

FRESHWATER USE IN FLORIDA, 1975

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INTRODUCTION

The amount of freshwater in Florida remains relatively unchanged while population growth, urban development, and agriculture continue to put increasing demands on the available supply. For this reason it is important to gather data on the water requirements of the State by various categories of use. Periodic assessments can indicate trends that are important in making estimates of future water use needed in planning for future water demands.

Water use data for 1975 collected as part of a nationwide inventory are published in reports by Healy (1977) and Leach (1978). This report summarizes data, by counties, under the following categories: public supply; rural (self-supplied) including domestic and livestock; irrigation; industrial (self-supplied); and thermoelectric power generation.

Data on use of saline water for thermoelectric power generation were collected as part of the inventory but are not included in this report because saline water is pumped from, and returned to, a saline source and is not considered part of the freshwater cycle. However, the quantity of saline water pumped for this purpose exceeds all freshwater used in the State. Nonwithdrawal use of freshwater, also not reported, includes 10,300 million gallons per day (Mgal/d) that flows through the hydroelectric-power-generation plant located on the Apalachicola River near Chattahoochee.

TOTAL FRESHWATER

Total statewide freshwater uses in 1975 by county from surface- and ground-water sources for public supply, rural, irrigation, industrial, and thermoelectric power generation, are shown on the large map.

Freshwater use in 1975 was 6,918 Mgal/d compared to 5,768 Mgal/d in 1970 (fig. 1). Public water supply demand increased from 884 to 1,146 Mgal/d and rural (self-supplied) increased from 195 to 266 Mgal/d, both largely reflecting the increase in population from 6.8 to 8.5 million. Water used for irrigation showed the greatest increase, from 2,099 to 2,868 Mgal/d. Water used for industrial (self-supplied) and thermoelectric power generation remained relatively stable as industrial use increased from 926 to 940 Mgal/d and thermoelectric power generation decreased slightly from 1,700 to 1,698 Mgal/d. Figure 2 portrays the statewide freshwater use from source through use to disposition. For example, of the 1,146 Mgal/d used for public supply, 983 Mgal/d or 85.8 percent was ground water. Disposition of the public supply indicated that 48.9 percent was consumed, with the remaining 51.1 percent (586 Mgal/d) returned to the system for reuse. Figure 2 also shows that the major freshwater source for irrigation and thermoelectric power generation is surface water whereas ground water is the major source of water for public, rural, and industrial supplies.

PUBLIC SUPPLIES

Information on total amounts of freshwater pumped for public supplies was obtained from 710 county, municipal, and private utility systems. The largest system in the State, operated by the Miami-Dade Water and Sewer Authority, serves more than 1.12 million people; the smallest, private systems, serve fewer than 100 people. Total freshwater use for public supply in each of Florida's 67 counties is shown in figure 3, which indicates that major use is concentrated around population centers. The seven most populous counties: Broward, Dade, Duval, Hillsborough, Orange, Palm Beach, and Pinellas, account for almost 700 Mgal/d or 61 percent of the total 1,146 Mgal/d of freshwater withdrawn for public supply in 1975. The per capita use of water in Florida for 1975 was 168 gallons per day for the 6.8 million people served by public supply. In 1975, 1.4 million more people were served by public supplies than in 1970. If this rate of increase continues, the public water supply systems will have to withdraw about 47 Mgal/d more freshwater each year to supply the projected increase in population.

RURAL SELF-SUPPLIED

Rural (self-supplied) water use of 266 Mgal/d includes 203 Mgal/d pumped for domestic use and 63 Mgal/d pumped for livestock. Rural water use in the State is less than 4 percent of the total freshwater withdrawn for all uses.

Withdrawals for rural use are shown by counties in figure 4. The rural self-supplied population represents 21.6 percent of Florida's population. The per capita rural water use is 142 gallons per day, as compared with 168 gallons per day for those on public water supply systems. Rural water use for Monroe County is small and reported as zero on the map because the rural population in the county where adequate freshwater is available is small. The population of the county, concentrated along the Florida Keys, is supplied by freshwater either from a pipeline from Dade County or from desalination plants. Little to no freshwater underlies the Florida Keys so that it can be tapped for private self-supplied systems.

INDUSTRIAL

The total quantity of self-supplied freshwater withdrawn by industries in 1975 was 940 Mgal/d, an increase of less than 2 percent since 1970. Of the 940 Mgal/d used by industry, 779 Mgal/d or almost 83 percent is withdrawn from ground-water sources. Seven counties: Flagler, Glades, Lafayette, Levy, Monroe, Union, and Washington, reported no self-supplied industrial water use (fig. 5). In several counties large amounts of self-supplied water were used by industry: Hamilton and Polk Counties used 270 Mgal/d for phosphate mining; Duval, Escambia, Gulf, Nassau, Putnam, and Taylor Counties used 225 Mgal/d for pulp and paper processing; Lake, Pasco, and Polk Counties used 70 Mgal/d for citrus processing; Palm Beach County used 66 Mgal/d for food processing; and Escambia County used 100 Mgal/d for chemical products. The remaining 200 Mgal/d were pumped for lime rock mining, air conditioning, and many other smaller industries scattered around the State.

IRRIGATION

Total freshwater pumped for irrigation in 1975 amounted to 2,868 Mgal/d. The amounts of freshwater pumped for irrigation by counties are shown in figure 6. Figure 2 shows that irrigation is the largest user of freshwater in the State and accounts for more than 41 percent of the total freshwater pumped. Irrigation also has the largest consumptive use: 1,332 Mgal/d, or about 46 percent. The smallest amounts of freshwater for irrigation are withdrawn in 32 counties in the northern part of the State (fig. 6). Five counties in northern Florida—Bay, Franklin, Liberty, Wakulla, and Washington—reported no water used for irrigation; 16 counties used less than 1 Mgal/d; and 11 used between 1 and 10 Mgal/d. Although these counties contain about half of the land available for farming, they used only 34 Mgal/d—slightly more than 1 percent of the total freshwater pumped for irrigation. By comparison, each of 20 other counties reported larger amounts of water used for irrigation than in the 32 northern counties combined. Most irrigation occurs in the central and southern parts of the State. In these areas more freshwater is required for irrigation because the winter and early spring growing seasons coincide with the dry season, when evapotranspiration rates are high. Further, the soils here are more porous and do not retain moisture as well as in other parts of the State.

THERMOELECTRIC POWER GENERATION

Most thermoelectric power-generating plants in Florida are near the coast where large quantities of saline or brackish water can be withdrawn from bays or estuaries for cooling. Powerplants that are inland use freshwater from lakes or streams for cooling. During 1975, water withdrawn for thermoelectric power production totaled 13,138 Mgal/d which included 11,440 Mgal/d of saline water. This represents an 18 percent increase over the quantity of fresh and saline water withdrawn in 1970. During these same 5 years power production increased 42 percent. The disparity between increased water use and increased power production probably reflects the greater number of plants recycling water through cooling ponds or cooling towers.

The quantities of freshwater used by the thermoelectric power-generating plants are shown in figure 7. Only 28 of the 67 counties used any freshwater for power generation. Of these 28 counties, 13 used less than 1 Mgal/d of freshwater, either to supplement the saline water for cooling or for other purposes. Counties where large quantities of freshwater are used for power generation include: Escambia, Polk, and Volusia, more than 200 Mgal/d; Jackson, Suwannee, and Wakulla, between 100 and 200 Mgal/d; Highland, Orange, and Putnam, between 50 and 100 Mgal/d.

Although thermoelectric power production is the second largest user of freshwater in the State, it consumes only 36 Mgal/d, or less than 1 percent of the total freshwater withdrawn, because most of the water is recycled.

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EXPLANATION

Freshwater withdrawn in million gallons per day.

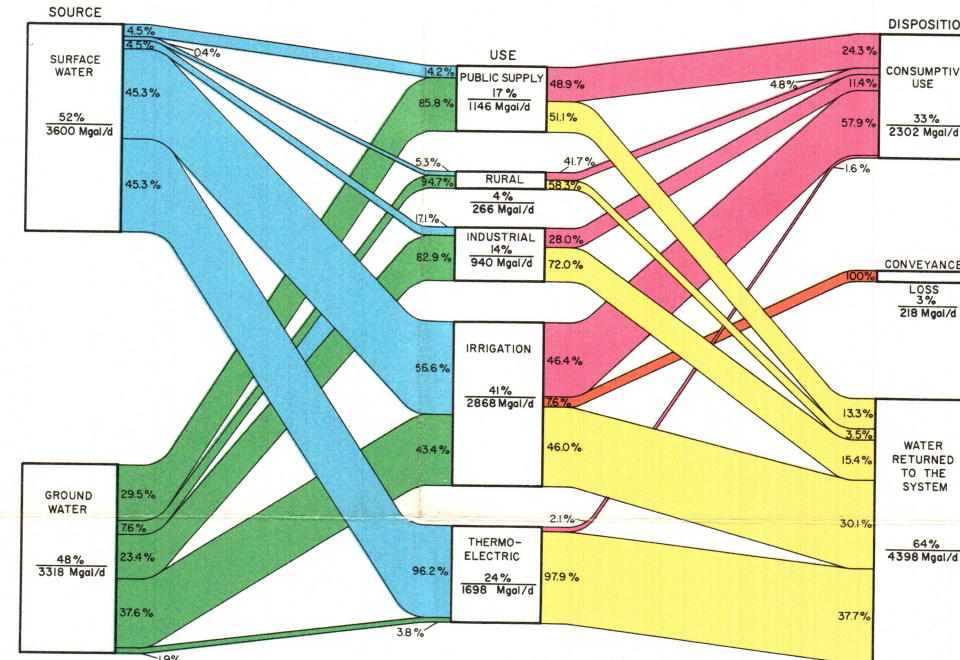
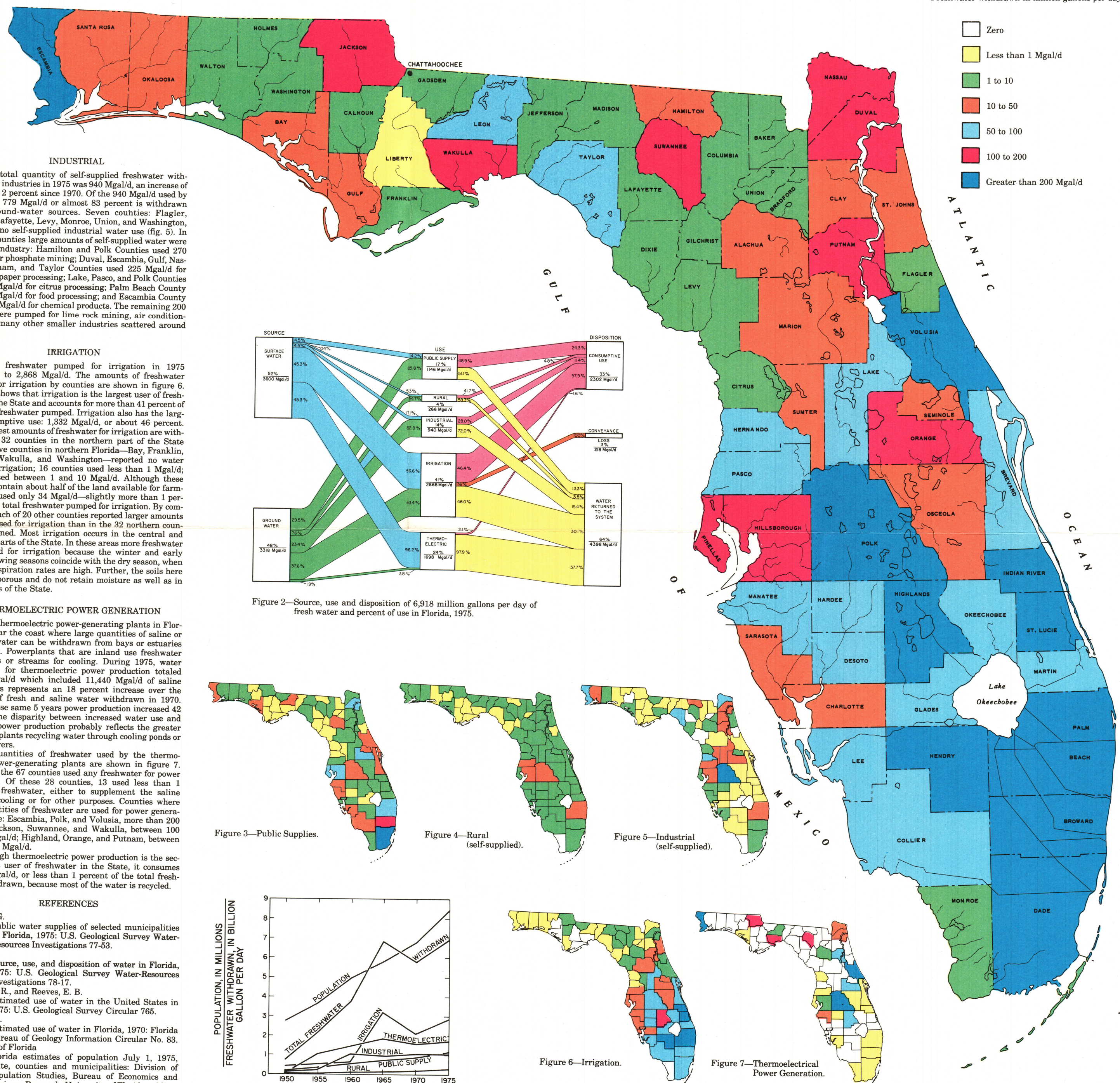
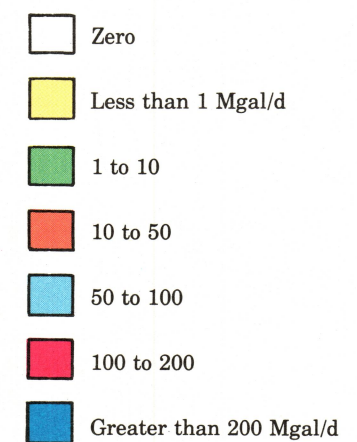


Figure 2—Source, use and disposition of 6,918 million gallons per day of fresh water and percent of use in Florida, 1975.

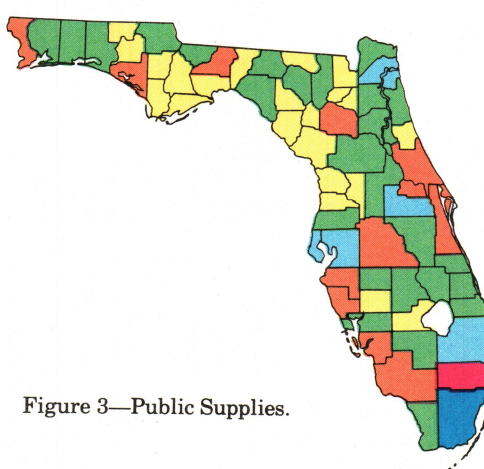


Figure 3—Public Supplies.

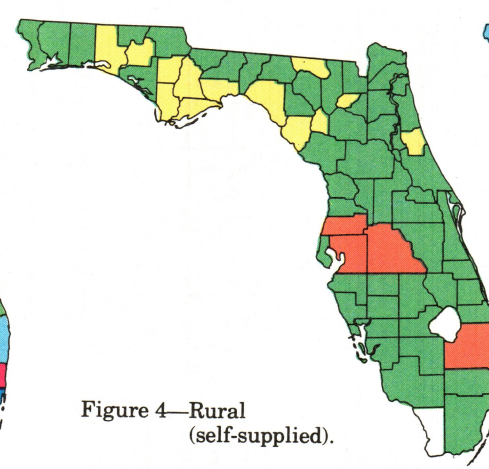


Figure 4—Rural (self-supplied).

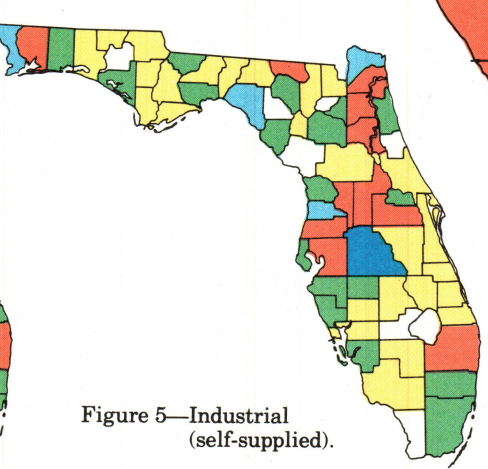


Figure 5—Industrial (self-supplied).

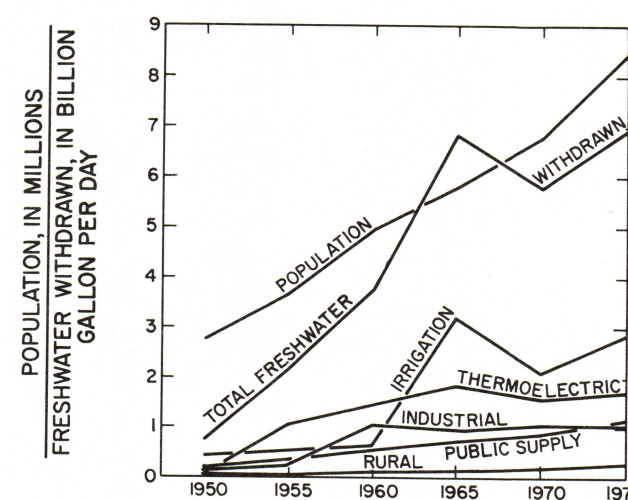


Figure 6—Irrigation.

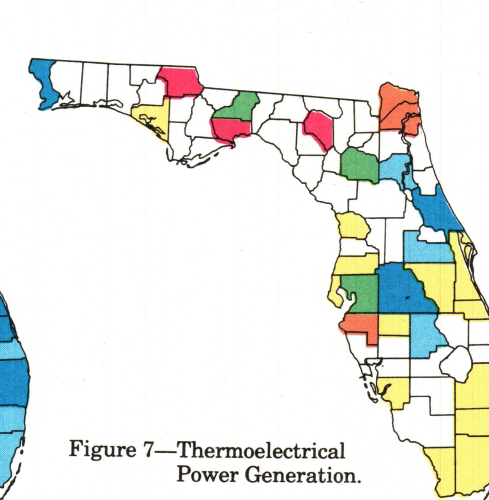
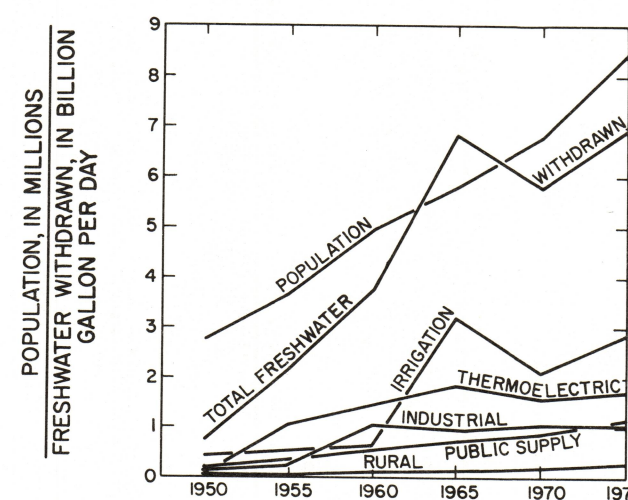


Figure 7—Thermoelectric Power Generation.

Figure 1—Trends in population and fresh water withdrawn in Florida, 1950-75.



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