.

REFERENCES

- Florida Development Commission
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- MacKichan, K. A.
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Table 1. Total water use, in million gallons per day, by type of use and source in Florida, 1965.

Type Use	Surface Water		Ground Water		All Water	
	Fresh	Saline	Fresh	Saline	Fresh	Saline
Public supplies	68	---	640	---	710	---
Industrial, self-supplied	170	60	700	---	870	60
Irrigation	1,980	---	1,180	---	3,160	---
Thermoelectric power	1,900	6,100	10	80	1,900	6,180
Rural	---	---	---	---	---	---
Domestic	---	---	120	---	120	---
Livestock	---	---	15	---	25	---
Military use, self-supplied	---	---	30	---	30	---
TOTAL (rounded)	4,130	6,160	2,690	80	6,820	6,240

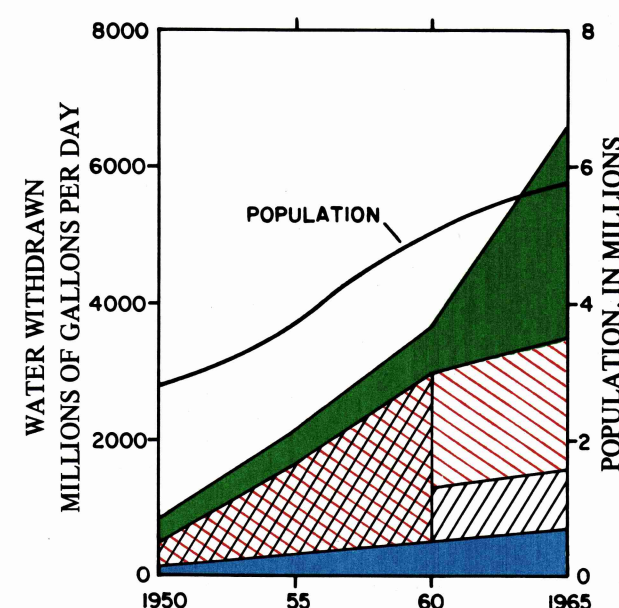
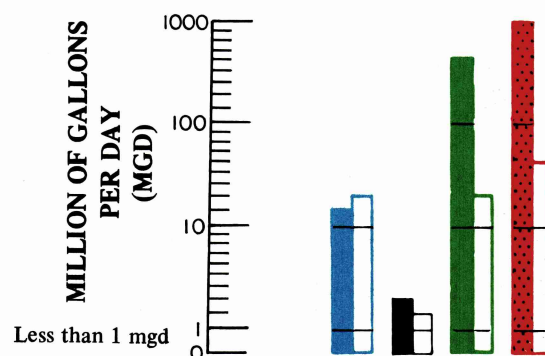


Figure 1. Trends in population and withdrawals of fresh water in Florida, 1950-65.

TYPE OF WATER USE

- BLUE - Public Supply
- BLACK - Self-supplied industrial
- GREEN - Irrigation
- RED - Thermoelectric power generation



- Solid bar is fresh surface water.
- Open bar is fresh ground water.
- Stippled bar indicates saline water.

TOTAL FRESH WATER WITHDRAWN IN COUNTY FOR PUBLIC SUPPLY, INDUSTRY, AND IRRIGATION

- Less than 1
- 1-10
- 11-100
- 101-200
- Greater than 200

0 10 20 30 40 50 MILES

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DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

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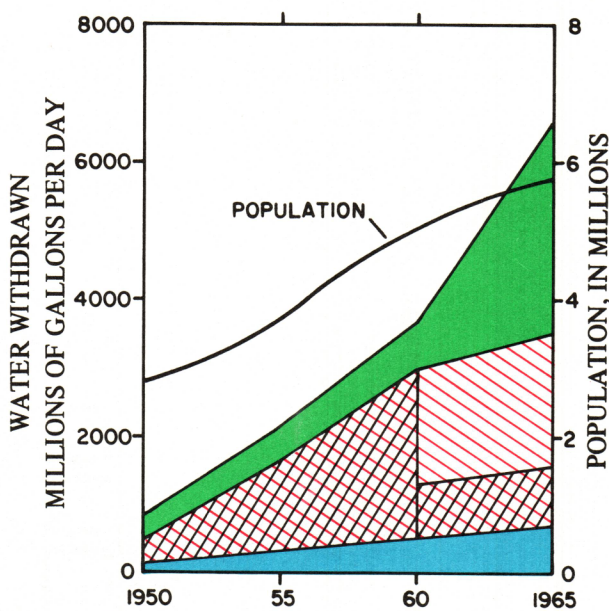
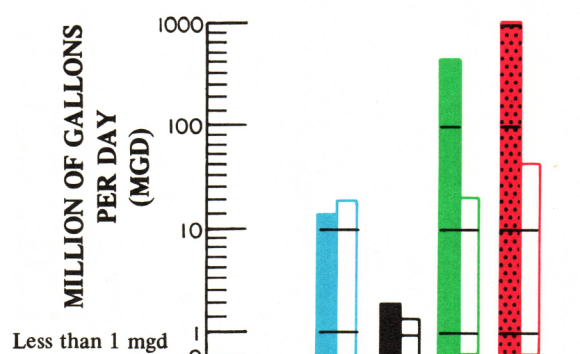


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