ESTIMATED PUMPAGE FROM GROUND-WATER SOURCES FOR PUBLIC SUPPLY AND RURAL DOMESTIC USE IN FLORIDA, 1977

By
Henry G. Healy

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INTRODUCTION

Increasing interest in Florida as a state to visit, vacation in, or retire to, has caused accelerated growth in the State population—permanent and transient—during 1965 through 1977. Commensurate with the steadily increasing number of tourists and permanent residents, ground-water pumpage, particularly for public supply, has steadily increased during those 13 years.

In 1977, ground-water sources supplied almost 86 percent of the total State demand for public supply and 99 percent of the rural domestic use, while surface-water sources supplied the remaining 14 and 1 percent, respectively (Leach and Healy, 1980 p. 13 and 16). Surface water is either the principal or supplemental source of water for public supply in only 12 of Florida's 67 counties, and in two of these counties, Okeechobee and Manatee, it is the sole source. Ground water supplied virtually all of the rural domestic demand in 1977; only minimal amounts of surface water were used in four counties.

The purpose of this report is to: document the quantities of ground water being withdrawn for public supply and rural domestic use; identify the ground-water reservoirs (aquifers) that are the sources of supply; and present trends in ground-water pumpage from 1965 through 1977.

SOURCES OF DATA

The water-use data in this report are from several published sources. Pumpage data prior to 1977 were taken from Pride (1970; 1973), Healy (1972), and Leach (1978). Pumpage for 1977 was taken from Leach and Healy (1980).

Sources, reliability, and terminology of water-use data for public supply and rural domestic use are discussed in some detail by Pride (1973) and Leach (1978). Leach (1978, p. 6) defines public supplies as those from a municipal water-supply system or water utility that serves the public; and in reference to rural supply, Leach further states: "If a public supply is either not available to individual families and small communities or if available and not used by them the water used is self-supplied and categorized as 'rural' or 'rural supply' whether or not the users live within the city limits."

Data for public supply are those figures reported directly by water plant personnel. Rural domestic supply was computed indirectly by multiplying the total number of people in each county not served by a municipal system times a per capita use amount that was estimated from a nearby area where records were kept (Leach, 1978, p. 15).

AQUIFERS

The large map shows pumpage from the principal aquifers: the Floridan, the Biscayne, the sand-and-gravel of northwest Florida, and "other." These aquifers with the exception of "other" have been described in many county and areal reports published by the U.S. Geological Survey and State agencies. For example, the Floridan aquifer is described and discussed by Parker and others (1955, p. 188), Pride and others (1966, p. 79–91), Klein (1975), Causey and Leve (1976), and Grubb (1977); the Biscayne aquifer by Schroeder and others (1958) and by Sherwood and others (1973 p. 47–68); and the sand-and-gravel aquifer by Musgrove and others (1961 p. 13–17) and Pascale (1974 p. 10–23).

The aquifer category "other" is used collectively in this report to include numerous nonartesian and artesian water-yielding sand, shell, sandstone, and limestone deposits in the Tertiary Tamiami and Hawthorn Formations and in the Pleistocene deposits. These discontinous water-bearing deposits have been assigned various local names. For example, the shallow aquifer (McCoy, 1962, p. 24); water-table aquifer (Clark and others, 1963, p. 19); nonartesian aquifer (Bermes and others, 1963, p. 41); surficial aquifer (Wilson, 1977, p. 21); the clastic aquifer (Knochenmus and Beard, 1971, p. 31) and secondary artesian aquifers (Lichtler and others, 1968, p. 88) are some of the names assigned.

Pumpage from water-bearing units of the lower Hawthorn Formation and the Tampa Limestone in parts of southwest Florida are also included under "other" rather than under Floridan aquifer. In southwest Florida, most of the Floridan aquifer contains nonpotable water. Because potable water in southwest Florida is available only from the Hawthorn Formation and from the Tampa Limestone, these formations have been considered separate from the Floridan aquifer in most previous reports on water use in southwest Florida.

WATER USE

Table 1 shows 1977 estimated pumpage in million gallons per day from the principal aquifers for public supply and rural domestic use. The figures represent pumpage from within the county, including water exported to adjacent counties.

The total ground water withdrawn in 1977 from the aquifers in Florida for public supply was 1,059 million gallons per day (Mgal/d). The Floridan aquifer supplied 460 Mgal/d or 43 percent of the total statewide pumpage used for public supply. The Biscayne aquifer, the chief source of water supply in Dade and Broward Counties of southeast coastal Florida, supplied 461 Mgal/d or 44 percent of the statewide pumpage in 1977. The sand-and-gravel aquifer, the principal source of water in extreme northwest Florida, supplied 34 Mgal/d or 3 percent of the statewide pumpage for public supply. Aquifers included under "other" are the chief source for public supply and domestic rural use in many counties in south Florida and along the Gulf and Atlantic coasts of peninsular Florida. These aquifers supplied 104 Mgal/d or 10 percent of the quantity of water used for public supply.

In 1965, ground water supplied 760 Mgal/d (population served, 5.32 million) for public supply and rural domestic use (Pride, 1970). In 1977, ground-water pumpage for the same uses was 1,251 Mgal/d (population served 8.03 million), an increase of 491 Mgal/d or 65 percent. Estimated pumpage for public supply and rural domestic use, in million gallons per day, for 1965 (Pride, 1970), 1970 (Pride, 1973), 1975 (Leach, 1978), and 1977 (Leach and Healy, 1980), is as follows:

	1965	1970	1975	1977	Increase, in percent 1965–77
Public supply	640	759	983	1,059	65
Rural domestic	120	165	201	192	60
Total, statewide	760	924	1,184	1,251	65

Estimated pumpages from each aquifer for 1965, 1970, 1975, and 1977 are shown in figure 1. Pumpage for public supply increased about 62 percent from the Floridan aquifer, 68 percent from the Biscayne, 79 percent from the sand-and-gravel aquifer, and 100 percent from "other" aquifers during 1965–77. During the same period pumpage for rural domestic use increased 63 percent from the Floridan aquifer, 136 percent from the sand-and-gravel aquifer, and 89 percent from "other" aquifers.

Except for Orange County, the most rapid increase in ground-water pumpage for public supply is in counties in coastal areas. From 1970 through 1977 average daily pumpage from the Floridan aquifer increased 26 Mgal/d in Duval, 6 Mgal/d in Hillsborough, 17 Mgal/d in Orange, 20 Mgal/d in Pasco, 11 Mgal/d in Pinellas, and 7 Mgal/d in Volusia Counties (Pride, 1973; Leach and Healy, 1980). Total population served in these counties was 1.3 million in 1970 and 1.8 million in 1977. As population in Florida continues to increase over the next decade, ground-water sources will play an evermore important role in meeting the State demands for water.

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Figure 1. Estimated pumpage from ground-water sources from 1965, 1970, 1975, and 1977.

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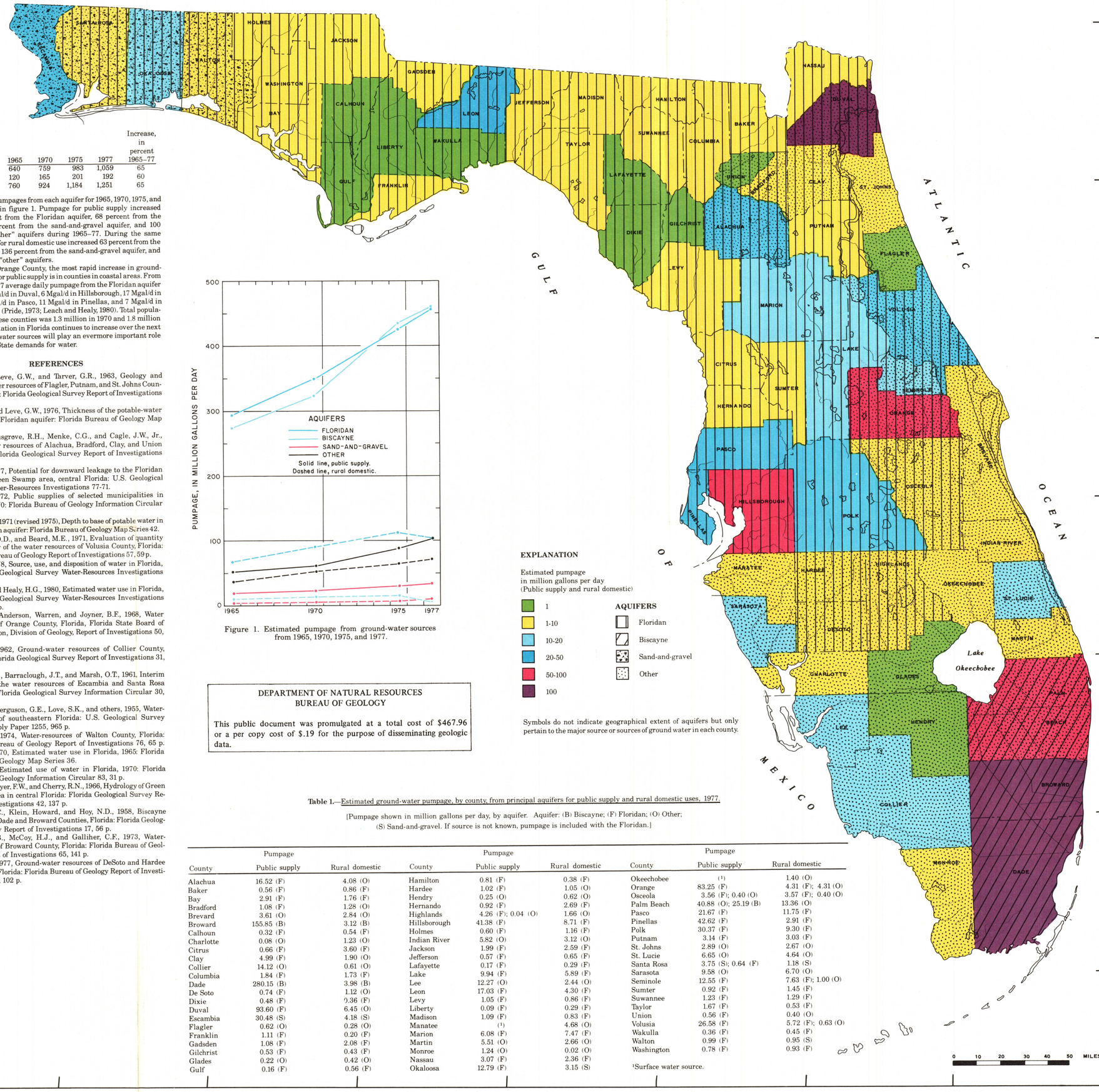

Table 1.—Estimated ground-water pumpage, by county, from principal aquifers for public supply and rural domestic uses, 1977.

[Pumpage shown in million gallons per day, by aquifer. Aquifer: (B) Biscayne; (F) Floridan; (O) Other; (S) Sand-and-gravel. If source is not known, pumpage is included with the Floridan.]

County	Pumpage Public supply	Pumpage Rural domestic	County	Pumpage Public supply	Pumpage Rural domestic	County	Pumpage Public supply	Pumpage Rural domestic
Alachua	16.52 (F)	4.08 (O)	Hamilton	0.81 (F)	0.38 (F)	Okeechobee	(1)	1.40 (O)
Baker	0.56 (F)	0.86 (F)	Hardee	1.02 (F)	1.05 (O)	Orange	83.25 (F)	4.31 (F); 4.31 (O)
Bay	2.91 (F)	1.76 (F)	Hendry	0.25 (O)	0.62 (O)	Osceola	3.56 (F); 0.40 (O)	3.57 (F); 0.40 (O)
Bradford	1.08 (F)	1.28 (O)	Hernando	0.92 (F)	2.69 (F)	Palm Beach	40.88 (O); 25.19 (B)	13.36 (O)
Brevard	3.61 (O)	2.84 (O)	Highlands	4.26 (F); 0.04 (O)	1.66 (O)	Pasco	21.67 (F)	11.75 (F)
Broward	155.85 (B)	3.12 (B)	Hillsborough	41.38 (F)	8.71 (F)	Pinellas	42.62 (F)	2.91 (F)
Calhoun	0.32 (F)	0.54 (F)	Holmes	0.60 (F)	1.16 (F)	Polk	30.37 (F)	9.30 (F)
Charlotte	0.08 (O)	1.23 (O)	Indian River	5.82 (O)	3.12 (O)	Putnam	3.14 (F)	3.03 (F)
Citrus	0.66 (F)	3.60 (F)	Jackson	1.99 (F)	2.59 (F)	St. Johns	2.89 (O)	2.67 (O)
Clay	4.99 (F)	1.90 (O)	Jefferson	0.57 (F)	0.65 (F)	St. Lucie	6.65 (O)	4.64 (O)
Collier	14.12 (O)	0.61 (O)	Lafayette	0.17 (F)	0.29 (F)	Santa Rosa	3.75 (S); 0.64 (F)	1.18 (S)
Columbia	1.84 (F)	1.73 (F)	Lake	9.94 (F)	5.89 (F)	Sarasota	9.58 (O)	6.70 (O)
Dade	280.15 (B)	3.98 (B)	Lee	12.27 (O)	2.44 (O)	Seminole	12.55 (F)	7.63 (F); 1.00 (O)
De Soto	0.74 (F)	1.12 (O)	Leon	17.03 (F)	4.30 (F)	Sumter	0.92 (F)	1.45 (F)
Dixie	0.48 (F)	0.36 (F)	Levy	1.05 (F)	0.86 (F)	Suwannee	1.23 (F)	1.29 (F)
Duval	93.60 (F)	6.45 (O)	Liberty	0.09 (F)	0.29 (F)	Taylor	1.67 (F)	0.53 (F)
Escambia	30.48 (S)	4.18 (S)	Madison	1.09 (F)	0.83 (F)	Union	0.56 (F)	0.40 (O)
Flagler	0.62 (O)	0.28 (O)	Manatee	(1)	4.68 (O)	Volusia	26.58 (F)	5.72 (F); 0.63 (O)
Franklin	1.11 (F)	0.20 (F)	Marion	6.08 (F)	7.47 (F)	Wakulla	0.36 (F)	0.45 (F)
Gadsden	1.08 (F)	2.08 (F)	Martin	5.51 (O)	2.66 (O)	Walton	0.99 (F)	0.95 (S)
Gilchrist	0.53 (F)	0.43 (F)	Monroe	1.24 (O)	0.02 (O)	Washington	0.78 (F)	0.93 (F)
Glades	0.22 (O)	0.42 (O)	Nassau	3.07 (F)	2.36 (F)			
Gulf	0.16 (F)	0.56 (F)	Okaloosa	12.79 (F)	3.15 (S)			

[1]Surface water source.