UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUMMARY OF U.S. GEOLOGICAL SURVEY INVESTIGATIONS AND HYDROLOGIC CONDITIONS IN THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT FOR 1978

OPEN-FILE REPORT 79-1257

Prepared in cooperation with the
SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

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By R. L. Knutilla and H. C. Rollins

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Tallahassee, Florida

1979

UNITED STATES DEPARTMENT OF THE INTERIOR

CECIL D. ANDRUS, Secretary

GEOLOGICAL SURVEY

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CONTENTS

CONTENTS (Continued)

ILLUSTRATIONS

ILLUSTRATIONS (Continued)

ILLUSTRATIONS (Continued)

TABLES

CONVERSION FACTORS

For those readers who may prefer to use SI (metric) units rather than inch-pound units, conversion factors for terms used in this report are listed below:

Multiply inch-pound unit	By	To obtain SI (metric) unit
inch (in)	25.40	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square foot (ft^2)	0.0929	square meter (m^2)
square mile (mi^2)	2.590	square kilometer (km^2)
gallon (gal)	3.785	liter (L)
	3.785×10^{-3}	cubic meter (m^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
gallon per minute (gal/min)	0.06308	liter per second (L/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
degrees Fahrenheit (°F)	(°F-32) x 0.556	degrees Celsius (centigrade) (°C)
mean sea level (msl)	---	National Geodetic Vertical Datum of 1929 (NGVD of 1929)

SUMMARY OF U.S. GEOLOGICAL SURVEY INVESTIGATIONS AND HYDROLOGIC CONDITIONS IN THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT FOR 1978

By R. L. Knutilla and H. C. Rollins

ABSTRACT

This report summarizes water-resources investigations in the Southwest Florida Water Management District performed by the U.S. Geological Survey, Water Resources Division, for fiscal year 1978. The investigations are part of the Federal program of appraising the nation's water resources. The cooperative program for fiscal year 1978 included 37 interpretive investigations. Abstracts of 30 reports released during 1978 and a bibliography of reports released since 1933 are included. The hydrologic setting of southwest Florida and discussions of surface-water, ground-water, and quality-of-water conditions are given. Hydrologic conditions in southwest Florida are described and illustrated by hydrographs of selected surface-water, ground-water and lake-stage data collection sites. In addition, summaries of water-use data and data on the regional observation monitor-well program are provided.

INTRODUCTION

This report describes the hydrologic conditions in southwest Florida during the 1978 water year (October 1977 to September 1978) and summarizes water-resources investigations being made by the U.S. Geological Survey. The report is a reference for professionals and laymen who are interested in the water resources of the area. Preparation of this report was funded as part of the cooperative program with the Southwest Florida Water Management District (SWFWMD).

The report contains a tabulation of active water-resources investigations, a summary of water use in the District, and a discussion of hydrologic conditions. In addition, the report contains a list of reports prepared by the U.S. Geological Survey for southwest Florida.

Report Area and Investigations Program

The area covered by this report contains about 10,000 mi^2 in southwestern Florida (fig. 1). Boundaries of the area coincide with those of the Southwest Florida Water Management District and, for this report, will be referred to as the District. The area contains 10 counties and parts of 6 others. U.S. Geological Survey cooperative water-resources investigations in the District are performed by the Southwest Florida Subdistrict in Tampa and by the East-Central Florida Subdistrict in Orlando. Investigations are made in cooperation with federal, state, county, and local units of government.

Investigations in the District provide the following:

1. Hydrologic data for determination and evaluation of the quantity, quality, and use of water resources.

2. Results of analytical and interpretive water-resources appraisals that describe the occurrence and availability of water, and the physical, chemical, and biological characteristics of water.

3. Results of investigations using modeling techniques to further understanding of hydrologic systems and to quantitatively predict response of the systems to natural or manmade stress.

4. Dissemination of water data and results of investigations and research through reports, maps, and other forms of public release.

5. Scientific and technical assistance in hydrology and related fields to federal, state, and local agencies.

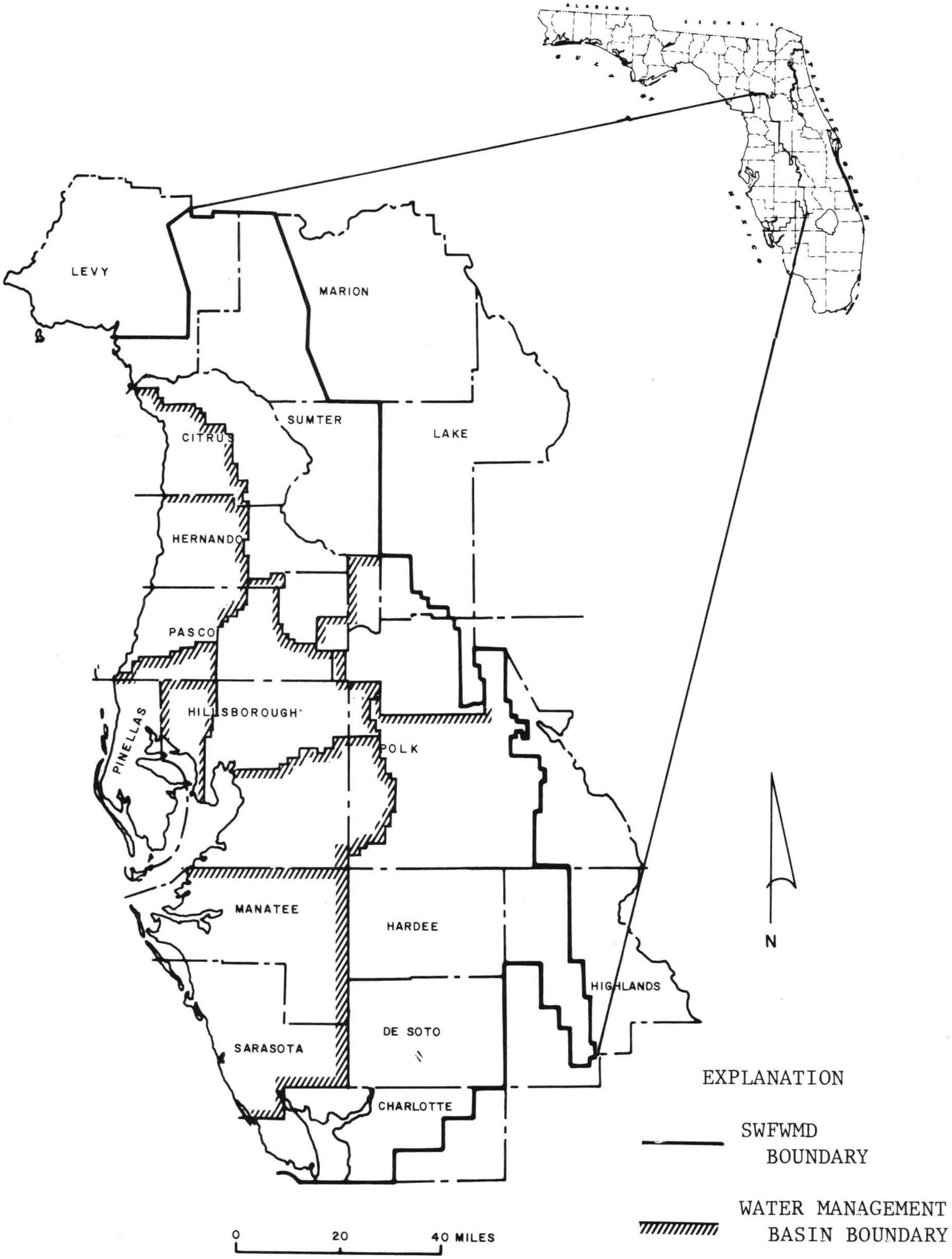


Figure 1.--Location of the Southwest Florida Water Management District and the water management basins.

Water-Resources Program

The U.S. Geological Survey maintains a diversified program that encompasses all aspects of water information needs in the District. The cooperative program for fiscal year 1978 included 37 interpretive investigations. Hydrologic data were obtained at about 1,500 sites.

Federal, state, county, city, and local agencies that contributed funds for investigations and data collection are as follows:

U.S. Army Corps of Engineers
U.S. Department of Housing and Urban Development
U.S. Geological Survey
Florida Department of Environmental Regulation
Florida Department of Transportation
Florida Department of Pollution Control
Southwest Florida Water Management District
Hillsborough County
Sarasota County
Pinellas County
Bradenton
Clearwater
St. Petersburg
Tampa
Sarasota
Englewood Water District
Winter Haven Boat Course District

Requests for information on investigations should be directed to:

District Chief
U.S. Geological Survey
325 John Knox Road, Suite F-240
Tallahassee, Florida 32303

Telephone: (904) 386-1118

Subdistrict Chief
Southwest Florida Subdistrict
U.S. Geological Survey
Tampa Commerce Mall
4710 Eisenhower Blvd., Suite B-5
Tampa, Florida 33614

Telephone: (813) 228-2124

Subdistrict Chief
East-Central Florida Subdistrict
U.S. Geological Survey
Suite 216, Federal Building
80 North Hughey Avenue
Orlando, Florida 32801

Telephone: (305) 420-6191

SUMMARY OF WATER-RESOURCES INVESTIGATIONS

Current and proposed investigations in the District are divided into 12 categories as listed below. Proposed investigations in each category indicate long-range needs in water-resources information.

1. Areal assessment
2. Hydrologic data base
3. Water quality and flow characteristics of streams
4. Hydrologic hazards
5. Water-quality characteristics of aquifers
6. Utilization of subsurface space
7. Land-use hydrology
8. Lake hydrology
9. Estuarine and wetland hydrology
10. Water atlas and lay reader reports
11. Aquifer and stream system evaluation
12. Comprehensive regional hydrology

Areal Assessment

Areal investigations provide base-line information on hydrology and geology and describe the areal and regional water-supply characteristics of aquifers and river basins. Current and proposed areal assessment studies are listed below.

AREAL ASSESSMENT INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-158	Hydrology of Englewood Water District	———	———	———	———	———
FL-191	Well field water-level mapping	———	———	———	———	———
FL-210	Well field water-resources evaluations	———	———	———	———	———
FL-301	Withlacoochee River basin assessment	———	———	- - -	- - -	- - -
Proposed	Quality assessment of selected rivers			- - -	- - -	- - -
Proposed	Trends in potentiometric surface			- - -		
Proposed	Water-supply potential of streams			- - -	- - -	- - -
Proposed	Ground-water resources of Pasco County			- - -	- - -	
Proposed	Shallow ground-water resources of Pinellas County			- - -	- - -	
Proposed	Water resources of Hardee County			- - -	- - -	
Proposed	Hydrology of Sulphur Springs Quadrangle			- - -		
Proposed	Hydrogeology of SWFWMD			- - -		

——— Active - - - - - - Proposed

Hydrologic Data Base

Hydrologic records provide data on streamflow, ground water, water use, and quality of ground and surface water. These data are needed for the appraisal, protection, and management of water resources. The data-base program consists of maintaining surface- and ground-water data collection networks, and collecting of hydrologic records such as water levels, geologic information, water-use data, and miscellaneous streamflow measurements. Current and proposed data-base activities are listed below.

HYDROLOGIC DATA BASE INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-001	Surface-water records	———	———	———	———	———
FL-002	Ground-water records	———	———	———	———	———
FL-003	Quality-water records	———	———	———	———	———
FL-007	Water-use inventory	———	———	———	———	———
FL-179	Sarasota public water supply	———	———	———	———	———
FL-208	Technical assistance - SWFWMD	———	———	———	———	———
FL-232	Technical assistance - Hillsborough County	———	———	———	———	———
FL-256	Potentiometric water-level maps	———	———	———	———	———
FL-257	Aquifer-characteristics maps	———	———	———	———	———
FL-263	Remote-data acquisition	———	———	———	- - -	- - -
FL-280	Annual summary report	———	———	———	———	———
FL-281	Technical assistance - Pinellas County	———	———	———	———	———

Water Quality and Flow Characteristics of Streams

Investigations of water quality and flow characteristics of streams provide data needed to define existing conditions and to predict changes under various plans of basin development. Proposals for recommended studies are listed below.

INVESTIGATIONS OF WATER QUALITY AND FLOW CHARACTERISTICS OF STREAMS		Period of Investigation				
		1978	1979	1980	1981	1982
Proposed	Low-flow studies - SWFWMD			- - -	- - -	- - -
Proposed	Braden River water supply			- - -	- - -	
Proposed	Waste load assimilation - streams			- - -	- - -	- - -
Proposed	River basin assessment - Peace and Myakka Rivers			- - -	- - -	- - -

Hydrologic Hazards

Investigations of drought and flood flows are made to define their frequency, duration, and magnitude. Information on the probability and extent of future floods is needed to reduce flood losses and to protect life and property. Information on droughts is needed where streams are used for water supply and for protection of instream flows. Information on sinkholes is needed to delineate areas subject to subsidence or collapse. Current and proposed studies are listed below.

INVESTIGATIONS OF HYDROLOGIC HAZARDS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-006	HUD flood studies	———	———	———		
FL-105	Small streams flood frequencies	———	———	———	———	———
FL-267	Watershed modeling for streamflow simulation	———	———	———		
FL-308	Geohydrology of sinkholes	———	———	- - -		
Proposed	Flood frequency of tidal streams				- - -	
Proposed	Frequency and effects of droughts on water resources			- - -	- - -	
Proposed	Impact of dam failure on flooding			- - -	- - -	

Water-Quality Characteristics of Aquifers

Water-quality investigations of aquifers are made to define area and depth variations in ground-water quality, to define existing and potential ground-water contamination, and to predict changes in water quality. Current investigations and proposed studies are listed below.

INVESTIGATIONS OF WATER-QUALITY CHARACTERISTICS OF AQUIFERS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-285	Saltwater encroachment	———	———	———		
FL-285a	Resistivity study to locate saltwater-freshwater interface				- - -	- - -
FL-302	Radionuclides in ground water	———	———			
Proposed	Occurrence and origin of mineralized ground water			- - -	- - -	
Proposed	Interconnection between Tampa Bay and Floridan aquifer			- - -		

Utilization of Subsurface Space

Investigations of subsurface space are made to evaluate the effects of injecting waste effluent into wells tapping saline aquifers, to determine means of artificially recharging aquifers, and to evaluate the potential movement of stored fresh or waste waters. Current investigations and a proposed study are listed below.

INVESTIGATIONS OF UTILIZATION OF SUBSURFACE SPACE		Period of Investigation				
		1978	1979	1980	1981	1982
FL-152	Subsurface disposal, Pinellas County	———	———			
FL-154	Subsurface waste storage, Federal	———	———	———		
FL-198	Subsurface storage, St. Petersburg	———	———	———		
FL-293	Regional effects of injection	———	———			
Proposed	Effects of long-term injection			- - -	- - -	- - -

Land-Use Hydrology

Land-use hydrologic investigations provide information on land-use planning and zoning, water-resources management, and evaluation of the effects of man-made alterations to the environment. Current land-use investigations and proposed studies are listed below.

LAND-USE HYDROLOGY INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-107	Hydrology of landfill sites, Hillsborough County	———	———	———		
FL-219	Urban hydrology	———	———	———		
FL-316	Hydrology of landfill and sewage effluent sites	———	———	———	———	
Proposed	Hydrology of internally drained area, Hillsborough County			- - -		
Proposed	Hydrologic factors relating to land use, Pinellas County			- - -		
Proposed	Effects of frost protection pumping, Hillsborough County			- - -		
Proposed	Basin assessment studies				- - -	- - -

Lake Hydrology

Lake hydrology investigations provide an understanding of the role of lakes in the hydrologic system and define possible cause of changes in lake water quality and lake levels. Current and proposed lake investigations are listed below.

LAKE HYDROLOGY INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-143	Lakes in southwest Florida	———	———	———	———	———
FL-278	Winter Haven lakes	———	———			
Proposed	Effects on lake water quality by adding ground water			- - -	- - -	
Proposed	Regional lake-stage evaluation			- - -	- - -	

Estuarine and Wetland Hydrology

Investigations of estuaries and wetlands are conducted to determine hydrologic and water-quality conditions and to predict changes due to development. Current and proposed studies are listed below.

ESTUARINE AND WETLAND HYDROLOGY INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-159	Estuarine hydrology, Tampa Bay	———	———	———	- - -	- - -
FL-292	Freshwater inflow to estuaries as related to water quality	———	———			
Proposed	Freshwater inflow to estuaries, Peace and Myakka			- - -	- - -	
Proposed	Waste-load assimilation capacity, Charlotte Harbor			- - -	- - -	- - -

Water Atlas and Lay Reader Reports

Atlases and brochures describing hydrologic problems and principals are prepared to provide the public with a better understanding of the water resources. Current and proposed reports are listed below.

WATER ATLAS AND LAY READER REPORTS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-075	Florida water atlas	———	———	———	———	———
Proposed	District map atlas			- - -	- - -	- - -
Proposed	Lay reader report			- - -	- - -	- - -

Aquifer and Stream System Evaluation

Aquifer and stream system investigations are made to predict the effects of industrial, municipal, and agricultural developments on water resources. Current and proposed investigations are listed below.

AQUIFER AND STREAM SYSTEM EVALUATION INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-264	Effect of ground-water development	———	———	———		
FL-265	Water supply, Hillsborough River	———	———	———		
Proposed	Ground-water development, Tampa area			- - -	- - -	
Proposed	Time-of-travel studies, stream			- - -	- - -	
Proposed	Mapping permeable zones, Floridan aquifer			- - -	- - -	

Comprehensive Regional Hydrology

Comprehensive regional hydrologic investigations are made to provide information for critical areas with emerging problems in development and management of the total water resources and to assess hydrologic investigations of various management alternatives for regional water and waste-management plans. Current and proposed investigations are listed below.

COMPREHENSIVE REGIONAL HYDROLOGY INVESTIGATIONS		Period of Investigation				
		1978	1979	1980	1981	1982
FL-310	Southeastern regional limestone investigation	———	———	———	———	
Proposed	Green Swamp function, regional hydrology			- - -	- - -	- - -

——— Active   - - - - - - Proposed

REPORTS RELEASED IN FISCAL YEAR 1978

Thirty reports of investigations in the Southwest Florida Water Management District were released in FY78. These reports are on hydrologic and hydrogeologic investigations in southwest Florida. This section contains abstracts from each report.

Copies of reports listed in this section and the following section, "Reports Released Since 1933," are available for inspection at the U.S. Geological Survey offices in Tampa, Tallahassee, Miami, and Orlando; at the U.S. Geological Survey Library in Reston, Virginia; at libraries of the State University System of Florida; and at the Southwest Florida Water Management District office. For information about availability of reports contact the U.S. Geological Survey, 325 John Knox Road, Suite F-240, Tallahassee, Florida 32303 or the Southwest Florida Water Management District, Office of Communications and Information, 5060 U.S. Highway 41 South, Brooksville, Florida 33512.

For annual bulletins, information circulars, map series, and reports of investigations published by the Florida Bureau of Geology, contact the Bureau of Geology, Florida Department of Natural Resources, 903 West Tennessee Street, Tallahassee, Florida 32304. Florida Bureau of Geology publications are available for inspection at many public libraries throughout Florida.

Abstracts from reports released in 1978 follow:

Buono, Anthony, Causseaux, K. W., and Moore, J. E., 1978, Summary of U.S. Geological Survey investigations and hydrologic conditions in the Southwest Florida Water Management District for 1977: U.S. Geological Survey Open-File Report 78-331.

Abstract. -- *This report summarizes the activities of the Southwest Florida Subdistrict Office of the U.S. Geological Survey, Water Resources Division, for fiscal year 1977. The organization and mission of the subdistrict office are described. The cooperative program for fiscal year 1977 included 41 interpretive investigations. Abstracts of 20 reports released by the subdistrict during 1977 and an extensive bibliography of reports released from 1933 to 1977 are included. The hydrologic setting of southwest Florida is outlined followed by discussions of surface-water, ground-water and quality-of-water conditions. Hydrologic conditions in southwest Florida in 1977 are shown by the presentation of hydrographs from selected surface-water, ground-water, and lake-stage data collection sites.*

Buono, Anthony, Rutledge, A. T., and Wolansky, R. M., 1978, Configuration of the top of the Floridan aquifer, Southwest Florida Water Management District and adjacent areas: U.S. Geological Survey Open-File Report 78-34.

Abstract. -- *This map report presents the configuration of the top of the first consistent rock of the Floridan aquifer in the Southwest Florida Water Management District. The surface of the aquifer is defined as the rock below which no clay confining beds occur. In most areas the surface represents the top of the Tampa Limestone or Suwannee Limestone. The rock units which are considered to be part of the Floridan aquifer are the limestones and dolomites of the Lake City Limestone, the Avon Park Limestone, the Ocala Limestone, the Suwannee Limestone, and the Tampa Limestone. These units range from Middle Eocene age to early Miocene age, respectively.*

Fernandez, Mario, Jr., 1979, Water-quality data for landfills, Hillsborough County, Florida, January 1974-October 1977: U.S. Geological Survey Open-File Report 78-820.

Abstract. -- *Periodic water-quality data were collected at four landfills in Hillsborough County from January 1974 through October 1977. Water samples were analyzed for nitrogen and phosphorus species, cations, toxic heavy metals, chloride, specific conductance, chemical oxygen demand, biological oxygen demand, and coliforms. Findings for specific conductance measurements and chloride concentration are presented for selected wells in the surficial and limestone aquifers. Results of chemical and bacteriological analysis from four landfills are presented as basic data. Lithologic and well descriptions are presented for wells drilled at the landfills after January 1974.*

Fernandez, Mario, Jr., 1979, Water-quality data from a sludge disposal test site, St. Petersburg, Florida, November 1973-July 1977: U.S. Geological Survey Open-File Report 78-821.

Abstract. -- *From November 1973 to July 1977, water samples were collected from wells to obtain background water-quality conditions and to determine the effects on ground-water quality by St. Petersburg's sludge-disposal operation (sod farm). Specific conductance and pH were determined in the field. Samples were collected for laboratory determination of selected nitrogen and phosphorus species, sodium, potassium, calcium, magnesium, chloride, trace metals, chemical and biochemical oxygen demand, and coliforms.*

Fernandez, Mario, Jr., 1979, Water-quality data from a landfill, Pinellas County, Florida, May 1975-October 1977: U.S. Geological Survey Open-File Report 78-822.

Abstract. -- *Beginning in May 1975, surface- and ground-water samples were collected periodically to obtain certain background water-quality conditions at a landfill site in Pinellas County, Florida. Specific conductance and pH were determined in the field. Samples were collected for laboratory determination of selected nitrogen and phosphorus species,* *sodium, potassium, calcium, magnesium, trace metals, chloride, pH, specific conductance, chemical and biochemical oxygen demands, specific pesticides, and herbicides and coliforms.*

Goetz, C. L., Reichenbaugh, R. C., and Ogle, J. K., 1978, Water-supply potential of the lower Hillsborough River, Florida, 1976: U.S. Geological Survey Water-Resources Investigations 78-29.

Abstract. -- *The Tampa Reservoir Dam, constructed in 1945 on the lower Hillsborough River 10 miles above the mouth, provides 12.5 miles of natural channel storage for city water supply. Flow of the lower Hillsborough River and storage in Tampa Reservoir become deficient during annual dry periods. Excluding dead storage, Tampa Reservoir capacity is 2,000 million gallons at a maximum stage of 22.5 feet above mean sea level. For 20-year, annual-minimum-flow conditions, Hillsborough River flow is exceeded when the draft rate reaches 38 million gallons per day. In any year, at full capacity, Tampa Reservoir and Hillsborough River have a 5-percent chance of failing to supply at least 66 million gallons per day; and a 2-percent chance of failing to supply at least 59 million gallons per day.*

Runoff and effluent from agricultural, industrial, and urban areas enter the stream system above Tampa Reservoir. A wide range of chemical constituents, including nutrients, metals, herbicides, and pesticides analyzed in samples taken at the reservoir, are all below the maximum acceptable limits set by the U.S. Environmental Protection Agency for raw waters used for public supply. Water color exceeds the recommended level based on aesthetic considerations. The color is successfully removed through the treatment process at the Tampa water treatment plant.

Hammett, K. M., Turner, J. F., Jr., and Murphy, W. R., Jr., 1978, Magnitude and frequency of flooding on the Myakka River, southwest Florida: U.S. Geological Survey Water-Resources Investigations 78-65.

Abstract. -- *Tatum Sawgrass, a large surface depression in the Myakka River basin, formerly served as a natural detention area for Myakka River flood water overflow. A recently constructed (1974) dike system across the lower part of Tatum Sawgrass has reduced previously available storage, thereby affecting downstream flooding.*

An evaluation of the effects of Tatum Sawgrass dikes on flooding indicates that flood-peak discharges and flood heights having recurrence intervals of up to 25 years are increased. As a result, about 1,200 additional acres along Myakka River main stem may be inundated during 2-year flood conditions. Maximum effects include a 19 percent increase in flood-peak discharge at State Road 780 and a 0.8 foot increase in flood height near the downstream end of the study reach. Floods having recurrence intervals of 50 years or greater will overtop dikes and storage capacity in Tatum Sawgrass will revert to natural condition capacity.

Diked condition flood profiles, having recurrence intervals of 2, 5, 10, 25, 50, 100, 200, and 500 years were determined for the nontidal part *of a 45-mile reach of Myakka River main stem, Clay Gully, and Blackburn Canal. These data may be used by local governmental agencies to aid in flood-plain management and development.*

Hickey, J. J., 1979, Hydrogeologic data for the South Cross Bayou subsurface-injection test site, Pinellas County, Florida: U.S. Geological Survey Open-File Report 78-575.

Abstract. -- *One exploratory hole, a test injection well, and nine monitor wells were constructed at the South Cross Bayou test-injection site between January 1973 and October 1975. The exploratory hole was drilled to a depth of 3,280 feet below land surface. The test injection well, 856 feet distant from the exploratory hole, is uncased from 961 to 1,080 feet. Four of the monitor wells were constructed within the exploratory hole and range in depth from 520 to 1,224 feet and two of the monitor wells, within 140 feet of the exploratory hole, are 35 to 94 feet deep. The remaining three monitor wells are within 106 feet of the test injection well and range in depth from 250 to 800 feet.*

At the test site, the first 125 feet below land surface is predominantly limestone and clay; from 125 to 3,280 feet it is mostly limestone and dolomite. Gypsum is also present below 1,260 feet.

During the 33-hour withdrawal test in which well A1 was pumped at a rate of 5,000 gallons per minute, the water level in well B2, uncorrected for environmental factors and 856 feet from the pumped well, declined 0.9 foot, from 1.5 to 2.4 feet below mean sea level. During the 96-hour injection test, injection at an average rate of 4,350 gallons per minute, uncorrected water levels in well B2 rose 0.4 foot, from 2.0 feet to 1.6 feet below mean sea level. Well B2 is open to the injection test zone.

Water containing 19,000 milligrams per liter of chloride is estimated to be from a depth of about 370 feet below land surface. After completion of the injection test, the chloride concentration in water from well A2 decreased from 19,000 to 8,800 milligrams per liter. Chloride concentration in water from 16 additional wells near the test site and 25 to 302 feet deep, ranged from about 10 to 290 milligrams per liter.

Hickey, J. J., and Barr, G. L., 1979, Hydrogeologic data for the Bear Creek subsurface-injection test site, St. Petersburg, Florida: U.S. Geological Survey Open-File Report 78-853.

Abstract. -- *Lithologic, hydraulic, geophysical data, and chemical analyses of water from wells at the Bear Creek site are reported. Data were collected to determine the feasibility of subsurface injection of storm runoff. An exploratory hole and five observation wells were constructed between October 1974 and April 1976.*

The lithology of the upper 185 feet at the test site is predominantly sand and marl. From 185 feet to at least 3,504 feet below, the lithology is predominantly limestone and dolomite. Gypsum is also present below 1,290 feet. Vertical intrinsic permeability, porosity, and compressibility of cores are reported.

A 73-hour withdrawal test discharging 3,450 gallons per minute was run in the test injection well. At the site, chloride concentration in water from 192 to 1,267 feet, ranged from 150 to 20,000 milligrams per liter. Eleven additional wells near the test site were sampled for water quality.

Hickey, J. J., and Spechler, R. M., 1979, Hydrologic data for the southwest subsurface-injection test site, St. Petersburg, Florida: U.S. Geological Survey Open-File Report 78-852.

Abstract. -- *Three injection wells, A1, A2, and A3, and nine observation wells, B1 through B9, were constructed at the Southwest St. Petersburg site to determine feasibility of injecting wastewater treatment plant effluent into permeable zones containing saline water. Two withdrawal tests and one injection test were performed. Both withdrawal tests ran for about 3 days, one discharging 650 gallons per minute from well B8; the other discharging 6,490 gallons per minute from test well A3. The injection test was run in A3 for 91.1 days at an average rate of 2,830 gallons per minute. Injection well pressure reached a maximum of 48.1 pounds per square inch near the end of the test. Rhodamine WT was used as a tracer during the injection test and was identified in wells B3, B6, and B7. Before the injection test, chloride concentration in well B6, 35 feet distant from the injection well, and in well B3, 733 feet distant, ranged from 19,000 to 21,000 milligrams per liter. At the end of the test, chloride concentration in B6 was 1,800 milligrams per liter and in B3 was 5,400 milligrams per liter. Eleven wells near the site were sampled before the test for water-quality analyses and chlorides ranged from 18 to 1,400 milligrams per liter.*

Lopez, M. A., and Michaelis, D. M., 1979, Hydrologic data from urban watersheds in the Tampa Bay area, Florida: U.S. Geological Survey Water-Resources Investigations 78-125.

Abstract. -- *Hydrologic data are being collected in 10 urbanized watersheds located in the Tampa Bay area, Florida. The gaged watersheds have impervious areas that range from 19 percent for a residential watershed in north Tampa to nearly 100 percent for a downtown Tampa watershed. Land-use types, including roads, residential, commercial, industrial, institutional, recreational, and open space, have been determined for each watershed. Rainfall and storm runoff data collected since 1971 for one site and since 1975 for six other sites through September 1976, have been processed. These data are recorded at 5-minute intervals and are stored in the U.S. Geological Survey WATSTORE unit values file. Daily rainfall at 12 sites and daily pan evaporation at one site have been stored in the WATSTORE daily values file.*

Chemical and biological analyses of storm runoff for six sites, base flow for seven sites, and analyses of bottom material for seven sites are also stored in the WATSTORE water-quality file.

Rainfall and storm runoff for selected storms, daily rainfall, and daily pan-evaporation data are summarized in this report. Water-quality analyses of all water-quality samples are also listed.

Murphy, W. R., Jr., 1978, Flood profiles for lower Brooker Creek, west-central Florida: U.S. Geological Survey Water-Resources Investigations 77-115.

Abstract. -- *Flood profiles are included in this report for selected recurrence-interval floods for a 12.6-mile reach of lower Brooker Creek. Flood heights are provided for other recurrence-interval floods for which flood profiles were not presented.*

The procedure for determining flood profiles, outlined in the report, is based on flood heights computed in a step-backwater analysis using the following data: 2-, 2.33-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence-interval flood-peak discharges; 106 stream-channel cross sections (including roughness coefficients); and stage-discharge relations. Computed flood heights are judged to be generally accurate to about ± 0.5 foot.

Resulting flood-profile data can be used to delineate areal extent of flooding on topographic maps. This information can be used by local governmental agencies to control flood-plain development and minimize possible future flood losses.

Murphy, W. R., Jr., 1978, Flood profiles for Cypress Creek, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-8.

Abstract. -- *Flood profiles are included in this report for selected recurrence-interval floods for a 27-mile reach of Cypress Creek, for a 4-mile tributary reach, and for a 1.2-mile distributary reach.*

The procedure for constructing flood profiles is based on flood heights computed in a step-backwater analysis using the following data: 2-, 2.33-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year flood-peak discharges; data for 53 Cypress Creek channel cross sections, 11 tributary cross sections, and 7 distributary cross sections (including roughness coefficients); and stage-discharge relations. Computed flood heights are judged to be generally accurate to plus-or-minus 0.5 foot.

Flood data presented can be used to delineate areal extent of flooding on topographic maps. This information can be used by local governmental agencies to control flood-plain development and thereby minimize possible future losses from floods.

Murphy, W. R., Jr., Hammett, K. M., and Reeter, C. V., 1978, Flood profiles for Peace River, south-central Florida: U.S. Geological Survey Water-Resources Investigations 78-57.

Abstract. -- *This report presents flood heights and profiles for a 70-mile reach of Peace River from Bartow to Arcadia. The flood heights* *were calculated using the U.S. Geological Survey step-backwater model. Profiles were prepared for floods having expected recurrence intervals of 2, 2.33, 5, 10, 25, 50, 100, 200, and 500 years.*

Flood-peak discharges used in the step-backwater analyses were determined by weighting stream gaging station data with data from a regional analysis. Land-surface elevation data for 183 cross sections (including values of Manning's roughness coefficient) were also used in the backwater analyses.

Flood-height data are judged to be generally accurate to ±0.5 foot. They indicate that most roads and two bridges in the study reach will be inundated by some of the floods evaluated.

Reichenbaugh, R. C., Brown, D. P., and Goetz, C. L., 1979, Results of testing landspreading of treated municipal wastewater at St. Petersburg, Florida: U.S. Geological Survey Water-Resources Investigations 78-110.

Abstract. -- *Chlorinated secondary-treated effluent was used to irrigate a grassed 4-acre site at rates of 2 and 4 inches per week for periods of 11 and 14 weeks, respectively. Part of the site was drained by tile lines 5 feet below land surface. Chemical and bacteriological changes in the acidic ground water in the shallow sand aquifer and in the effluent from the drains were studied.*

Irrigation of the drained plot resulted in rapid passage of the applied wastewater through the soil and poor nitrogen removal. The rapid percolation permitted nitrification but prevented denitrification. Thus, the effluent from the drains contained as much as 5.2 milligrams per liter nitrate nitrogen. Irrigation of the undrained plot resulted in more extensive nitrogen removal.

Total phosphorus in the shallow ground water on the site and in the effluent from the drains increased from 1.4 milligrams per liter before irrigation to as much as 5 milligrams per liter in the ground water 5 feet below land surface.

Concentrations of nitrogen and phosphorus did not increase in ground water downgradient from the site, although increased chloride concentrations demonstrated downgradient migration of the applied wastewater.

Prior to irrigation, total coliform were not detected in ground water at the site. After irrigation, total and fecal coliforms were detected in ground water at the site and downgradient. The nitrifying bacteria Nitrosomonas and Nitrobacter were present at the irrigated site in greatest numbers at the soil surface; their numbers decreased with depth.

Robertson, A. F., Mills, L. R., and Parsons, D. C., 1978, Ground water withdrawn for municipal, industrial, and irrigation use in the upper Peace and Alafia River basins, west-central Florida, 1970-74: U.S. Geological Survey Open-File Report 78-29.

Abstract. -- *Quantities of ground water withdrawn for municipal, industrial, and irrigation use in the upper Peace and Alafia River basins*

during 1970-74 are listed in this report. Within the 1,160 square mile study area, the principal source of ground water is the Floridan aquifer.

The several methods of determining the quantities of ground water withdrawn are metering water use, relating measured well discharge to power consumption or to pumping time, and relating water use to phosphate production and to citrus irrigation or processing. About 90 percent of the study area is metered. The annual municipal pumpage increased from 11,165 million gallons in 1970 to 13,455 million in 1974. Water use per ton of phosphate produced is estimated to be 3,320 gallons per ton before 1971 and 2,460 gallons per ton from 1971 through 1974. Citrus irrigation pumpage--estimated by extrapolating the water quantities applied on pilot areas to unmeasured areas--declined from 33.4 billion gallons in 1970 to 31.3 billion in 1974. The citrus processing industry used about 4.9 billion gallons in 1970 and about 5.9 billion in 1974.

Ryder, P. D., 1978, Model evaluation of the hydrogeology of the Cypress Creek well field in west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-79.

Abstract. -- The Cypress Creek well field is being developed to help supply a rapidly growing population in west-central Florida. Planned withdrawals from the area could eventually exceed 60 million gallons per day.

The ground-water system in the Cypress Creek well-field area consists of a surficial sand aquifer, a semiconfining clay layer ranging from 2 to 25 feet in thickness, and a sequence of carbonate rocks, approximately 1,000 feet thick, called the Floridan aquifer.

All recharge to the Floridan aquifer in the local area is derived from the overlying surficial sand aquifer by downward percolation through the semiconfining clay bed. Part of this recharge is returned to the surficial deposits within the area as upward leakage, and most of the remainder leaves the area as it flows downgradient within the Floridan aquifer.

The major proportion of water supplied to municipal wells open to the Floridan aquifer comes from a dolomitic section of the Avon Park Limestone containing two major cavernous zones. These zones are at approximately 400 feet and 500 feet below sea level in the well-field area.

The hydrogeology of the well-field area was evaluated by digital model simulation. A two-dimensional finite-difference model was calibrated by simulating natural steady-flow conditions for September 16, 1974. The leakance of the semiconfining layer was the main hydrologic parameter that was varied to achieve a satisfactory calibration. Leakance values (the ratio of hydraulic conductivity to confining-bed thickness) derived from the model were mapped for a 120-square-mile area encompassing the well field. Values ranged from about 10^{-6} to 10^{-2} cubic foot per day per foot. The values encompass the range of estimates obtained from aquifer tests in the area.

Model runs were made to analyze sensitivity of the model to variations in selected parameters. Tests were also run to determine the reliability of the parameter estimates used in the calibration. The tests indicated that parameter estimates could be improved in certain areas by

(1) locating observation wells away from areas of large irrigation pumping effects, (2) defining the thickness and water-level configuration of the surficial aquifer in the area northeast of the well field, and (3) obtaining data on hydraulic characteristics in the Floridan aquifer in areas where the head difference between the surficial and Floridan aquifers is minimal, by means of aquifer tests.

The model was tested further by attempting to simulate the potentiometric surface of the Floridan aquifer under actual pumping stresses during the January 1976 dry period. The model could not effectively simulate the hydrologic system under these conditions because of the requirement of fixed water levels in the surficial aquifer. Therefore, a quasi-three-dimensional model was used to simulate the system with declining water levels in the surficial aquifer. These model results indicate the need for better estimates of aquifer characteristics and water-level configuration for the surficial aquifer in the entire modeled area. The use of the three-dimensional model for future predictive analysis for water management will necessitate expansion and redefinition of the boundaries of the model and estimation of new model parameters for the additional area that will be affected by the large-scale withdrawals.

Ryder, P. D., and Mills, L. R., 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1977: U.S. Geological Survey Open-File Report 78-311.

Abstract. -- The coastal parts of Pasco, Pinellas and Hillsborough Counties are undergoing extensive urban development. The Floridan aquifer is the area's principal water supply. Potentiometric and water-table maps were prepared in order to determine the effect of ground-water withdrawals in selected well fields in west-central Florida.

These maps were prepared in September 1977 to capture the annual high-water-level period. Water levels generally rose in the well fields in response to recharge from summer rains and the cessation of irrigation.

Ryder, P. D., Mills, L. R., and Laughlin, C. P., 1978, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District and adjacent areas, September 1977: U.S. Geological Survey Open-File Report 78-9.

Abstract. -- A September 1977 potentiometric-surface map of the Southwest Florida Water Management District depicts the annual high water-level period.

Potentiometric levels increased 15-30 feet between May 1977 and September 1977, in the citrus and farming section of southeastern Hillsborough, northern Hardee, and southwestern Polk Counties. These areas are widely affected by pumpage for irrigation and have the greatest range in water-level fluctuations between the low and high water-level periods. Water-level rises in coastal, northern and southern areas of the Water Management District ranged from 0-15 feet.

Sinclair, W. C., 1978, Preliminary evaluation of the water-supply potential of the spring-river system in the Weeki Wachee area and the lower Withlacoochee River, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-74.

Abstract. -- *Coastal springs and seeps, including Rainbow Springs, a tributary of Withlacoochee River, discharge as much as a billion gallons of water per day to low-lying coastal swamps and estuarine marshes along the Gulf Coast of Citrus and Hernando Counties. The springs discharge water from a part of the Floridan aquifer which underlies about 3,400 square miles of west-central Florida.*

Although Weeki Wachee Spring has long been regarded as a source of freshwater supply, long-term diversion of large volumes of water from Weeki Wachee River will cause encroachment of brackish water throughout the residential canals in the lower reach of the river to about 4.4 miles below Weeki Wachee Spring. Short-term diversion of 50 cubic feet per second are feasible during periods when spring discharge is above 200 cubic feet per second.

Weeki Wachee Spring is analogous to a flowing well tapping an artesian aquifer. Analysis of ground-water flow in the vicinity of the spring suggests a transmissivity of about 2.1 million feet squared per day. Other solution cavities near Weeki Wachee may have equally large potential for ground-water development with minor effects on Weeki Wachee Spring and River. Withdrawal of 50 cubic feet per second from Eagle's Nest Sink, for example, would diminish the flow from Weeki Wachee Spring by about 15 cubic feet per second.

Flow characteristics of Withlacoochee River and Rainbow Springs indicate that about 600 cubic feet per second is available on a perennial basis, disregarding the downstream requirements for control of saltwater encroachment. About 500 cubic feet per second is sufficient to maintain the freshwater-saltwater interface within its present range in the lower Withlacoochee River. An additional 23 cubic feet per second is necessary to offset evaporation loss from Lake Rousseau. Allowing 523 cubic feet per second for the above, low-flow analysis of the discharge records indicates that, with a 25-year recurrence interval, during a 90-day low-flow period, the flow available for diversion would average about 200 cubic feet per second.

Sinclair, W. C., 1979, Field data from an observation well in Hillsborough Bay near Tampa, Florida, drilled March 14 to April 5, 1978: U.S. Geological Survey Open-File Report 78-984.

Abstract. -- *An observation well was drilled in Hillsborough Bay to determine the lithologic and hydrologic character of deposits which comprise the bay bottom and the underlying limestone.*

Tampa Limestone is the first consolidated rock at the site and underlies about 38 feet of unconsolidated sediments. The upper 20 feet of the Tampa Limestone is relatively permeable; from about 57 to 130 feet below mean low tide a section of low permeability occurs. The Suwannee Limestone is separated from the Tampa at 130 feet by about a foot of dense

chert. Permeability of that section of Suwannee Limestone penetrated is relatively high. A clay layer in the Hawthorn Formation, which forms a confining bed atop the limestones of the Floridan aquifer in adjacent shoreline areas, is not present at the well site.

On May 15, 1978, the water level in the well, corrected for density, was about 0.39 feet below mean sea level. Quality of water from the aquifer, at the site, is similar to that in Hillsborough Bay.

Sinclair, W. C., 1979, Test data from the chloride-monitor well at Sun City Center, Hillsborough County, Florida: U.S. Geological Survey Open-File Report 78-1030.

Abstract. -- A test well drilled for Southwest Florida Water Management District at Sun City Center in Hillsborough County, will serve to monitor the interface between freshwater in the aquifer and the underlying chloride water.

The sulfate content of the water in the aquifer at the well site exceeds 250 milligrams per liter below a depth of about 700 feet. Wells for domestic and public supply in the area bottom at less than 500 feet and are separated from the sulfate water by about 100 feet of poorly-permeable limestone.

The freshwater-chloride water interface is quite sharp and occurs at a depth of 1,410 feet. The chloride water is similar in composition to seawater but nearly twice as saline.

Stewart, J. W., Goetz, C. L., and Mills, L. R., 1978, Hydrogeologic factors affecting the availability and quality of ground water in the Temple Terrace area, Hillsborough County, Florida: U.S. Geological Survey Water-Resources Investigations 78-4.

Abstract. -- Ground water occurs in two aquifers in the Temple Terrace area. The lower one is the artesian Floridan aquifer; the upper is the water-table aquifer.

The Floridan aquifer is a thick sequence of limestone and dolomite layers which include several permeable zones that generally are treated as a single hydrologic unit. The top of the Tampa Limestone is considered to be the top of the Floridan aquifer in the Temple Terrace area. There, the top of the Tampa Limestone generally ranged from 20 feet above mean sea level to 60 feet below. The public supply wells of the city of Temple Terrace tap the Tampa Limestone and the underlying Suwannee Limestone, in the upper part of the Floridan aquifer. The transmissivity of the Floridan aquifer is estimated to be about 1.3×10^5 square feet per day and the storage coefficient to be about 3.4×10^{-4} on the average. The general direction of ground-water movement in the Floridan aquifer is from north to south but within the city the direction of movement is from northeast to southwest. The quantity of water moving southwest through a 1.8-mile-wide section of the aquifer is about 2.7 million gallons per day. Ample supplies of water are available for additional development from the Floridan in the Temple Terrace area.

The water-table aquifer consists of fine to medium sand, sandy clay, clayey sand, and clay. The thickness of the water-table aquifer generally ranges from 20 to 80 feet. The vertical hydraulic conductivity of the material making up the water-table aquifer ranges from 5.2×10^{-5} to 8.4 feet per day, and the horizontal hydraulic conductivity is about 13 feet per day. The aquifer is not used as a source of water for public supplies.

Coliform bacteria indicate degradation of water quality in the Floridan aquifer at three of the city wells. The specific source of the coliform bacteria in water from these three wells was not determined; however, disposal of sewage by septic tank systems introduces large quantities of coliform bacteria into the surficial sediments and into the water-table aquifer. High concentrations of these organisms also are found in surface waters, including sinkholes, in the Temple Terrace area. Colored water has also degraded the quality of the water supplies from these three wells. The source of the color is surface water which enters the Floridan aquifer and moves through solution channels in the interval between 120 and 180 feet below land surface, in a cavernous limestone considered to be the most productive water-yielding zone in the aquifer.

Turner, J. F., Jr., 1979, Streamflow simulation studies of the Hillsborough, Alafia, and Anclote Rivers, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-102.

Abstract. -- A modified version of the Georgia Tech Watershed model was applied to the Hillsborough, Alafia, and Anclote Rivers of west-central Florida. The model was calibrated for five gaged points in these basins using 4 years of historical and current rainfall, runoff, and evapotranspiration data. Modeled watersheds range in size from about 70 to 650 square miles.

Calibration results are evaluated using regression analyses of (1) observed and synthesized flood hydrographs (peaks and volumes) from calibration study and (2) long-term observed annual flood-peak discharges and peak discharges synthesized from historical rainfall records available (1950-72) for two rain gages bordering the study area. Results of these analyses indicate that correlation coefficients of calibration data range from 0.86 to 0.98 (peaks) and 0.88 to 0.95 (volumes); correlation coefficients of long-term data range from 0.51 to 0.74 (peaks). Most correlation coefficients were found to be significant at a 1-percent probability level.

Standard errors of estimate for calibration data range from 17 to 36 percent (peaks) and 23 to 41 percent (volumes); standard errors for long-term data range from 30 to 42 percent (peaks).

Turner, J. F., Jr., Murphy, W. R., Jr., and Reeter, C. V., 1979, Flood profiles for Pithlachascotee River, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-100.

Abstract. -- *Data defining the magnitude and frequency of flooding are provided for a non-tidal 16-mile reach of the Pithlachascotee River. These data include areal flood-frequency relations and flood heights for the 2-, 2.33-, 5-, 10-, 25-, 50-, 100-, 200-, and 500-year recurrence intervals. Flood profiles are provided for the 2.33-, 5-, 10-, 100-, and 500-year recurrence intervals.*

Study results indicate that flood discharges in the study area are highly variable and are one-third to one-half of regional estimates. Differences between study area and regional estimates are due to large quantities of flood-water drainage to the regional aquifer system in the upper basin, a large karst area of about 138 square miles. Graded roads and bridges located at three sites along the upper study reach will be inundated by various frequency floods.

Flood inundation maps can be prepared from flood data presented in this report.

Wolansky, R. M., 1978, Feasibility of water-supply development from the unconfined aquifer in Charlotte County, Florida: U.S. Geological Survey Water-Resources Investigations 78-26.

Abstract. -- *The unconfined aquifer in Charlotte County contains some potable water over most of the area, and represents a potential source of water supply to help satisfy the increasing demands of development. The unconfined aquifer extends throughout the county and averages about 35 feet thick; it is composed of sand, marl, shells, and limestone. A sequence of clay with an average thickness of about 40 feet separates the unconfined aquifer from the underlying confined (artesian) aquifers.*

An estimated 150 billion cubic feet of relatively good quality water is stored in the unconfined aquifer in Charlotte County. The transmissivity of the unconfined aquifer averages about 500 square feet per day, ranging from about 100 to 7,000 square feet per day. The specific yield of the unconfined aquifer is estimated to be about 0.25.

Although recharge of the unconfined aquifer is primarily from rainfall, a significant amount of recharge occurs by upward movement of water from the underlying confined aquifers through abandoned and flowing irrigation wells. The average annual recharge is estimated at about 12 inches per year, and ranges from less than 1 inch to 16 inches per year, depending on the permeability and thickness of aquifer material and the topography.

The chemical quality of the water in the unconfined aquifer is variable. Except in tidal areas and where brackish water enters the aquifer from wells that tap the confined aquifers, however, the chloride concentration of water from the unconfined aquifer generally is less than 50 milligrams per liter. In water from some wells, concentrations of dissolved iron and color exceed the limits established by the U.S. Environmental Protection Agency. Both iron and color are easily removed from water as part of the water treatment process, however.

Cape Haze and Gasparilla Island well fields are the only water-supply facilities presently (1977) withdrawing from the aquifer. Their total withdrawal is about 0.43 million gallons per day. About 1,000 pri-

vate and industrial wells pump about 2 to 4 million gallons per day. Average well yield throughout Charlotte County is about 10 to 30 gallons per minute.

The area of greatest potential yield is located east of Telegraph Swamp in eastern Charlotte County. The unconfined aquifer in this area can be developed by constructing conventional wells, collector wells, or tile drains. The amount of water that could be salvaged by capturing natural water loss (evaporation and runoff) of 12 inches annually is about 14 million gallons per day for a 25-square-mile area.

Wolansky, R. M., Mills, L. R., and Woodham, W. M., 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1978: U.S. Geological Survey Open-File Report 78-939.

Abstract. -- The coastal parts of Pasco, Pinellas, Hillsborough, and Sarasota Counties in west-central Florida are undergoing extensive urban and suburban development. The Floridan aquifer is the principal water supply in the area. Potentiometric and water-table maps were prepared in order to determine the effect of ground-water withdrawals in selected well fields in the area.

The maps show the water levels in May 1978 to coincide with the annual low water-level period. Water levels generally declined in the well fields in response to an increase in pumpage.

Wolansky, R. M., Mills, L. R., and Woodham, W. M., 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1978: U.S. Geological Survey Open-File Report 78-1045.

Abstract. -- The water table in the surficial aquifer and the potentiometric surface of the Floridan aquifer in a 1,200-square-mile area in west-central Florida are mapped semiannually by the U.S. Geological Survey. The maps are based on water levels measured in wells each May, to coincide with seasonal low levels, and each September, to coincide with seasonal high levels.

The mapped area includes 11 well fields which supplied 107.5 million gallons to municipalities on September 26, 1978. The water is withdrawn from the Floridan aquifer, the major aquifer in Florida. The effect of localized withdrawal of ground water is shown on the maps as depressions in both the potentiometric and water-table surfaces.

Water levels were generally higher in September 1978 than in May 1978 because of seasonal rainfall. However, water levels were lower in well fields with significant increases in pumpage. These changes ranged from a decrease of 5 feet to an increase of 20 feet.

Wolansky, R. M., Mills, L. R., Woodham, W. M., and Laughlin, C. P., 1978, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, May 1978: U.S. Geological Survey Open-File Report 78-720.

Abstract. -- *A May 1978 potentiometric-surface map of the Southwest Florida Water Management District depicts the annual low water-level period.*

Potentiometric levels declined as much as 25 feet between September 1977 and May 1978 in the citrus and farming sections of southeastern Hillsborough, northwestern Hardee, and northern Manatee Counties. These areas are widely affected by pumpage for irrigation and have the greatest range in water-level fluctuations between the low and high water-level periods. Water-level declines in coastal, northern and southern areas of the Water Management District ranged from 0-15 feet.

Wolansky, R. M., Mills, L. R., Woodham, W. M., and Laughlin, C. P., 1978, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, September 1978: U.S. Geological Survey Open-File Report 78-1035.

Abstract. -- *A September 1978 potentiometric-surface map of the Southwest Florida Water Management District depicts the annual high water-level period.*

Potentiometric levels increased 10-25 feet between May 1978 and September 1978, in the citrus and farming sections of southern Hillsborough, northern Hardee, southwestern Polk and Manatee Counties. These areas are widely affected by pumping for irrigation and have the greatest range in water-level fluctuations between the low and high water-level periods. Water-level rises in coastal, northern and southern areas of the Water Management District ranged from 0-10 feet.

REPORTS RELEASED SINCE 1933

This section lists reports published by the U.S. Geological Survey during the period 1933-78 that concern the Southwest Florida Water Management District. The reports are listed according to categories of investigations described in the section "Summary of Water-Resources Investigations."

1. Areal Assessment

Barrachlough, J. T., and Marsh, O. T., 1962, Aquifers and quality of ground water along the gulf coast of western Florida: Florida Geological Survey Report of Investigation 29.

Bishop, E. W., 1956, Geology and ground-water resources of Highlands County, Florida: Florida Geological Survey Report of Investigation 15.

Bredehoeft, J. D., Papadopulos, S. S., and Stewart, J. W., 1965, Hydrologic effects of ground-water pumping in northwest Hillsborough County, Florida: U.S. Geological Survey Open-File Report FL-65001.

Buono, Anthony, Causseaux, K. W., and Moore, J. E., 1978, Summary of U.S. Geological Survey investigations and hydrologic conditions in the Southwest Florida Water Management District for 1977: U.S. Geological Survey Open-File Report 78-331.

Buono, Anthony, Rutledge, A. T., and Wolansky, R. M., 1978, Configuration of the top of the Floridan aquifer, Southwest Florida Water Management District and adjacent areas: U.S. Geological Survey Open-File Report 78-34.

Cathcart, J. B., 1963, Economic geology of the Chicora quadrangle, Florida: U.S. Geological Survey Bulletin 1162-A, p. A1-A66.

______ 1963, Economic geology of the Keysville quadrangle, Florida: U.S. Geological Survey Bulletin 1128.

______ 1963, Economic geology of the Plant City quadrangle, Florida: U.S. Geological Survey Bulletin 1142-D, p. D1-D56.

______ 1964, Economic geology of the Lakeland quadrangle, Florida: U.S. Geological Survey Bulletin 1162-G, p. G1-G128.

______ 1966, Economic geology of the Fort Meade quadrangle, Polk and Hardee Counties, Florida: U.S. Geological Survey Bulletin 1207.

Cherry, R. N., Stewart, J. W., and Mann, J. A., 1968, General hydrology of the middle gulf area, Florida: Florida Geological Survey Report of Investigation 56.

Clark, W. E., 1964, Possibility of salt-water leakage from proposed Intra-coastal Waterway near Venice, Florida, well field: Florida Geological Survey Report of Investigation 38.

Coble, R. W., 1974, The Anclote and Pithlachascotee Rivers as water-supply sources: Florida Bureau of Geology Map Series 61.

Coker, A. E., 1968, Application of remote sensing to occurrence of collapse sinkholes in the Alafia and Peace River Basins, Florida, in Earth Resources Aircraft Program, Status Review: National Aeronautics and Space Administration, v. 3, sec. 22A, 14 p.

Duerr, A. D., 1975, The potentiometric surface and water quality of the Floridan aquifer in southwest Hillsborough County, Florida, 1952-74: U.S. Geological Survey Water-Resources Investigations 50-75.

Faulkner, G. L., 1972, Mid-1971 ground-water conditions in Yankeetown well field, Levy County, Florida: U.S. Geological Survey Open-File Report FL-72001.

______ 1972, Ground-water conditions in the lower Withlacoochee River--Cross-Florida Barge Canal complex: U.S. Geological Survey Water-Resources Investigations 4-72.

______ 1973, Geohydrology of the Cross-Florida Barge Canal area with special reference to the Ocala vicinity: U.S. Geological Survey Water-Resources Investigations 1-73.

Healy, H. G., 1975, Potentiometric surface and areas of artesian flow of the Floridan aquifer in Florida: Florida Bureau of Geology Map Series 73.

______ 1976, Terrace map of Florida: Florida Bureau of Geology Map Series 71.

Heath, R. C., and Smith, P. C., 1954, Ground-water resources of Pinellas County, Florida: Florida Geological Survey Report of Investigation 12.

Hughes, G. H., Hampton, E. R., and Tucker, D. F., 1971, Annual and seasonal rainfall in Florida: Florida Bureau of Geology Map Series 40.

Hunn, J. D., and Cherry, R. N., 1969, Remote sensing of offshore springs and spring discharge along the Gulf Coast of central Florida, in Second Annual Earth Resources Aircraft Program, Status Review: National Aeronautics and Space Administration, v. 3, Hydrology and Oceanography, sec. 39, 7 p.

Hutchinson, C. B., 1977, Appraisal of shallow ground-water resources and management alternatives in the upper Peace and Eastern Alafia River Basins, Florida: U.S. Geological Survey Water-Resources Investigations 77-124.

Hutchinson, C. B., and Mills, L. R., 1976, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1976: U.S. Geological Survey Open-File Report 77-257.

Hutchinson, C. B., and Wilson, W. E., 1974, Evaluation of a proposed connector well, northeastern DeSoto County, Florida: U.S. Geological Survey Water-Resources Investigations 5-74.

Joyner, B. F., and Sutcliffe, Horace, Jr., 1976, Water resources of Myakka River basin area, Florida: U.S. Geological Survey Water-Resources Investigations 76-58.

Kaufman, M. I., 1967, Hydrologic effects of ground-water pumpage in the Peace and Alafia River basins, Florida: Florida Geological Survey Report of Investigation 46.

Kaufman, M. I., and Dion, N. P., 1968, Ground-water resources data, Charlotte, DeSoto, and Hardee Counties, Florida: Florida Geological Survey Information Circular 53.

Knochenmus, D. D., 1967, Tracer studies and background fluorescence of ground water in the Ocala, Florida area: U.S. Geological Survey Open-File Report FL-67004.

______ 1971, Ground water in Lake County, Florida: Florida Bureau of Geology Map Series 44.

Knochenmus, D. D., and Hughes, G. H., 1976, Hydrology of Lake County, Florida: U.S. Geological Survey Water-Resources Investigations 76-72.

Kohout, F. A., and Meyer, F. W., 1959, Hydrologic features of the Lake Istokpoga and Lake Placid areas, Highlands County, Florida: Florida Geological Survey Report of Investigation 19.

Menke, C. G., Meredith, E. W., and Wetterhall, W. S., 1961, Water resources of Hillsborough County, Florida: Florida Geological Survey Report of Investigation 25.

Mills, L. R., Duerr, A. D., and Buono, Anthony, 1975, Potentiometric surface of the Floridan aquifer, May 1975; well field pumpage; and selected hydrographs; Hillsborough County, Florida: U.S. Geological Survey Open-File Report 75-618.

Mills, L. R., and Laughlin, C. P., 1976, Potentiometric surface of the Floridan aquifer, May 1975, and change of the potentiometric surface, 1969 to 1975, Southwest Florida Water Management District and adjacent areas: U.S. Geological Survey Water-Resources Investigations 76-80.

Mills, L. R., Laughlin, C. P., and Parsons, D. C., 1976, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District, September 1975: U.S. Geological Survey Open-File Report 76-003.

Motz, L. H., 1974, The hydrologic effects of the Tampa By-Pass Canal: Florida Bureau of Geology Report of Investigation 82.

Parker, G. G. and others, 1955, Water resources of southeastern Florida, with special reference to the geology and ground water of the Miami area: U.S. Geological Survey Water-Supply Paper 1255.

Pascale, C. A., 1975, Estimated yield of fresh-water wells in Florida: Florida Bureau of Geology Map Series 70.

Peek, H. M., 1951, Cessation of flow of Kissengen Spring, Polk County, Florida: Florida Geological Survey Report of Investigation 7, pt. 3.

______ 1958, Ground-water resources of Manatee County, Florida: Florida Geological Survey Report of Investigation 18.

______ 1959, The artesian water of the Ruskin area of Hillsborough County, Florida: Florida Geological Survey Report of Investigation 21.

Peek, H. M., and Anders, R. B., 1955, Interim report on the ground-water resources of Manatee County, Florida: Florida Geological Survey Information Circular 6.

Pride, R. W., Meyer, F. W., and Cherry, R. N., 1961, Interim report on the hydrologic features of the Green Swamp area in central Florida: Florida Geological Survey Information Circular 26.

______ 1966, Hydrology of the Green Swamp area in central Florida: Florida Geological Survey Report of Investigation 42.

Purdue, C. L., Jr., 1968, Summary report on the geological mineral resources of the Passage Key, Island Bay, Cedar Key, and Pelican Island National Wildlife Refuges, Florida: U.S. Geological Survey Bulletin 1260-O, p. O1-O13.

Robertson, A. F., 1973, Hydrologic conditions in the Lakeland Ridge area of Polk County, Florida: Florida Bureau of Geology Report of Investigation 64.

______ 1978, Flood profiles of the Alafia River, west-central Florida, computed by step-backwater method: U.S. Geological Survey Water-Resources Investigations 77-74.

Robertson, A. F., and Mallory, M. J., 1977, A digital model of the Floridan aquifer, Tampa Bay area, Florida: U.S. Geological Survey Water-Resources Investigations 77-64.

Robertson, A. F., and Mills, L. R., 1975, Ground-water withdrawals in the upper Peace and upper Alafia River basins, Florida: Florida Bureau of Geology Map Series 67.

Robertson, A. F., Mills, L. R., and Parsons, D. C., 1978, Ground water withdrawn for municipal, industrial, and irrigation use in the upper Peace and Alafia River basins, west-central Florida, 1970-74: U.S. Geological Survey Open-File Report 78-29.

Rosenau, J. C., and Faulkner, G. L., 1974, An index to springs of Florida: Florida Bureau of Geology Map Series 63.

Rutledge, A. T., and Grubb, H. F., 1978, Hydrogeologic maps of a flood detention area proposed by Southwest Florida Water Management District, Green Swamp area: U.S. Geological Survey Water-Resources Investigations 78-460.

Ryder, P. D., 1978, Model evaluation of the hydrogeology of the Cypress Creek well field in west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-79.

Ryder, P. D., Laughlin, C. P., and Mills, L. R., 1976, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District, September 1976: U.S. Geological Survey Open-File Report 77-353.

______ 1977, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District, May 1977: U.S. Geological Survey Open-File Report 77-552.

Ryder, P. D., and Mills, L. R., 1977, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1976: U.S. Geological Survey Open-File Report 77-551.

______ 1977, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1977: U.S. Geological Survey Open-File Report 77-642.

______ 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1977: U.S. Geological Survey Open-File Report 78-311.

Ryder, P. D., Mills, L. R., and Laughlin, C. P., 1978, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District and adjacent areas, September 1977: U.S. Geological Survey Open-File Report 78-9.

Sinclair, W. C., 1974, Hydrogeologic characteristics of the surficial aquifer in northwest Hillsborough County, Florida: Florida Bureau of Geology Information Circular 86.

______ 1977, Experimental study of artificial recharge alternatives in northwest Hillsborough County, Florida: U.S. Geological Survey Water-Resources Investigations 77-13.

______ 1978, Preliminary evaluation of the water-supply potential of the spring-river system in the Weeki Wachee area and the lower Withlacoochee River, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-74.

Stewart, H. G., Jr., 1959, Interim report on the geology and ground-water resources of northwestern Polk County, Florida: Florida Geological Survey Information Circular 23.

______ 1966, Ground-water resources of Polk County: Florida Geological Survey Report of Investigation 44.

Stewart, J. W., 1968, Hydrologic effects of pumping from the Floridan aquifer in northwest Hillsborough, northeast Pinellas, and southwest Pasco Counties, Florida: U.S. Geological Survey Open-File Report FL-68005.

______ 1968, Use of remote sensors in classifying lakes in west-central Florida, in Earth Resources Aircraft Program, Status Review: National Aeronautics and Space Administration, v. 3, sec. 22B, 11 p.

______ 1978, Areas of recharge to the Floridan aquifer in Florida: Florida Bureau of Geology Map Series.

Stewart, J. W., Laughlin, C. P., and Mills, L. R., 1976, Potentiometric surface of the Floridan aquifer, Southwest Florida Water Management District, May 1976: U.S. Geological Survey Open-File Report 76-004.

Stewart, J. W., Mills, L. R., Knochenmus, D. D., and Faulkner, G. L., 1971, Potentiometric surface and areas of artesian flow, May 1969, and change of potentiometric surface 1964 to 1969, Floridan aquifer, Southwest Florida Water Management District, Florida: U.S. Geological Survey Hydrologic Investigation Atlas HA-440.

Stringfield, V. T., 1933, Ground-water resources of Sarasota County, Florida, and exploration of artesian wells in Sarasota County, Florida: Florida Geological Survey, in 23rd-24th Annual Report.

Sutcliffe, Horace, Jr., 1975, Appraisal of the water resources of Charlotte County, Florida: Florida Bureau of Geology Report of Investigation 78.

Sutcliffe, Horace, Jr., and Joyner, B. F., 1968, Test well exploration in the Myakka River basin area, Florida: Florida Geological Survey Information Circular 56.

Tibbals, C. H., 1975, Aquifer tests in the summit reach of the proposed Cross-Florida Barge Canal near Ocala, Florida: U.S. Geological Survey Water-Resources Investigations 28-75.

Vernon, R. O., 1973, Top of the Floridan artesian aquifer: Florida Bureau of Geology Map Series 56.

Visher, F. N., and Hughes, G. H., 1969 (revised 1975), The difference in rainfall and potential evaporation in Florida: Florida Bureau of Geology Map Series 32.

Wilson, W. E., 1972, Hydrogeology of Florida's largest citrus grove: American Society of Civil Engineers, Irrigation and Drainage Division Speciality Conference proceedings, p. 293-307.

______ 1975, Ground-water resources of DeSoto and Hardee Counties, Florida: Florida Bureau of Geology Report of Investigation 83.

______ 1977, Simulated changes in ground-water levels resulting from proposed phosphate mining, west-central Florida--preliminary results: U.S. Geological Survey Open-File Report 77-882.

Wolansky, R. M., 1978, Feasibility of water-supply development from the unconfined aquifer in Charlotte County, Florida: U.S. Geological Survey Water-Resources Investigations 78-26.

Wolansky, R. M., Mills, L. R., and Woodham, W. M., 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1978: U.S. Geological Survey Open-File Report 78-939.

______ 1978, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1978: U.S. Geological Survey Open-File Report 78-1045.

Wolansky, R. M., Mills, L. R., Woodham, W. M., and Laughlin, C. P., 1978, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, May 1978: U.S. Geological Survey Open-File Report 78-720.

_______ 1978, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, September 1978: U.S. Geological Survey Open-File Report 78-1035.

2. Hydrologic Data Base

Conover, C. S., and Leach, S. D., 1975, Drainage basins in Florida: Florida Bureau of Geology Map Series 72.

Duerr, A. D., 1974, Hydrologic data from wells in southwest Hillsborough County, Florida, 1950-74: U.S. Geological Survey Open-File Report FL-74031.

______ 1975, Water levels in wells that tap the Floridan aquifer in southwest Hillsborough County, Florida, May 1974 and May 1975: U.S. Geological Survey Open-File Report FL-75002.

Healy, H. G., 1960, Water levels in artesian and nonartesian aquifers of Florida in 1960: Florida Geological Survey Information Circular 33.

______ 1966, Water levels in artesian and nonartesian aquifers in Florida, 1961-62: Florida Geological Survey Information Circular 48.

______ 1968, Water levels in artesian and nonartesian aquifers in Florida, 1963-64: Florida Geological Survey Information Circular 52.

______ 1970, Water levels in artesian and nonartesian aquifers of Florida, 1967-68: Florida Bureau of Geology Information Circular 68.

______ 1971, Water levels in artesian and nonartesian aquifers in Florida, 1965-66: Florida Bureau of Geology Information Circular 61.

______ 1972, Public water supplies of selected municipalities in Florida, 1970: Florida Bureau of Geology Information Circular 81.

______ 1972, Water levels in artesian and nonartesian aquifers of Florida, 1969-70: Florida Bureau of Geology Information Circular 73.

______ 1974, The observation well network of the U.S. Geological Survey in Florida: Florida Bureau of Geology Map Series 65.

______ 1974, Water levels in artesian and nonartesian aquifers of Florida, 1971-72: Florida Bureau of Geology Information Circular 85.

______ 1976, Water levels in artesian and nonartesian aquifers of Florida, 1973-74: U.S. Geological Survey Water-Resources Investigations 76-101.

______ 1977, Public water supplies of selected municipalities in Florida, 1975: U.S. Geological Survey Water-Resources Investigations 77-53.

Heath, R. C., 1961, Surface-water resources of Polk County, Florida: Florida Geological Survey Information Circular 25.

Hughes, G. H., 1975, Perspective use of fresh water for cooling systems of thermoelectric power plants in Florida: U.S. Geological Survey Water-Resources Investigations 43-75.

Kenner, W. E., Pride, R. W., and Conover, C. S., 1967, Drainage basins in Florida: Florida Geological Survey Map Series 28.

Laughlin, C. P., and Hughes, D. M., 1974, Hydrologic records for Lake County, Florida: U.S. Geological Survey Open-File Report FL-74018.

Laughlin, C. P., and Schol, M. C., 1971, Hydrologic records for Lake County, Florida, 1970-71: U.S. Geological Survey Open-File Report FL-71011.

______ 1973, Hydrologic records for Lake County, Florida, 1971-72: U.S. Geological Survey Open-File Report FL-73009.

Leach, S. D., 1977, Sources, use, and disposition of water in Florida, 1975: U.S. Geological Survey Open-File Report 77-577.

Lopez, M. A., and Michaelas, D. M., 1979, Hydrologic data from urban watersheds in the Tampa Bay area, Florida: U.S. Geological Survey Water-Resources Investigations 78-125.

Murphy, W. R., 1968, Causes of flooding of Little Charlie Bowlegs Creek upstream from Highlands Hammock State Park, Florida: U.S. Geological Survey Open-File Report FL-68004.

Peek, H. M., 1958, Record of wells in Manatee County, Florida: Florida Geological Survey Information Circular 19.

______ 1959, Record of wells in the Ruskin area, Hillsborough County, Florida: Florida Geological Survey Information Circular 22.

Pride, R. W., 1970 (Second edition 1975), Estimated water use in Florida, 1965: Florida Bureau of Geology Map Series 36.

______ 1973, Estimated water use in Florida, 1970: Florida Bureau of Geology Information Circular 83.

Rabon, J. W., 1970, Evaluation of streamflow data program in Florida: U.S. Geological Survey Open-File Report FL-70008.

Robertson, A. F., and Mills, L. R., 1975, Ground-water withdrawals in the upper Peace and the upper Alafia River Basins, Florida: Florida Bureau of Geology Map Series 67.

Sinclair, W. C., 1979, Field data from an observation well in Hillsborough Bay near Tampa, Florida, drilled March 14 to April 5, 1978: U.S. Geological Survey Open-File Report 78-984.

______ 1979, Test data from the chloride-monitor well at Sun City Center, Hillsborough County, Florida: U.S. Geological Survey Open-File Report 78-1030.

Stewart, H. G., 1963, Records of wells and other water-resources data in Polk County, Florida: Florida Geological Survey Information Circular 38.

Turner, J. F., Jr., 1979, Streamflow simulation studies of the Hillsborough, Alafia, and Anclote Rivers, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-102.

U.S. Geological Survey, Surface water records of Florida, Volume 1, Streams: 1961, 1962, 1963, 1964.

______ Surface water records of Florida, Volume 2, Lakes: 1961, 1962, 1963, 1964.

______ Water resources data for Florida, Part 1, Surface water records, Volume 1, Streams: 1965.

______ Water resources data for Florida, Part 1, Surface water records, Volume 2, Lakes: 1965.

______ Water resources data for Florida, Part 1, Surface water records, Volume 1, Streams--northern and central Florida: 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974.

______ Water resources data for Florida, Part 1, Surface water records, Volume 2, Streams--southern Florida, Lake Okeechobee and the Everglades: 1966, 1967, 1968, 1969, 1970, 1971, 1972.

______ Water resources data for Florida, Part 1, Surface water records, Volume 3, Lakes: 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974.

______ Water resources data for Florida, Part 2, Water quality records: 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974.

______ Water resources data for Florida, Volume 3, west-central Florida, surface water, ground water, quality of water: 1975.

______ Water resources data for Florida, Volume 3, southwest Florida, surface water, ground water, quality of water: 1976, 1977.

3. Quality and Flow Characteristics of Streams

Anderson, Warren, 1971 (revised 1975), Temperature of Florida streams: Florida Bureau of Geology Map Series 43.

Anderson, Warren, and Faulkner, G. L., 1973, Quantity and quality of surface water in Marion County, Florida: Florida Bureau of Geology Map Series 55.

Flippo, H. N., Jr., and Joyner, B. F., 1968, Low streamflow in the Myakka River basin area in Florida: Florida Geological Survey Report of Investigation 53.

Goetz, C. L., Reichenbaugh, R. C., and Ogle, J. K., 1978, Water-supply potential of the lower Hillsborough River, Florida, 1976: U.S. Geological Survey Water-Resources Investigations 78-29.

Heath, R. C., and Wimberly, E. T., 1971, Selected flow characteristics of Florida streams and canals: Florida Bureau of Geology Information Circular 69.

Higer, A. L., and Kolipinski, M. C., 1970, Sources of pesticides in Florida waters: U.S. Geological Survey Open-File Report FL-70005.

Joyner, B. F., 1973, Nitrogen, phosphorus, and trace elements in Florida surface waters, 1970-71: U.S. Geological Survey Open-File Report FL-73028.

Kaufman, M. I., 1969 (revised 1975), Color of water in Florida streams and canals: Florida Bureau of Geology Map Series 35.

______ 1969 (revised 1975), General distribution and concentration of orthophosphate in Florida streams: Florida Bureau of Geology Map Series 33.

______ 1970 (revised 1975), The pH of water in Florida streams and canals: Florida Bureau of Geology Map Series 37.

______ 1972 (revised 1975), The chemical type of water in Florida streams: Florida Bureau of Geology Map Series 51.

Kenner, W. E., 1969 (revised 1975), Seasonal variations of streamflow in Florida, 1969: Florida Geological Survey Map Series 31.

Kenner, W. E., Hampton, E. R., and Conover, C. S., 1969 (revised 1975), Average flow of major streams in Florida: Florida Bureau of Geology Map Series 34.

Pride, R. W., and Crooks, J. W., 1962, The drought of 1954-56 -- Its effect on Florida's surface-water resources: Florida Geological Survey Report of Investigation 26.

Rabon, J. W., 1967, Inflow-outflow characteristics of Lake Rosseau (Inglis Reservoir) on Withlacoochee River, Florida: U.S. Geological Survey Open-File Report FL-67002.

Slack, L. J., and Kaufman, M. I., 1973 (revised 1975), Specific conductance of water in Florida streams and canals: Florida Bureau of Geology Map Series 58.

Snell, L. J., and Kenner, W. E., 1974, Surface-water features of Florida: Florida Bureau of Geology Map Series 66.

Spitzer, P. R., Kolipinski, M. C., and Higer, A. L., 1969, Annotated bibliography of pesticides in Florida: U.S. Geological Survey Open-File Report FL-69006.

Stone, R. B., 1974, Low streamflow in Florida--magnitude and frequency: Florida Bureau of Geology Map Series 64.

4. Hydrologic Hazards

Bridges, W. C., 1977, Progress report on magnitude and frequency of floods on small drainage areas in Florida: U.S. Geological Survey Water-Resources Investigations 77-478.

Hammett, K. M., Turner, J. F., Jr., and Murphy, W. R., Jr., 1978, Magnitude and frequency of flooding on the Myakka River, southwest Florida: U.S. Geological Survey Water-Resources Investigations 78-65.

Murphy, W. R., Jr., 1978, Flood profiles for lower Brooker Creek, west-central Florida: U.S. Geological Survey Water-Resources Investigations 77-115.

______ 1978, Flood profiles for Cypress Creek, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-8.

Murphy, W. R., Jr., Hammett, K. M., and Reeter, C. V., 1978, Flood profiles for Peace River, south-central Florida: U.S. Geological Survey Water-Resources Investigations 78-57.

Pride, R. W., 1957, Flood-frequency relations for Florida: U.S. Geological Survey Open-File Report FL-57001.

______ 1958, Floods in Florida, magnitude and frequency: U.S. Geological Survey Open-File Report FL-58002.

Robertson, A. F., 1977, Flood profiles of the Alafia River, west-central Florida, computed by step-backwater method: U.S. Geological Survey Water-Resources Investigations 77-74.

Turner, J. F., Jr., 1972, Hydrograph simulation models of the Hillsborough and Alafia Rivers, Florida: A preliminary report: U.S. Geological Survey Open-File Report FL-74025.

______ 1973, Flood profiles of the lower Hillsborough River, Florida: U.S. Geological Survey Open-File Report FL-74003.

______ 1979, Streamflow simulation studies of the Hillsborough, Alafia, and Anclote Rivers, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-102.

Turner, J. F., Jr., Murphy, W. R., Jr., and Reeter, C. V., 1979, Flood profiles for Pithlachascotee River, west-central Florida: U.S. Geological Survey Water-Resources Investigations 78-100.

5. Quality Characteristics of Aquifers

Brown, D. W., 1958, Interim report on the changes in the chloride content of ground water in Pinellas County, Florida between 1947 and 1956: Florida Geological Survey Information Circular 16.

Bush, P. W., 1972, Salt-water movement in the lower Withlacoochee River --Cross-Florida Barge Canal complex: U.S. Geological Survey Water-Resources Investigations 5-72.

Cherry, R. N., 1966, Chloride content of ground water in Pinellas County, Florida, in 1950 and 1963: Florida Geological Survey Map Series 20.

Grubb, H. F., 1978, Potential for downward leakage to the Floridan aquifer, Green Swamp area, central Florida: U.S. Geological Survey Water-Resources Investigations 77-71.

Irwin, G. A., and Hutchinson, C. B., 1976, Radium-226 reconnaissance water sampling of eight Florida counties, December 1974 - January 1975: U.S. Geological Survey Water-Resources Investigations 76-103.

Kaufman, M. I., and Dion, N. P., 1967, Chemical character of water in the Floridan aquifer in southern Peace River basin, Florida, 1967: Florida Geological Survey Map Series 27.

Klein, Howard, 1971 (revised 1975), Depth to base of potable water in the Floridan aquifer: Florida Bureau of Geology Map Series 42.

Mills, L. R., and Ryder, P. D., 1977, Saltwater intrusion in coastal Citrus and Hernando Counties, Florida, 1975: U.S. Geological Survey Water-Resources Investigations 77-100.

Reichenbaugh, R. C., 1972, Sea-water intrusion in the upper part of the Floridan aquifer in coastal Pasco County, Florida, 1970: Florida Bureau of Geology Map Series 47.

Shattles, D. E., 1965, Quality of water from the Floridan aquifer in Hillsborough County, Florida, 1963: Florida Geological Survey Map Series 9.

Sinclair, W. C., 1979, Test data from the chloride-monitor well at Sun City Center, Hillsborough County, Florida: U.S. Geological Survey Open-File Report 78-1030.

Stewart, J. W., Goetz, C. L., and Mills, L. R., 1978, Hydrogeologic factors affecting the availability and quality of ground water in the Temple Terrace area, Hillsborough County, Florida: U.S. Geological Survey Water-Resources Investigations 78-4.

Toler, L. G., 1967, Fluoride in water in the Alafia and Peace River basins, Florida: Florida Geological Survey Report of Investigation 46.

6. Utilization of Subsurface Space

Hickey, J. J., 1977, Hydrogeologic data for the McKay Creek waste-injection test site, Pinellas County, Florida: U.S. Geological Survey Open-File Report 77-802.

______ 1979, Hydrogeologic data for the South Cross Bayou subsurface-injection test site, Pinellas County, Florida: U.S. Geological Survey Open-File Report 78-575.

Hickey, J. J., and Barr, G. L., 1979, Hydrogeologic data for the Bear Creek subsurface-injection test site, St. Petersburg, Florida: U.S. Geological Survey Open-File Report 78-853.

Hickey, J. J., and Spechler, R. M., 1979, Hydrologic data for the southwest subsurface-injection test site, St. Petersburg, Florida: U.S. Geological Survey Open-File Report 78-852.

Rosenshein, J. S., and Hickey, J. J., 1977, Storage of treated sewage effluent and treated storm water in a saline aquifer: Ground Water Journal, v. 15, no. 4, p. 284-293.

Wilson, W. E., 1976, Hydrologic data for a subsurface waste-injection site at Mulberry, Florida: U.S. Geological Survey Open-File Report 76-721.

______ 1977, Hydrologic data for a subsurface waste-injection site at Mulberry, Florida, 1972-76: U.S. Geological Survey Open-File Report 77-511.

7. Land-Use Hydrology

Cherry, R. N., and Brown, D. P., 1973, Hydrogeologic aspects of a proposed sanitary landfill near Old Tampa Bay, Florida: Florida Bureau of Geology Report of Investigation 68.

Cherry, R. N., Brown, D. P., Stamer, J. K., and Goetz, C. L., 1973, Hydrobiochemical effects of spraying waste-treatment plant effluent in St. Petersburg, Florida: In Proceedings 1973 workshop: Land spreading municipal effluent and sludge in Florida; Institute of Food and Agricultural Science, University of Florida, Gainesville.

Coker, A. E., and others, 1974, Automatic categorization of land-water cover types of the Green Swamp, Florida, using Skylab multispectral scanner (S-192) data: American Astronautical Society Annual Meeting.

Fernandez, Mario, Jr., 1979, Water-quality data for landfills, Hillsborough County, Florida, January 1974-October 1977: U.S. Geological Survey Open-File Report 78-820.

______ 1979, Water-quality data from a sludge disposal test site, St. Petersburg, Florida, November 1973-July 1977: U.S. Geological Survey Open-File Report 78-821.

______ 1979, Water-quality data from a landfill, Pinellas County, Florida, May 1975-October 1977: U.S. Geological Survey Open-File Report 78-822.

Higer, A. L., Coker, A. E., and Jurado, Antonio, 1974, Three photo mosaics, (1) color mosaic state of Florida; (2) southeast Florida, (3) central Florida: U.S. Geological Survey Open-File Report FL-74020.

Hutchinson, C. B., and Stewart, J. W., 1977, Hydrogeology of Toytown landfill, St. Petersburg, Florida: U.S. Geological Survey Water-Resources Investigations 77-78.

Lamonds, A. G., 1976, Proposed Cross-Florida Barge Canal: Assessment of impacts of proposed transloading facility, barge fleeting area, and barge port on water quality: U.S. Geological Survey Open-File Report 76-570.

Lamonds, A. G., with a section by M. L. Merritt, 1976, Proposed Cross-Florida Barge Canal--water quality aspects with a section on water assimilative capacity: U.S. Geological Survey Water-Resources Investigations 76-23.

McPherson, B. F., 1973, Vegetation map of southern parts of subareas A and C, Big Cypress Swamp, Florida: U.S. Geological Survey Hydrologic Investigation Atlas HA-492.

Reichenbaugh, R. C., 1976, Effects on ground-water quality from irrigating pasture land with sewage effluent near Lakeland, Florida: U.S. Geological Survey Water-Resources Investigations 76-108.

Reichenbaugh, R. C., Brown, D. P., and Goetz, C. L., 1979, Results of testing landspreading of treated municipal wastewater at St. Petersburg, Florida: U.S. Geological Survey Water-Resources Investigations 78-110.

Stewart, J. W., and Duerr, A. D., 1973, Hydrologic and geologic considerations for solid-waste disposal in west-central Florida: U.S. Geological Survey Water-Resources Investigations 50-73.

Stewart, J. W., and Hanan, R. V., 1970, Hydrogeologic factors affecting the utilization of land for sanitary landfills in northern Hillsborough County, Florida: Florida Bureau of Geology Map Series 39.

8. Lake Hydrology

Bush, P. W., 1973, A hydrologic description of Lake Minnehaha at Clairmont, Florida: Florida Bureau of Geology Map Series 54.

German, E. R., 1978, The hydrology of Lake Rousseau, west-central Florida: U.S. Geological Survey Water-Resources Investigations 77-126.

Hughes, G. H., 1974, Water-level fluctuations of lakes in Florida: Florida Bureau of Geology Map Series 62.

Hunn, J. D., 1974, Hydrology of Lake Tarpon near Tarpon Springs, Florida: Florida Bureau of Geology Map Series 60.

Hunn, J. D., and Reichenbaugh, R. C., 1972, A hydrologic description of Lake Magdaline near Tampa, Florida: Florida Bureau of Geology Map Series 49.

Kenner, W. E., 1961, Stage characteristics of Florida lakes: Florida Geological Survey Information Circular 31.

______ 1964, Maps showing depths of selected lakes in Florida: Florida Geological Survey Information Circular 40.

Reichenbaugh, R. C., 1977, Hydrology of Keystone Lake in northwest Hillsborough County, Florida: U.S. Geological Survey Water-Resources Investigations 76-124.

Reichenbaugh, R. C., and Hughes, G. H., 1977, Evaluation of chemical, biological, and physical conditions in the Winter Haven chain of lakes, Florida: U.S. Geological Survey Water-Resources Investigations 77-52.

Reichenbaugh, R. C., and Hunn, J. D., 1972, Hydrologic description of Lake Thonotosassa near Tampa, Florida: Florida Bureau of Geology Map Series 48.

Rutledge, A. T., 1978, Hydrologic reconnaissance of Tsala Apopka Lake, Citrus County, Florida: U.S. Geological Survey Water-Resources Investigations 77-89.

Stewart, J. W., 1969, Synoptic remote-sensing survey of lakes in west-central Florida, in Second Annual Earth Resources Aircraft Program: National Aeronautics and Space Administration, v. 3, Hydrology and Oceanography, sec. 38, 32 p.

Stewart, J. W., and Hughes, G. H., 1974, Hydrologic consequences of using ground water to maintain lake levels affected by water wells near Tampa, Florida: Florida Bureau of Geology Report of Investigation 74.

Taylor, G. F., 1978, Hydrology of Lake Panasoffkee, Sumter County, Florida: U.S. Geological Survey Water-Resources Investigations 77-88.

Taylor, R. L., 1953, Hydrologic characteristics of Lake Tarpon area, Florida: U.S. Geological Survey Open-File Report FL-53001.

9. Estaurine and Wetland Hydrology

Coker, A. E., Higer, A. L., and Goodwin, C. R., 1976, Detection of turbidity dynamics in Tampa Bay, Florida: In ERTS-1: A new window on our planet, U.S. Geological Survey Professional Paper 929, p. 330-333.

Goodwin, C. R., 1977, Circulation patterns for historical, existing, and proposed channel configurations in Hillsborough Bay, Florida: Proceedings of XXIV International Navigation Congress, Lennigrad, 1977.

Goodwin, C. R., and Michaelis, D. M., 1975, Tides in Tampa Bay, Florida: June 1971 to December 1973: U.S. Geological Survey Open-File Report FL-75004.

Goodwin, C. R., Rosenshein, J. S., and Michaelis, D. M., 1974, Water quality of Tampa Bay, Florida: Dry-weather conditions, June 1971: U.S. Geological Survey Open-File Report FL-74026.

______ 1974, Water quality of Tampa Bay, Florida: Wet-weather conditions, October 1971: U.S. Geological Survey Open-File Report FL-75005.

Mann, J. A., 1971, Hydrologic aspects of freshing upper Old Tampa Bay, Florida: Florida Bureau of Geology Report of Investigation 76.

Reichenbaugh, R. C., Rosenshein, J. S., and Westley, R. W., 1973, Basic water quality data for pollution abatement plan, Tampa Bay area, Florida: U.S. Geological Survey Open-File Report FL-73020.

Rosenshein, J. S., Goodwin, C. R., and Jurado, Antonio, 1975, Bottom configuration of Tampa Bay, Florida, as related to hydrologic evaluation of bay environment: American Society of Photogrammetry.

HYDROLOGIC SETTING

Water is the major factor in a balanced ecologic system for southwest Florida. Rainfall averages 49 to 55 inches per year and is the primary source of freshwater, recharging aquifers and providing streamflow. Ninety percent of southwest Florida's water supply for domestic, industrial, or agricultural purposes is obtained from ground water and the remaining 10 percent from surface water. Ground water is obtained from three principal aquifers, the unconfined surficial, the confined minor artesian, and the confined Floridan (fig. 2).

Climate

The climate of southwest Florida is subtropical and is characterized by warm, humid summers and mild winters. Some rainfall normally occurs during each month of the year but there is a distinct rainy season extending from May through September, and a low rainfall season extending from October through April. About 70 percent of the annual rainfall occurs during the rainy season. Winter rainfall is relatively light because Florida is the normal southern limit of winter frontal systems, the causative factor of winter rainfall. Summer rainfall is derived principally from convectional storms that usually occur in the afternoon and early evening. Spatially, summer rainfall is highly variable. Areas only a few miles apart often receive widely differing amounts of rain.

The average annual temperature at Lakeland, which typifies the District, is 72.5°F. Average monthly temperatures range from 61°F in January to 82°F in August. Rainfall at Lakeland averages 49.4 inches annually. Figure 3 shows annual rainfall departures from normal for the period 1941-78.

Topography and Drainage

Southwest Florida is characterized by relatively flat, generally swampy lowlands in the coastal areas and by flat to gently rolling hills in inland areas. Except for a coastal ridge in central Pinellas County that has altitudes of as much as 100 feet above National Geodetic Vertical Datum of 1929 (NGVD), coastal areas are less than 50 feet in altitude (fig. 4). Most inland areas range between 50 and 100 feet in altitude. However, a series of eroded ridges trending northwest in Pasco, Hernando, and Citrus Counties range between 100 and 150 feet in altitude and in places exceed 200 feet. Also, most of the east-central part of the District has altitudes that exceed 100 feet. In Polk County, altitudes exceed 150 feet in several places; the maximum is 305 feet above NGVD.

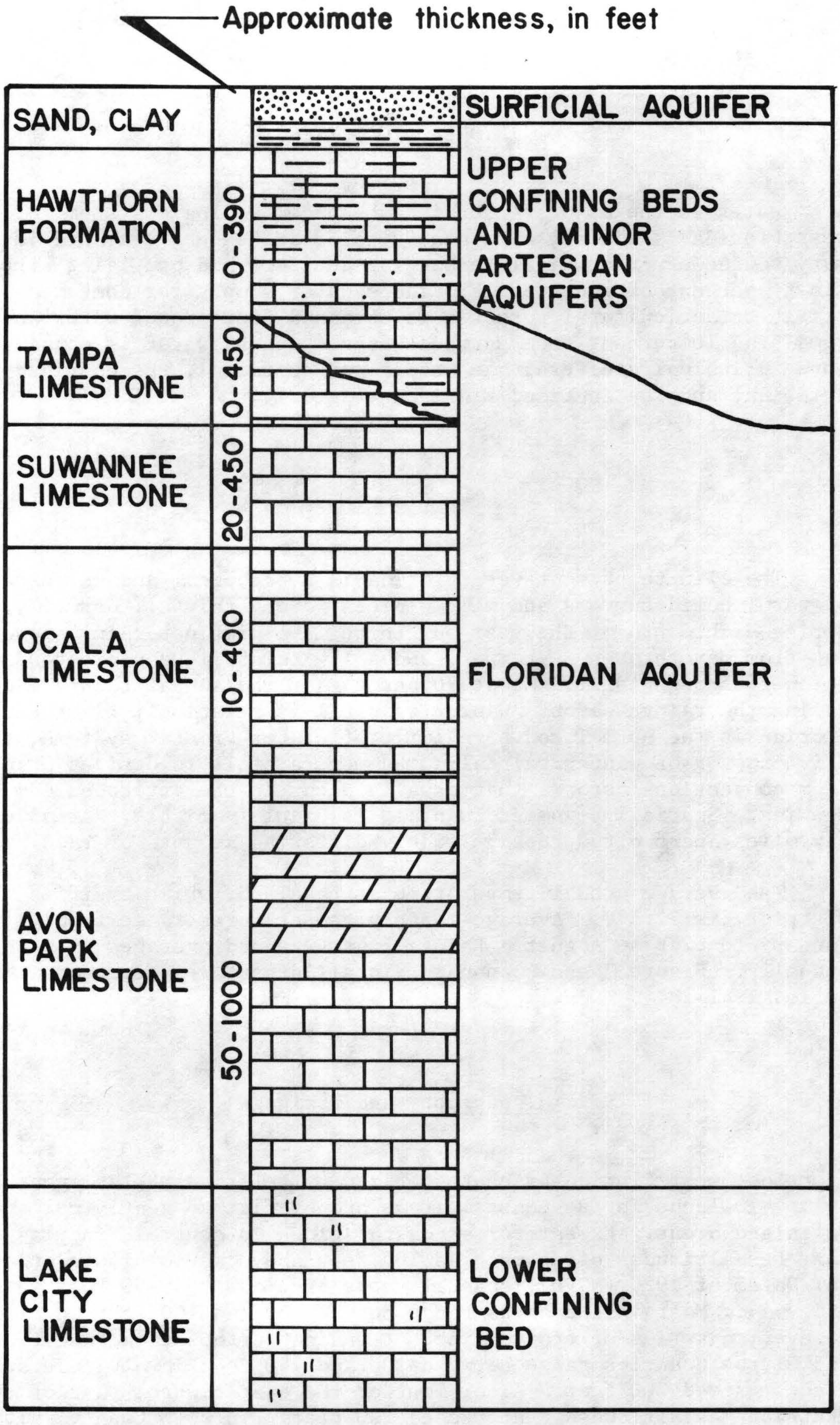


Figure 2.--Generalized hydrogeologic section.

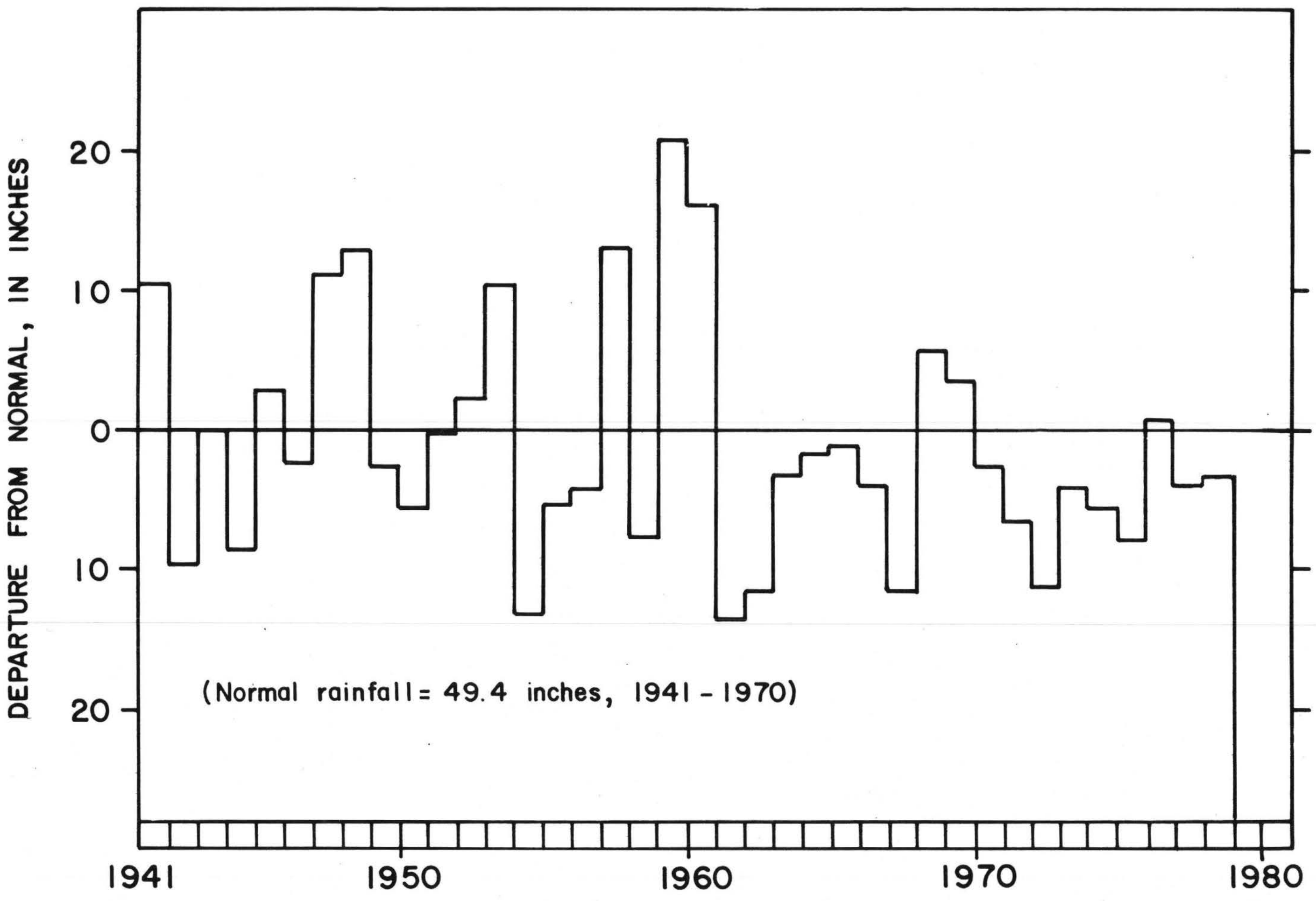


Figure 3.--Annual rainfall departures from normal at Lakeland, 1941-78.

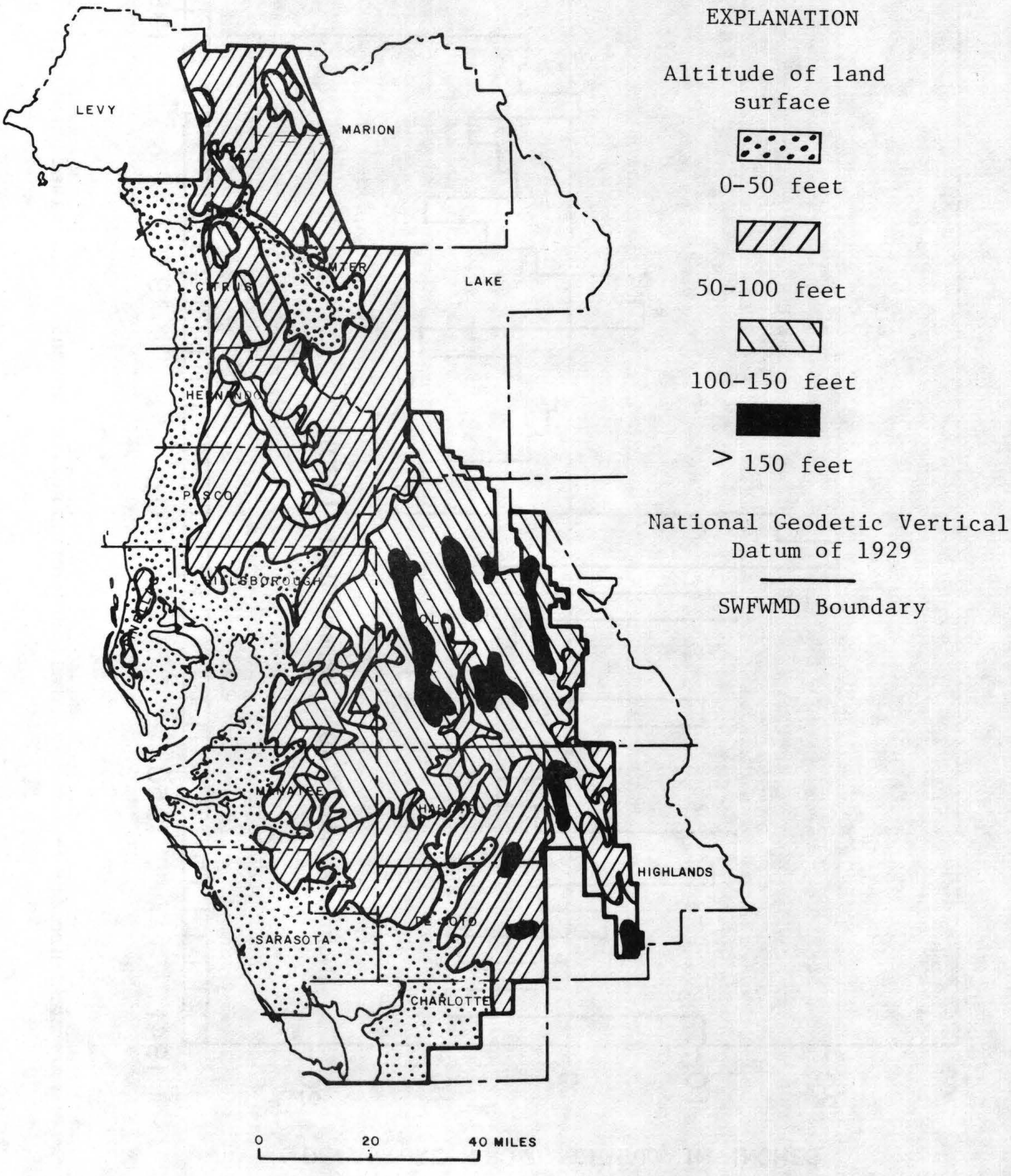


Figure 4.--Topography of southwest Florida.

More than two-thirds of the 10,000 mi^2 in the District is drained by nine rivers (fig. 5). The Peace River drains 2,400 mi^2 and the Withlacoochee River drains 2,000 mi^2. The western part of the District is drained by numerous coastal streams. Drainage is dendritic and is characterized by many small lakes, ponds, and marshlands. Stream density and runoff vary from low in the central highlands to high along the coast where numerous springs add to streamflow.

Most major streams are sustained during periods of dry weather by water discharging from springs. The major streams are free flowing except for occasional dams that are used to form lakes or impoundments for water supply. Although stream channels are generally shallow, they are fairly well defined.

Surficial Aquifer

The surficial aquifer (fig. 2) occurs throughout most of southwest Florida and consists predominantly of fine sand and clayey sand. Thickness of the sandy material generally ranges from 0 to 50 feet but is as much as 200 feet thick in the eastern part of southwest Florida. Depth to the water table ranges from land surface to 20 feet. Water is withdrawn from the surficial aquifer for small volume uses such as domestic supply.

Upper Confining Beds and Minor Artesian Aquifers

Principal formations beneath the surficial aquifer and overlying the Floridan aquifer are the Hawthorn Formation and, in places, unconsolidated sections of the Tampa Limestone (fig. 2). These formations range from about 50 to 700 feet in thickness, and consist of a heterogeneous mixture of limestone, dolomite, sand, and clay. Permeable zones in carbonate rocks of this section are minor confined aquifers that are capable of producing several hundred gallons of water per minute from individual wells. The relatively impermeable, interbedded clay deposits act as confining beds for these aquifers and for the Floridan aquifer.

The Hawthorn Formation is absent in areas north of an east-west line through Clearwater in Pinellas County, Tampa in Hillsborough County, and slightly north of Lake Parker and Winter Haven in Polk County, and confining material overlying the Floridan aquifer is relatively thin or missing. This allows a greater interaction between the Floridan aquifer and the overlying surficial aquifer. In areas south of the line, the Hawthorn Formation and unconsolidated sections of the Tampa Limestone are as thick as 700 feet and effectively inhibit vertical movement of water into or out of the Floridan aquifer.

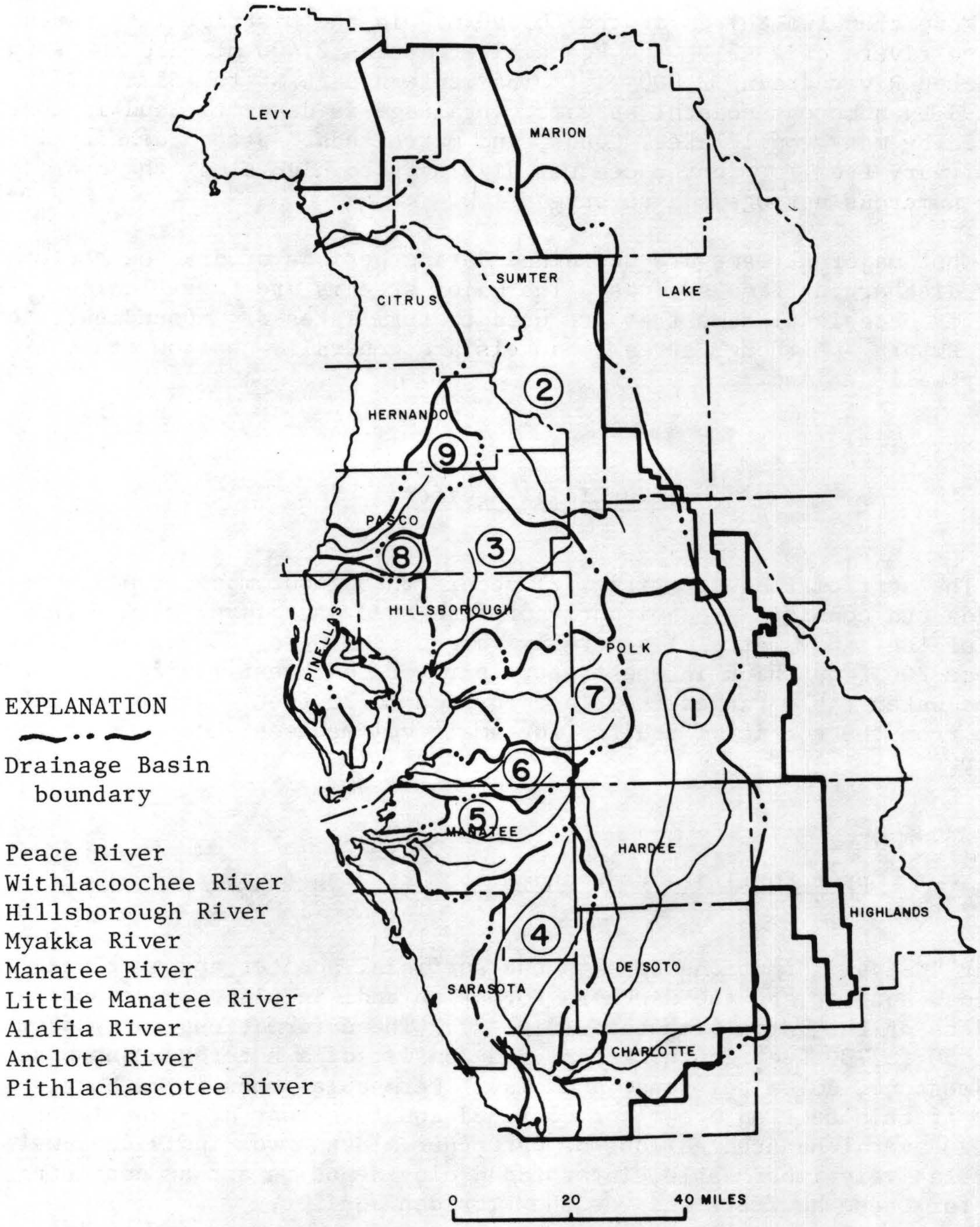


Figure 5.--Major drainage basins in southwest Florida.

Floridan Aquifer

The Floridan aquifer (fig. 2) is predominantly limestone and is the principal source of ground water in southwest Florida. The aquifer was defined to include all or parts of the Avon Park Limestone, Ocala Limestone, Suwannee Limestone, Tampa Limestone, and permeable parts of the Hawthorn Formation that are in hydraulic contact with the rest of the aquifer (Parker and others, 1955, p. 189). These units may be more than 1,000 feet thick.

The elevation of the top of the Floridan aquifer ranges from land surface in the northern part of the District to as much as 450 feet below NGVD in the southern part. Water in the aquifer occurs in faults, joints, bedding planes, solution cavities, and fractures. Zones of different permeability occur within the aquifer. The most productive zones are in the uppermost limestone (Hawthorn Formation and Tampa Limestone). Wells tapping the Floridan aquifer may yield as much as 5,000 gal/min.

Aquifer Recharge

Recharge to the Floridan and minor artesian aquifers is by direct infiltration, percolation, and leakage through confining beds. Infiltration occurs where sinkholes create direct connection between aquifers; where rivers or streams flow in contact with the aquifer; or where there is surface outcrop of the aquifer. Percolation occurs where a confining bed between the surficial aquifer and the Floridan aquifer is absent. The surficial aquifer is recharged by rainfall which infiltrates and percolates downward under the influence of gravity.

HYDROLOGIC CONDITIONS DURING THE 1978 WATER YEAR

Climatic Conditions

Rainfall for the 1978 water year was at or slightly below normal except in the northern part of the District where it was well above normal (fig. 6). Rainfall in the District during October was slightly below normal (fig. 7). This was followed by 4 months of well above normal precipitation. This above normal rainfall was reflected in the Withlacoochee River where, by the end of February, the river was approaching flood stage.

Rainfall was in the normal ranges in March and in the dry ranges (lowest 10 percent of actual rainfall) in April (fig. 7). Subsequently, rainfall became very sporadic. Some areas in the District registered

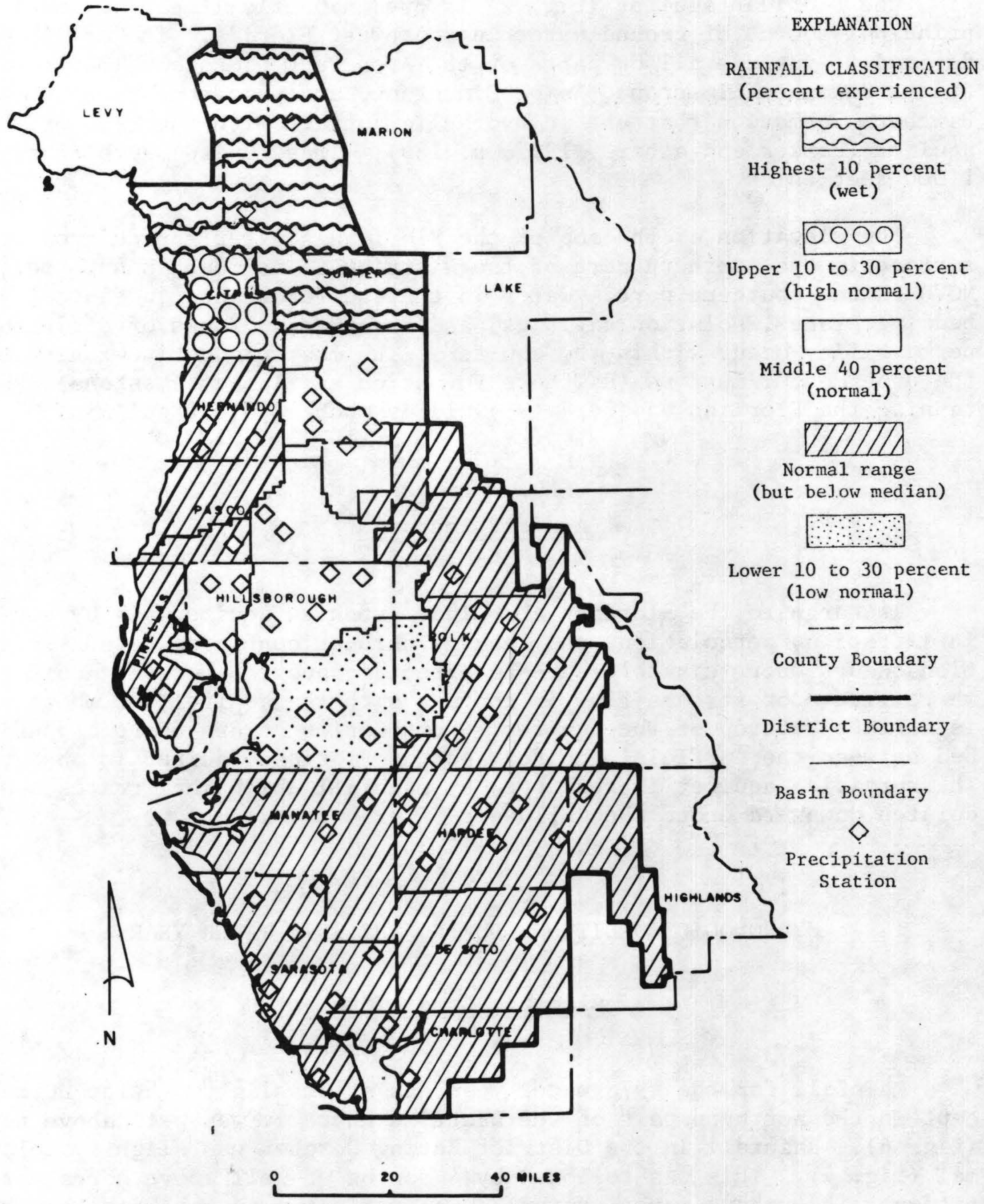


Figure 6.--Precipitation during the 1978 water year (from Southwest Florida Water Management District).

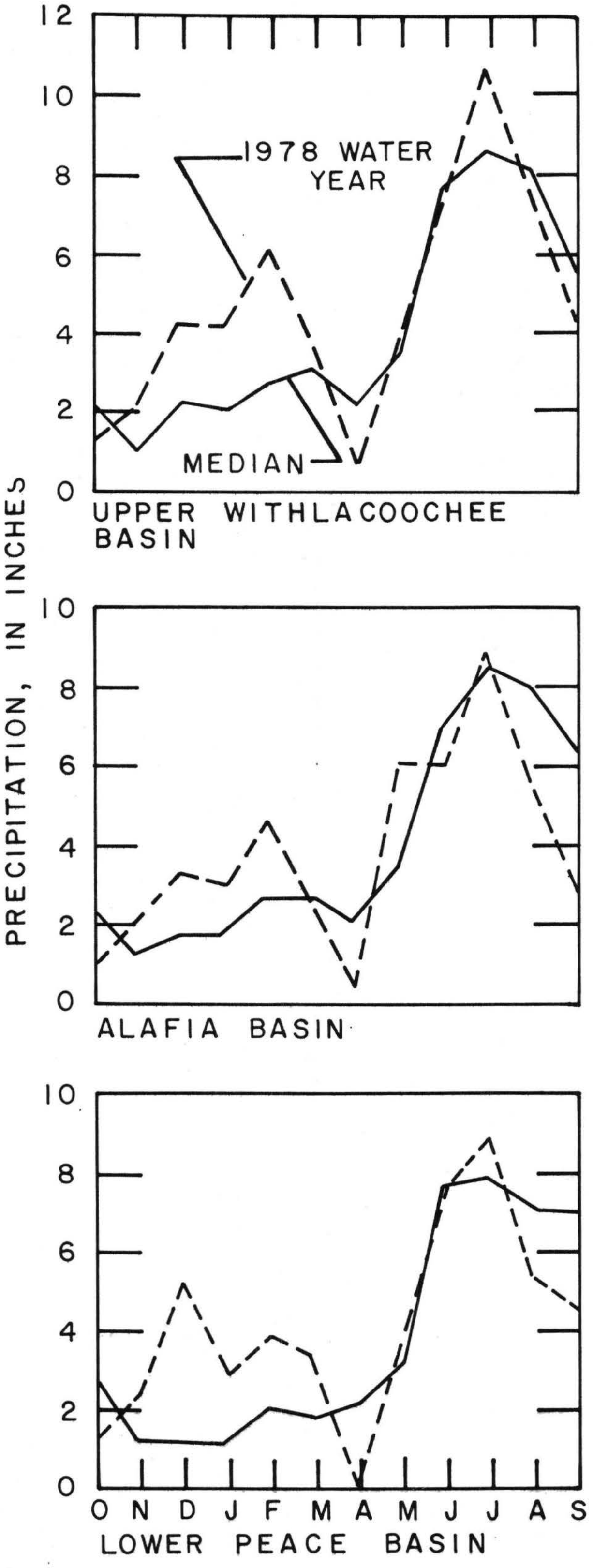


Figure 7.--Median and 1978 water-year precipitation (from National Oceanic and Atmospheric Administration).

above normal monthly rainfall whereas other areas were reportedly in the dry ranges. From May to August, however, the average rainfall for the District was about normal. September had very little rainfall. About one third of the precipitation stations were in the low normal range (lower 10 to 30 percent of actual rainfall).

Rainfall during the "dry season," October through April, was normal except in the northern part of the District where it was well above normal (fig. 8). Rainfall during the "wet season," May through September, was below normal except in the Hillsborough and upper Peace River basin where it was normal (fig. 9).

Based on the records at Lakeland, average temperatures during the first half of the year were below average (fig. 10). The winter months were unusually cold with temperatures averaging about 3, 6, and 8 degrees below average during December, January, and February, respectively. Temperatures were about average during April. Subsequently, temperatures were 1 to 2 degrees above average.

Surface Water

Stream Gaging Network

Streamflow data are obtained to provide information on flow characteristics, including drought and flood flows; to provide background information where streams are used for water supply or waste assimilation; and for bridge design, recreation, preservation of instream flow, and esthetics. A network of 62 stream gaging stations was operated by the U.S. Geological Survey in the District during 1978 (fig. 11). These stations were supplemented by a network of 91 stream sites where periodic stage and discharge data were obtained. Streamflow data are included in an annual report "Water Resources Data for Florida, Water Year 1978, Volume 3A: Southwest Florida." Data from the network were used to describe streamflow conditions as given in the following section.

Streamflow Conditions

Streamflow in the southern part of the District was above normal during most of the year as reflected by records for the Peace River at Arcadia (fig. 12a). Streamflow at the beginning of the water year was in the lower ranges, but increased to above normal in December. In April, streamflow patterns reversed sharply when streamflow was substantially below normal after 4 months of being unusually high. Subsequently, streamflow returned to above normal until the end of the year when it again was below normal.

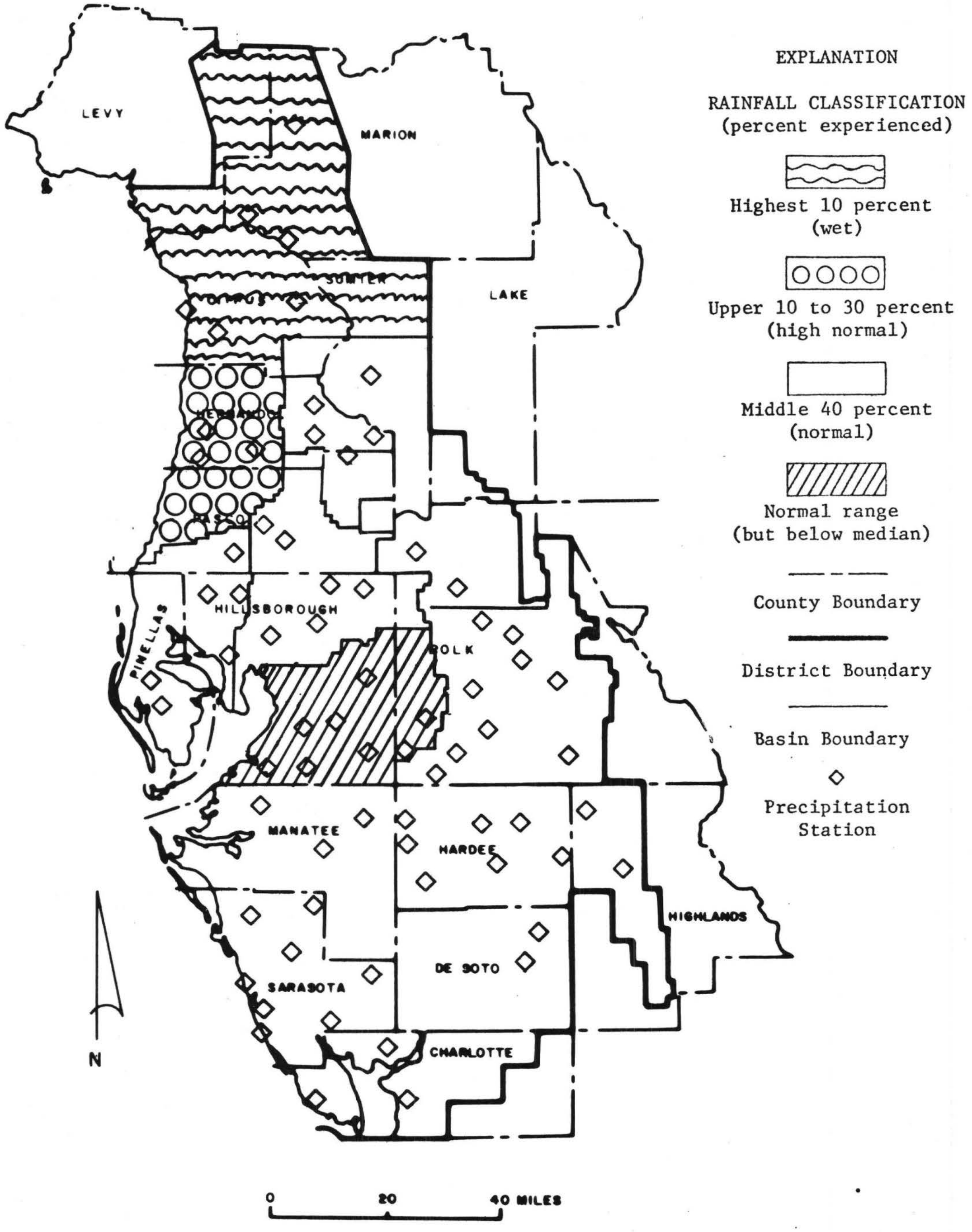


Figure 8.--Precipitation patterns during the dry season (October through April), 1977-78 (from Southwest Florida Water Management District).

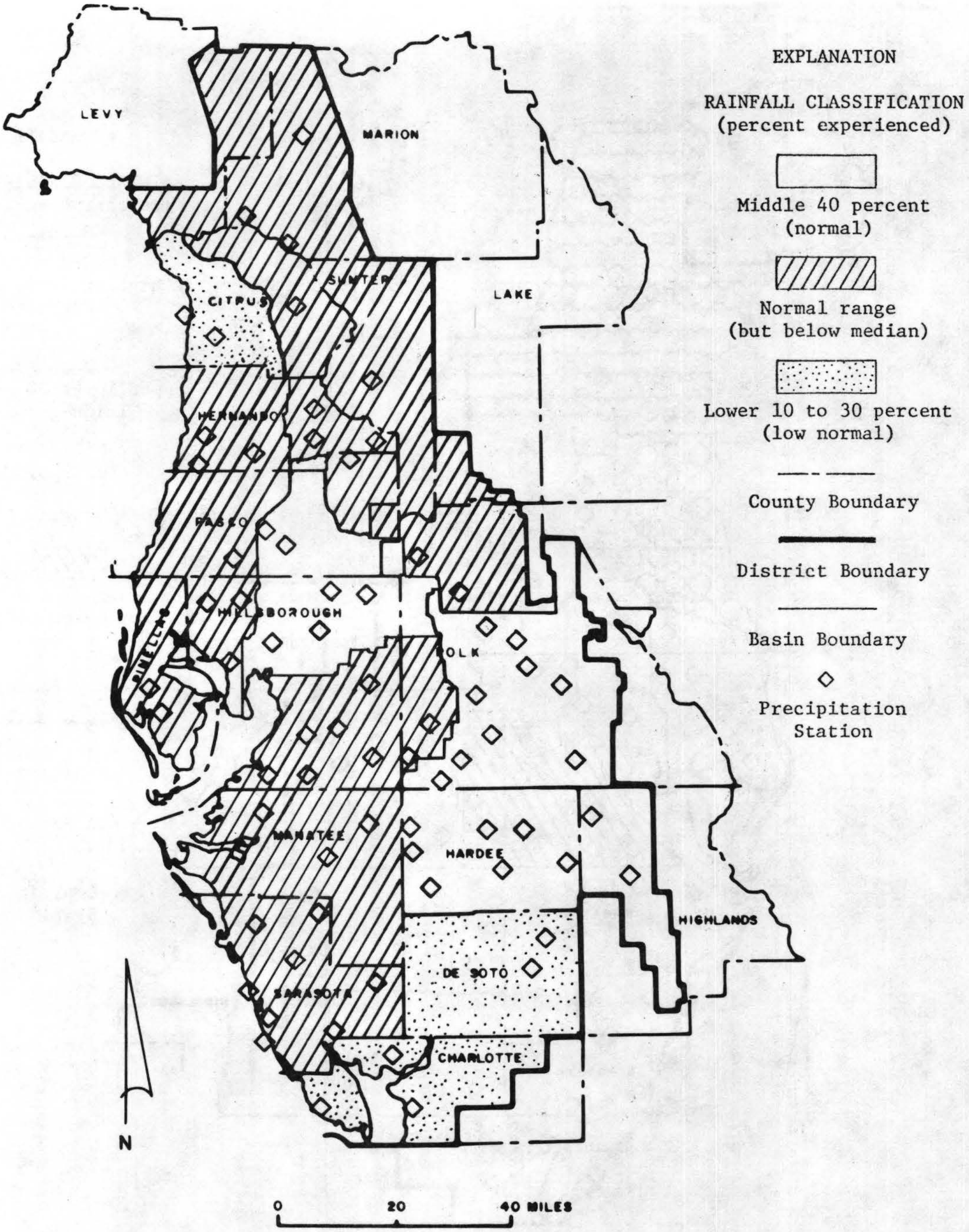


Figure 9.--Precipitation patterns during the wet season (May through September), 1978 (from Southwest Florida Water Management District).

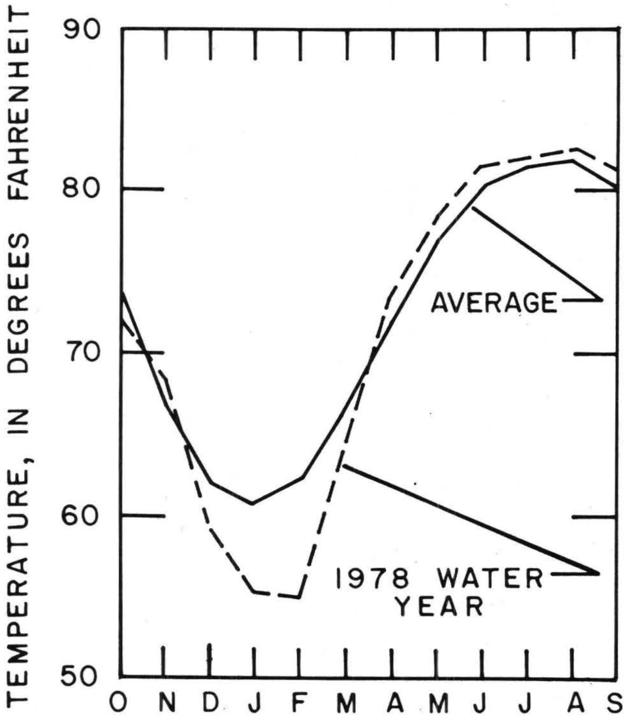
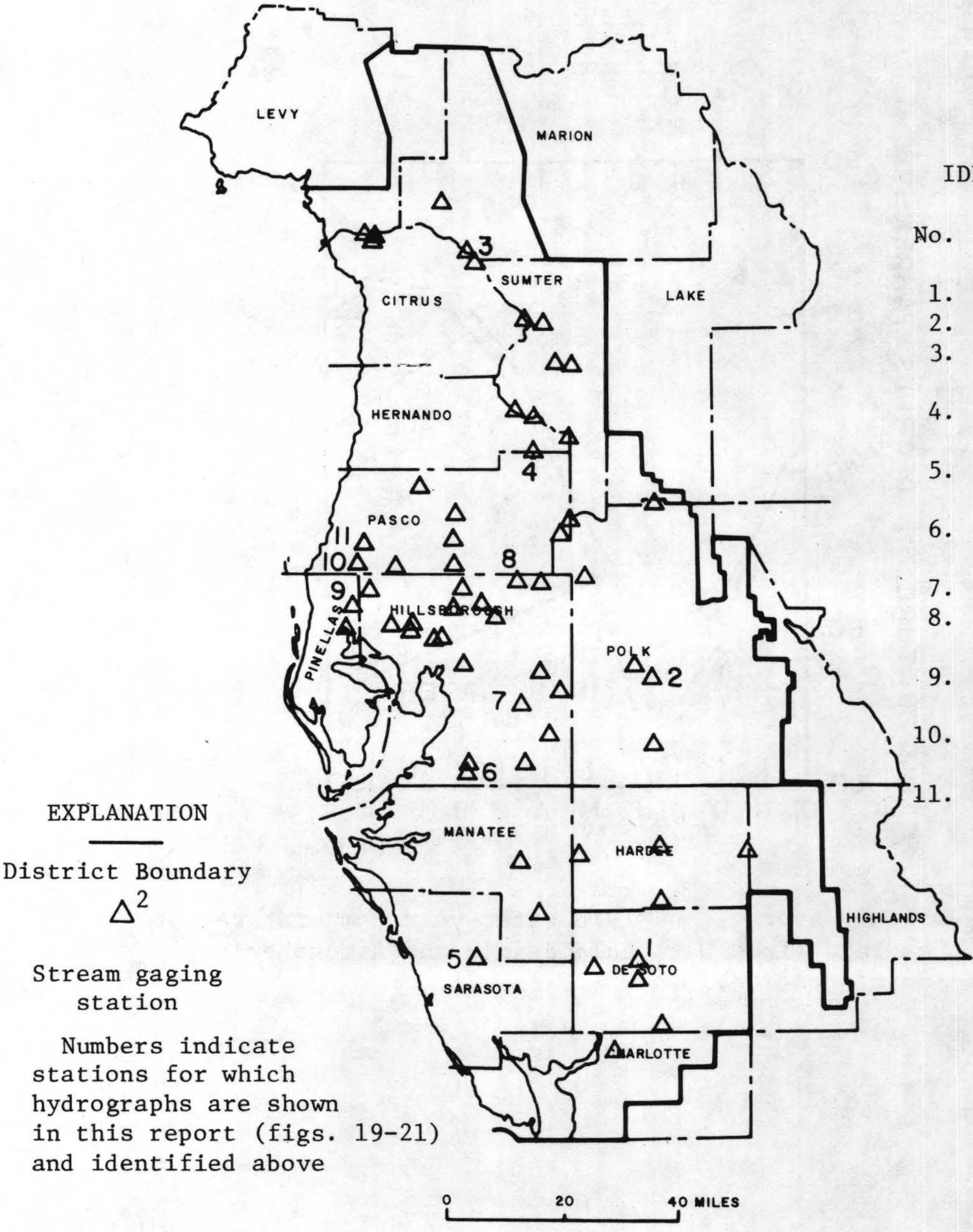


Figure 10.--Monthly average and 1978 water-year temperatures at Lakeland (from National Oceanic and Atmospheric Administration).



IDENTIFICATION

No.	Stream name
1.	Peace River at Arcadia
2.	Peace River at Bartow
3.	Withlacoochee River near Holder
4.	Withlacoochee River at Trilby
5.	Myakka River near Sarasota
6.	Little Manatee River near Wimauma
7.	Alafia River at Lithia
8.	Hillsborough River near Zephyrhills
9.	Brooker Creek near Tarpon Springs
10.	Anclote River near Elfers
11.	Pithlachascotee River near New Port Richey

Figure 11.--Locations of stream gaging stations.

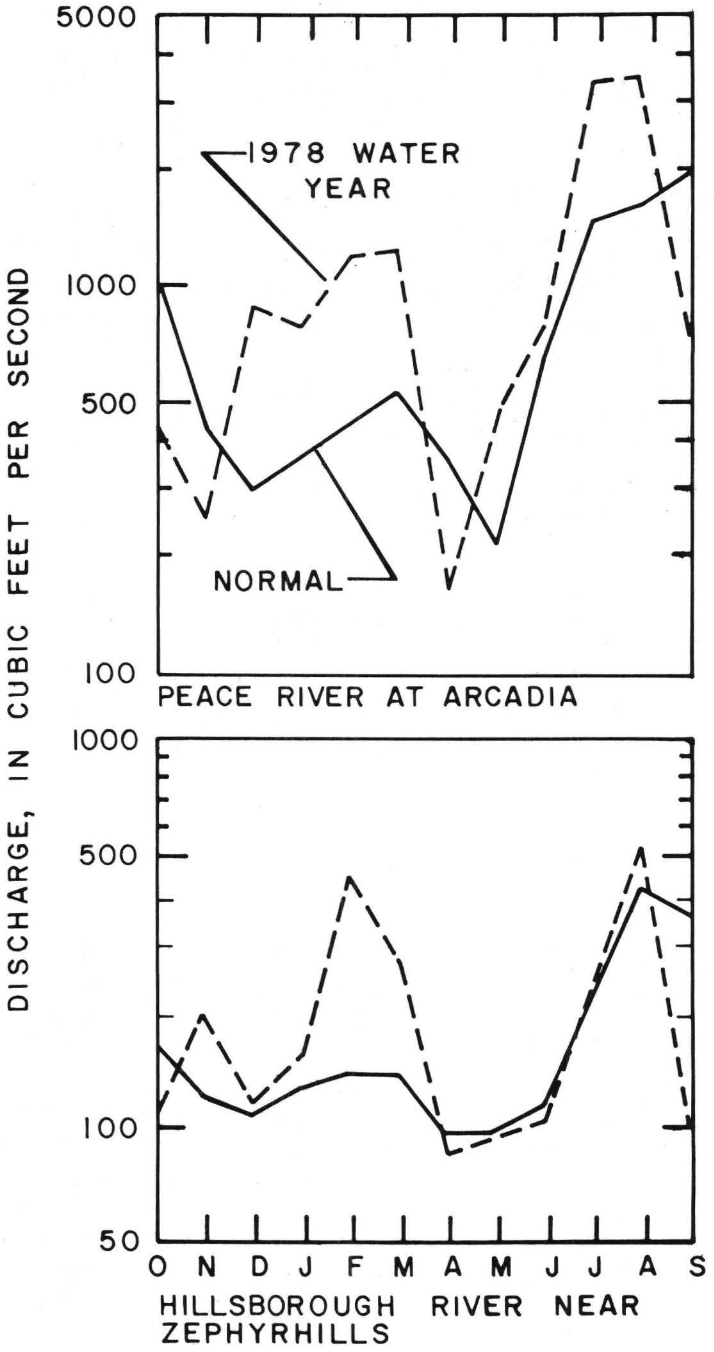


Figure 12a.--Normal monthly and 1978 water-year monthly mean discharge for Peace River at Arcadia and Hillsborough River near Zephyrhills.

Streamflow in the central part of the District was near normal during most of the year as reflected by records for the Hillsborough River near Zephyrhills (fig. 12a). During November, February, and March, streamflow was substantially above normal and in September it was considerably below normal. At the Zephyrhills gaging station, the monthly mean discharge for September was the lowest for a September since 1938.

Streamflow in the northern part of the District was at record low during the first part of the water year as based on records for the Withlacoochee River near Holder (fig. 12b). Streamflow at the Holder station in October was the second lowest for an October in the 47 years of record. Streamflow for the month of November was the lowest of record and that for December was the second lowest. Unusual winter rains reversed the pattern of below normal streamflow resulting in about twice normal discharge by March. Subsequently, streamflow was about normal. At Silver Springs near Ocala, a stream sustained almost entirely by ground-water discharge from springs, the discharge for November was also a record low for the month (fig. 12b). Because discharge from the spring is from ground-water sources, the range of discharge is subdued, and times of high or low discharge lag times of rain or drought by several months.

Figures 13 to 15 are hydrographs of monthly mean discharge for selected stations in the District. The hydrographs illustrate annual and long-term variability of streamflow. The stations were selected for areal coverage and on the basis of river size and importance. Locations of the stations are shown in figure 11.

Peace River basin

Discharges for the Peace River basin are illustrated by hydrographs of mean monthly discharge for gaging stations at Arcadia and Bartow (fig. 13). Discharge of the Peace River at Arcadia for 1978 averaged 1,080 ft^3/s, 92 percent of the long-term average, but well above the average of 441 ft^3/s in 1977. Discharge of the Peace River at Bartow averaged 188 ft^3/s for 1978, about 75 percent of the long-term average. Streamflow at Bartow was also appreciably more than that experienced in 1977. Streamflow patterns during the year approximately paralleled the long-term trends with lower discharges during winter and spring months and higher discharges during the summer months. Heavy rains during the winter months resulted in somewhat higher than average discharges, but the patterns of flow were typical.

Withlacoochee River basin

Discharges for the Withlacoochee River basin are illustrated by hydrographs for gaging stations near Holder and at Trilby (fig. 14).

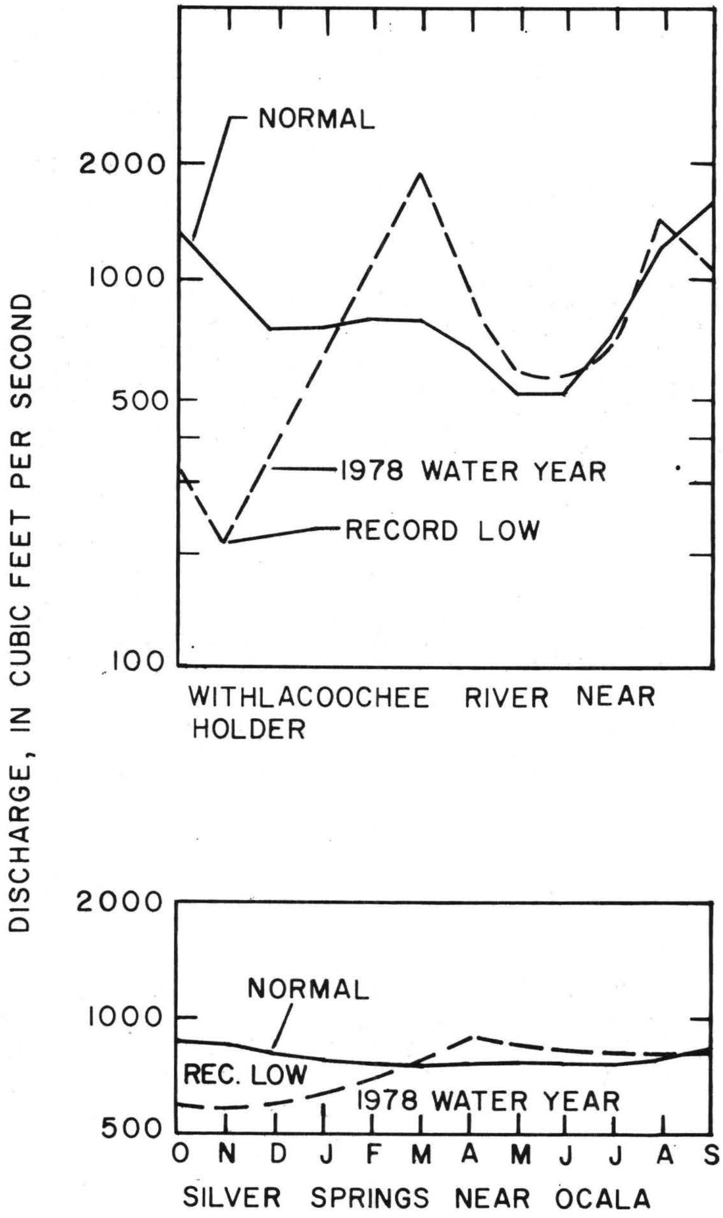


Figure 12b.--Normal monthly and 1978 water-year monthly mean discharge for Withlacoochee River near Holder and Silver Springs near Ocala. (The Ocala gage is outside the District but is representative of flow from springs in the northern part of the District.)

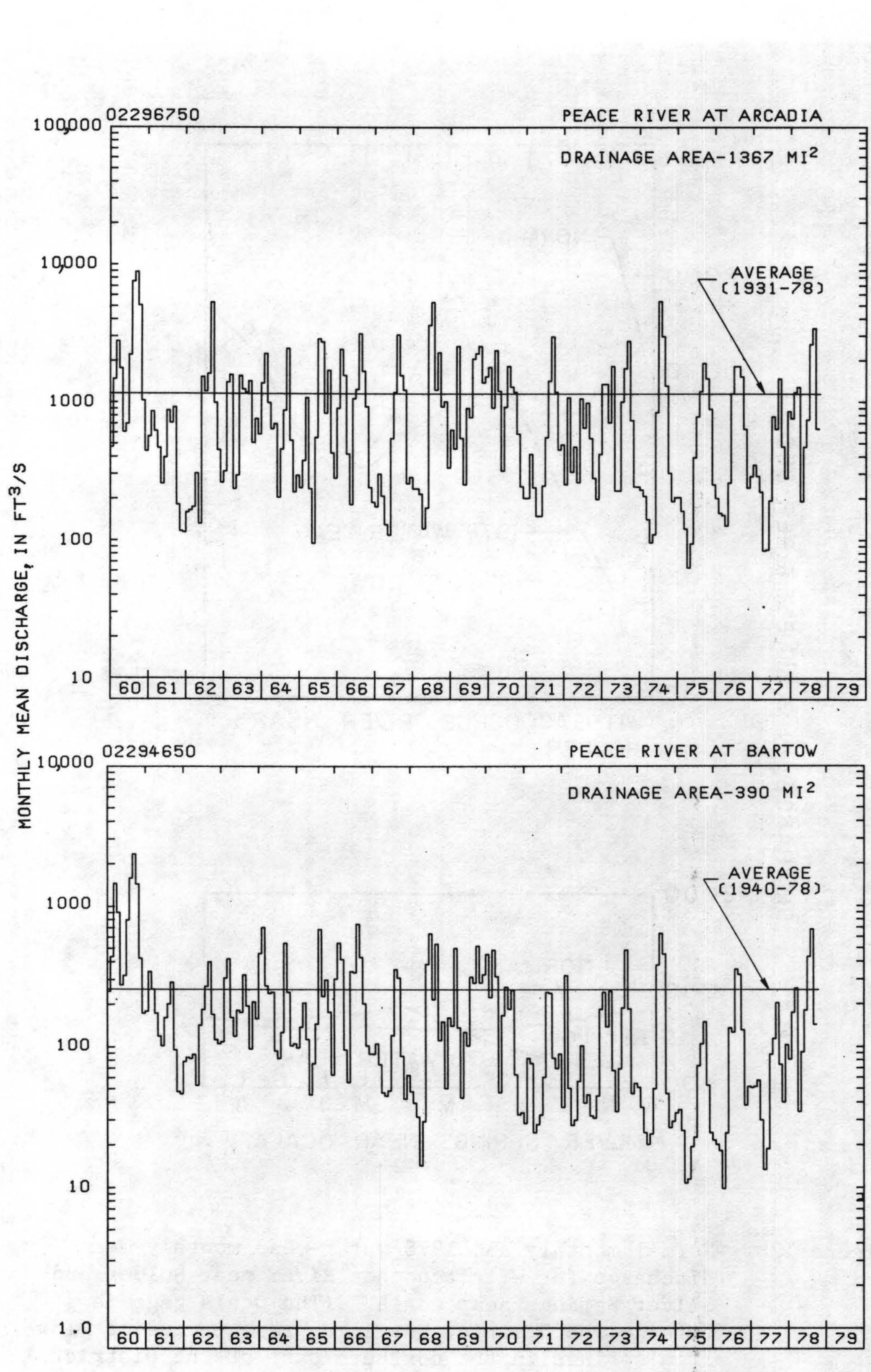


Figure 13.--Discharge hydrographs for streams in the Peace River basin.

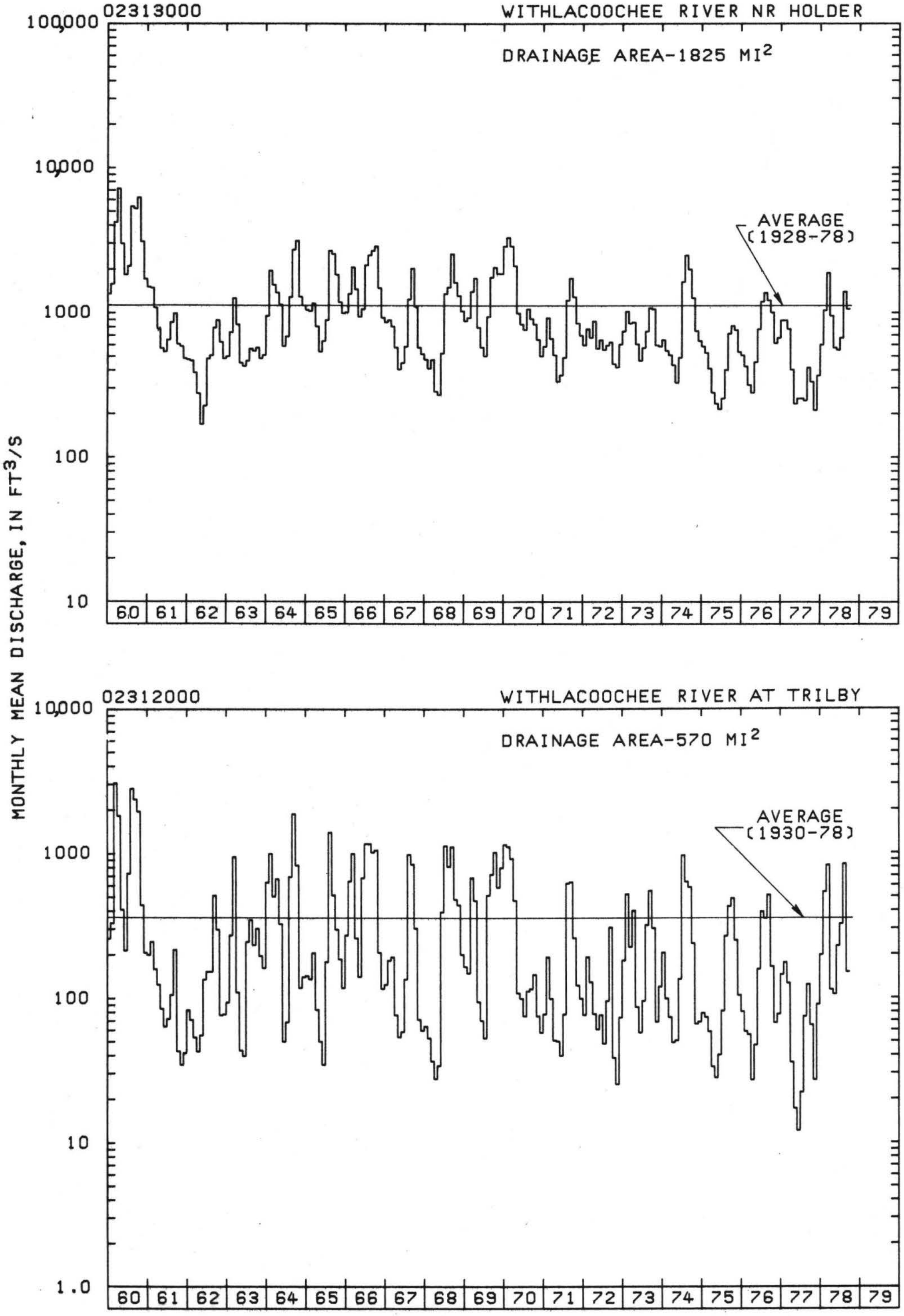


Figure 14.--Discharge hydrographs for streams in the Withlacoochee River basin.

Discharge for the station near Holder averaged 809 ft^3/s during 1978, about 75 percent of the long-term average but appreciably more than that of 1977. Discharge at Trilby averaged 290 ft^3/s, about 80 percent of average but more than 3 times that of 1977. Heavy rains during the winter months resulted in higher streamflow than normally expected at that time of the year. Otherwise, streamflow followed the normal seasonal patterns. Discharges during periods of high flow at Trilby are affected by diversions into the Hillsborough River and at times low flows are affected by wastewater diverted from ground-water supplies.

Coastal and central areas

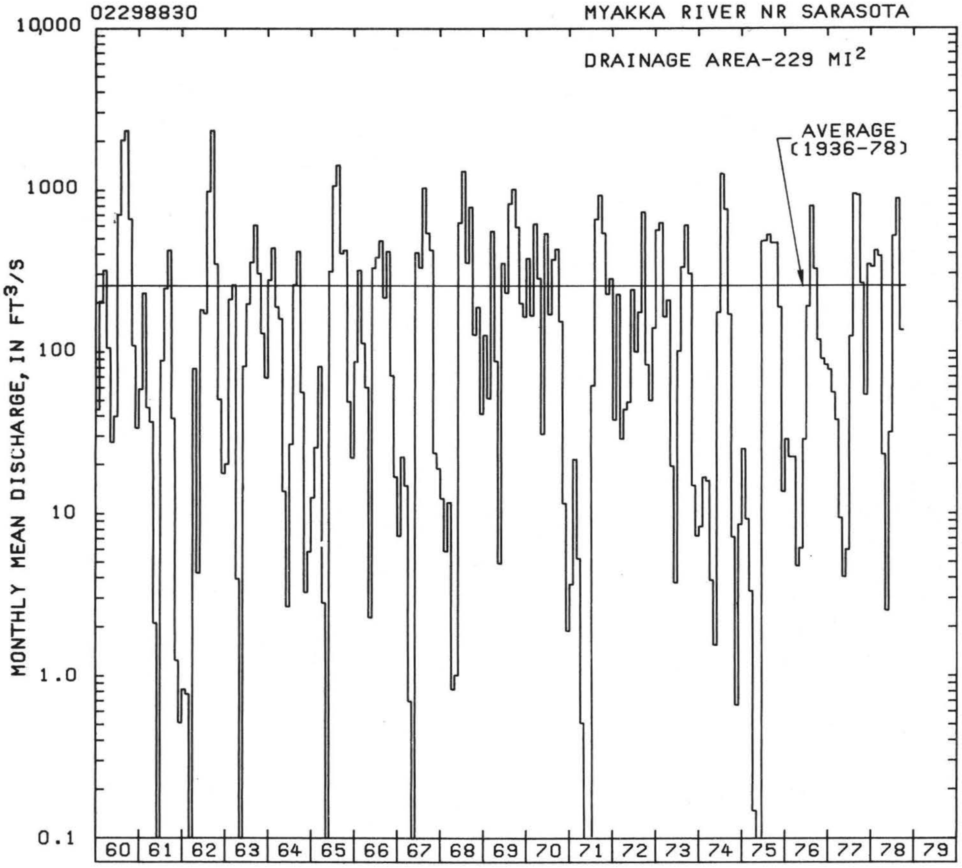
Discharge of coastal and central areas are illustrated by hydrographs for Myakka River at Sarasota, Little Manatee River near Wimauma, Alafia River at Lithia, Hillsborough River near Zephyrhills, Anclote River near Elfers, Brooker Creek near Tarpon Springs, and Pithlachascotee River near New Port Richey (fig. 15). The average discharge for the Myakka River for 1978 was 277 ft^3/s, and that for the Little Manatee River was 187 ft^3/s. Both were 110 percent of their long-term averages and appreciably higher than their respective discharges in 1977 (fig. 15a). Much of the higher average discharges can be attributed to the higher than normal discharge during the winter months.

Discharge of the Myakka River ranges widely between wet and dry seasons reflecting little sustained flow from ground water. The Little Manatee River has fairly uniform flow. The stream is affected slightly by diversions by the Manatee Power Plant.

Discharge for the Alafia River during 1978 averaged 257 ft^3/s, 71 percent of the long-term average and nearly twice as much as in 1977 (fig. 15b). Similarily, discharge for the Hillsborough River (194 ft^3/s, 73 percent of average) was almost twice that of 1977. Both streams have relatively high base-flow reflecting ground-water inflow during dry periods and contributions from springs. Higher than normal discharge during the winter months was instrumental in the higher average flow for the year at both gaging stations.

Discharge for the Anclote River near Elfers during 1978 averaged 42 ft^3/s, about 57 percent of the long-term average, but 2-1/2 times more than in 1977 (fig. 15c). As elsewhere in the District, above normal winter rains resulted in higher winter discharges and thus, higher annual discharge. The Anclote River drainage is primarily from wooded flatlands and pasture.

Brooker Creek drains a small area north of Tampa Bay much of which is swamps or lake area. Streamflow is highly variable. The average discharge during 1978 was 13 ft^3/s or about 59 percent of the long-term average (fig. 15c). The discharge was about 2-1/2 times that of 1977.



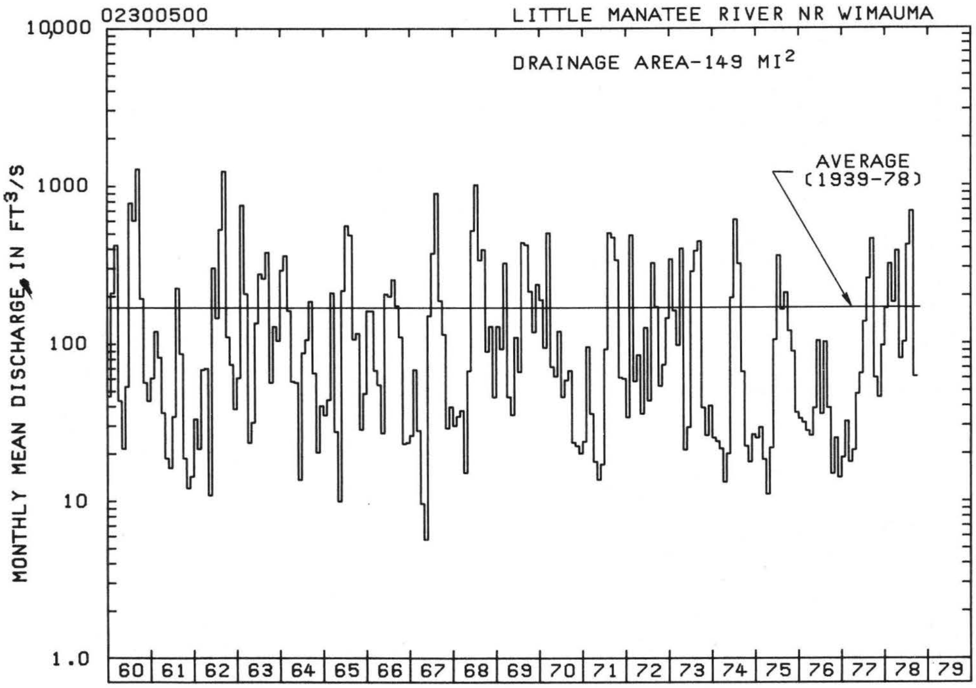
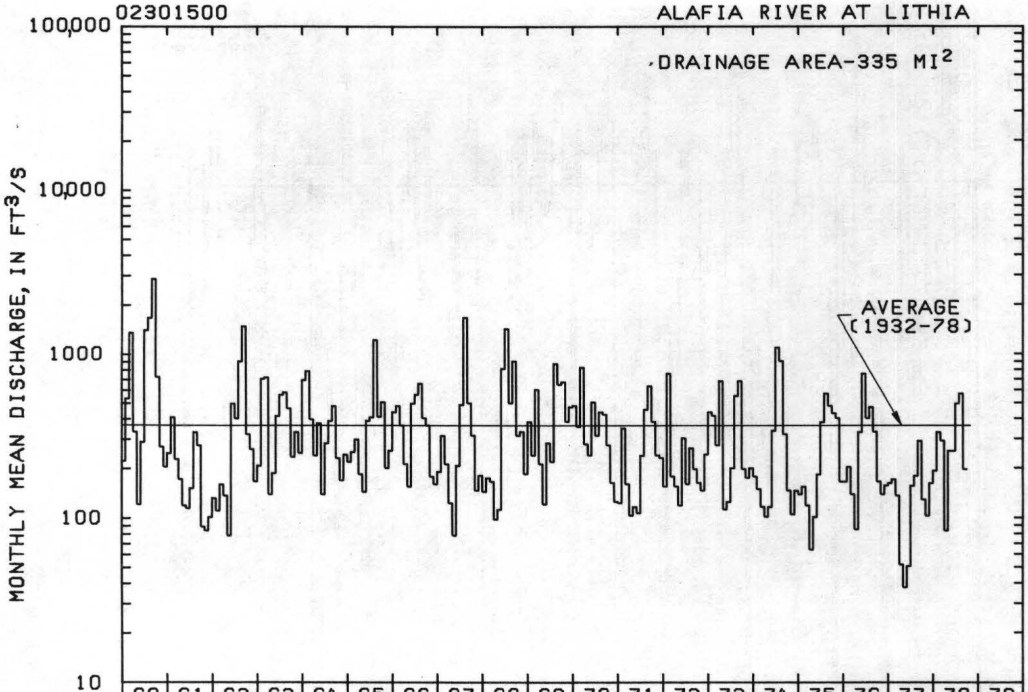


Figure 15a.--Discharge hydrographs for the Myakka and Little Manatee Rivers.



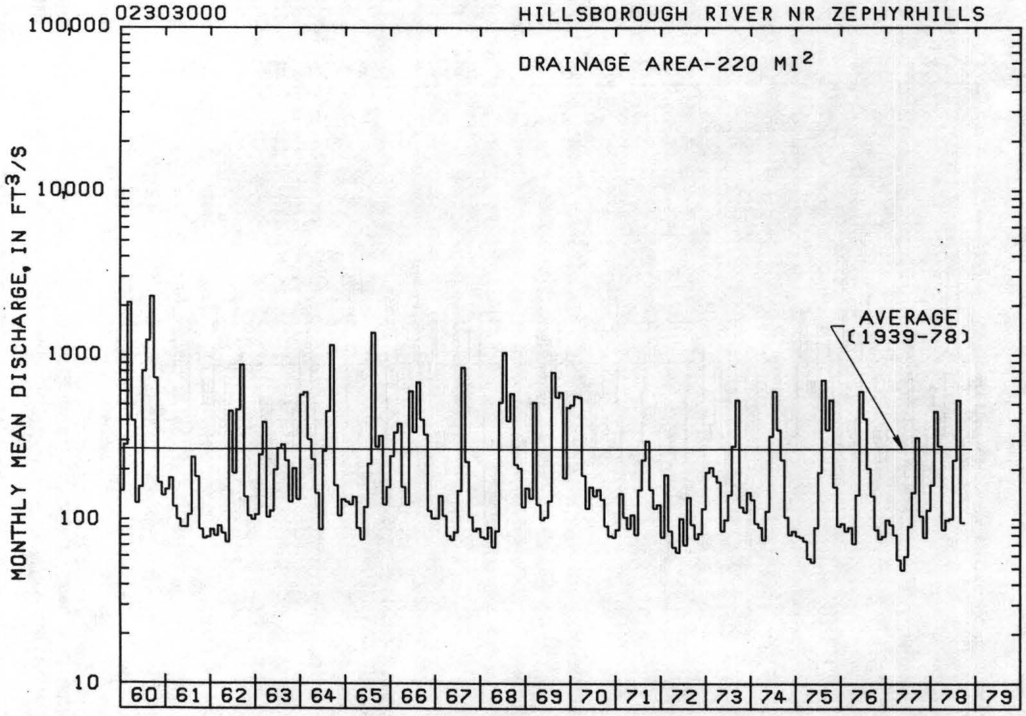
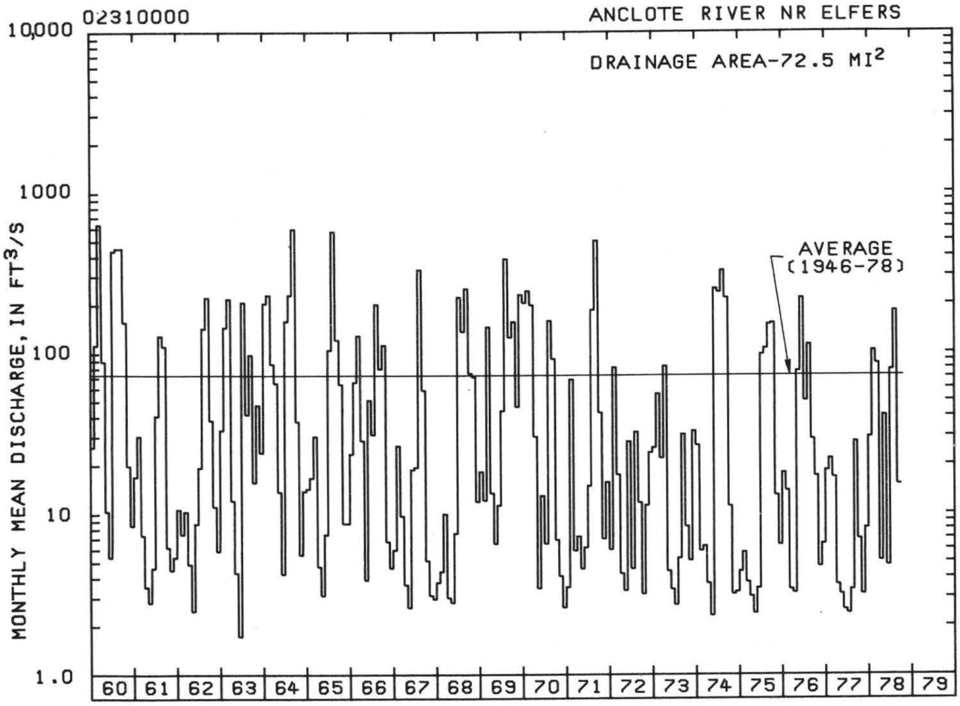


Figure 15b.--Discharge hydrographs for the Alafia and Hillsborough Rivers.



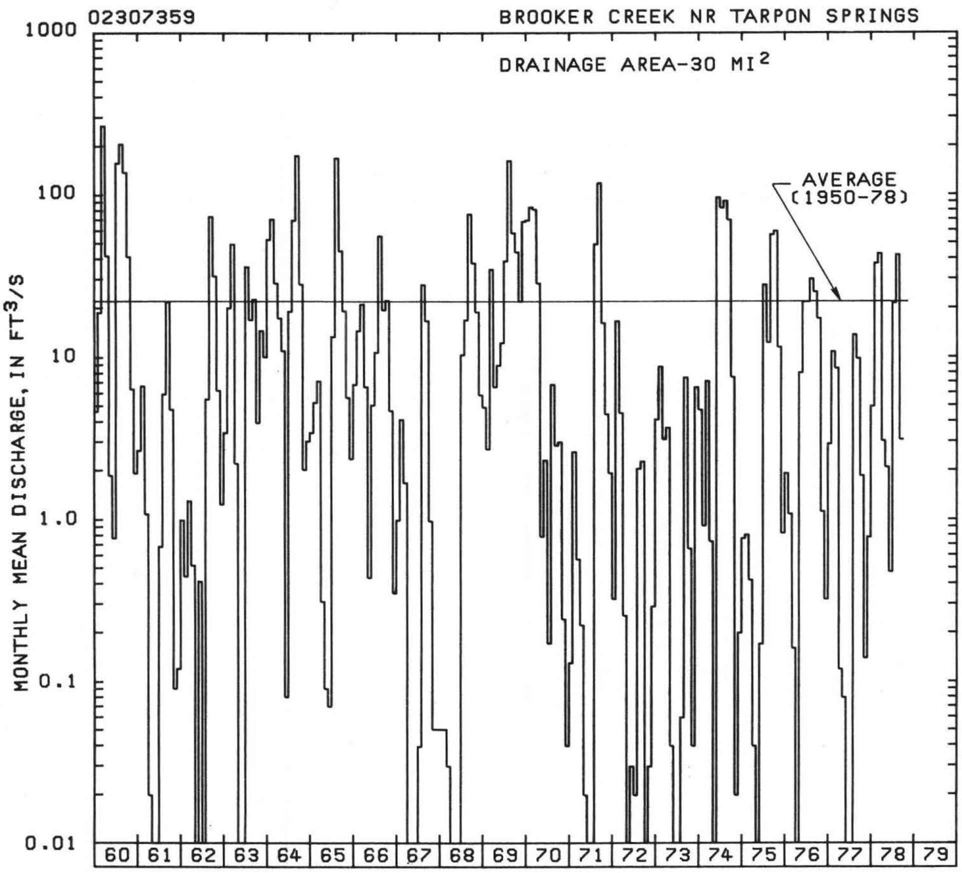


Figure 15c.--Discharge hydrographs for the Anclote River and Brooker Creek.

The Pithlachascotee River drains an area of swamps in the coastal plains and typifies flow characteristics in the northern part of the District. Discharge for the station near New Port Richey for 1978 was 24 ft^3/s, about 78 percent of the long-term average (fig. 15d). The higher discharge, about 2-1/2 times more than in 1977, can also be attributed, to a large extent, to higher than normal discharge during the winter months.

Many coastal streams in the northern part of the District are sustained by springs or spring clusters. Principal springs are Weeki Wachee and Chassahowitzka in western Hernando County and Homosassa Spring and the Crystal River spring complex in Citrus County. Discharge from the springs changes little from year-to-year or during any year. The range of measured discharge for Weeki Wachee during 1978, for example, was between 143 and 195 ft^3/s. The range during 1977 was between 138 and 186 ft^3/s. Discharges during the year may have been higher or lower than that reflected by the measurements but the range is indicative of the uniformity of flow. The maximum measured discharge of Weeki Wachee for the period of record was 275 ft^3/s, the minimum was 101 ft^3/s.

Lake Gage Network

A network of 124 lake stations was operated by the U.S. Geological Survey in the District in 1978 (fig. 16). Lake-stage data are needed to help local agencies manage lakes where legal stages have been established; to define fluctuations in stage in response to climatic factors and surface-water inflow and outflow; to define fluctuations as affected by regulation of inflow and outflow and by withdrawals and diversions; and to define relationships between lakes and aquifers. Lake-stage data are included in the report "Water Resources Data for Florida, Water Year 1978, Volume 3A: Southwest Florida."

Lake stages

Stages of inland lakes in the northern part of the District were generally below normal early in the water year, rose to above normal after December, and subsequently declined to below normal again late in the water year. The stage hydrograph for Lake Harris at Leesburg (fig. 17) illustrates the typical pattern.

In the southern part of the District, lake stages were also below normal early in the water year. By mid-year, stages rose to normal or above normal. The pattern of lake stage fluctuations in the south was more variable than in the north. At times, particularly late in the year, stages of some lakes were above normal whereas other lakes were somewhat

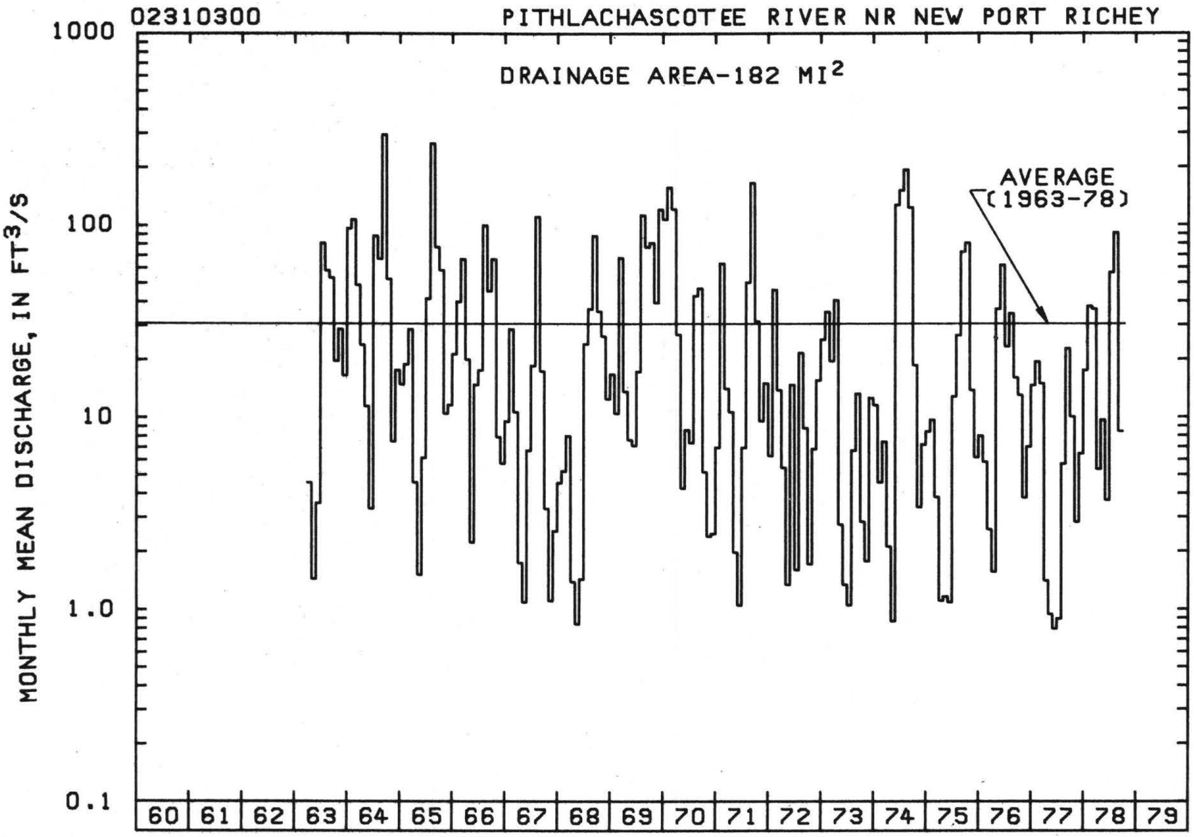
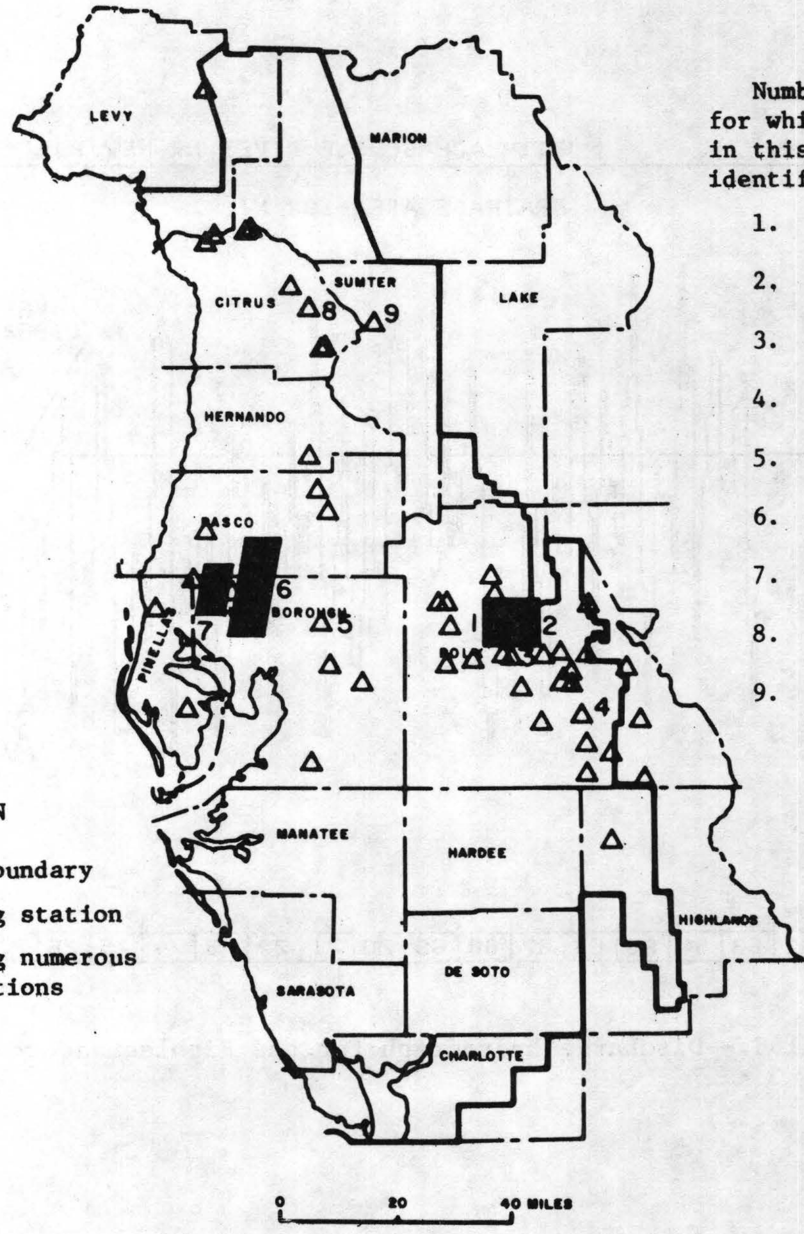


Figure 15d.--Discharge hydrograph for the Pithlachascotee River.



EXPLANATION

—— District boundary

△ 2 Lake gaging station

■ Area having numerous lake stations

IDENTIFICATION

Numbers indicate stations for which hydrographs are shown in this report (fig. 23) and identified below

1. Lake Howard at Winter Haven
2. Lake Hamilton near Lake Hamilton
3. Lake Otis at Winter Haven
4. Crooked Lake near Babson Park
5. Lake Carroll near Sulphur Springs
6. Lake Magdalene near Lutz
7. Keystone Lake near Odessa
8. Tsala-Apopka Lake at Inverness
9. Lake Panasoffkee near Lake Panasoffkee

Figure 16.--Locations of lake stations.

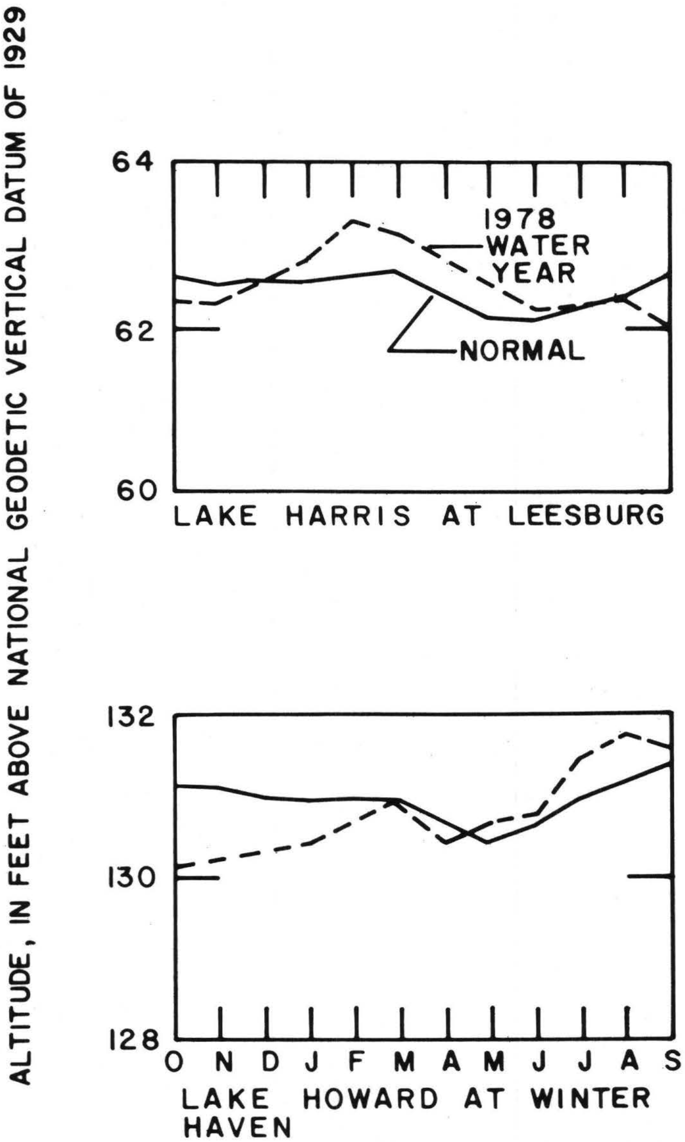


Figure 17.--Normal monthly and 1978 water-year monthly mean stages for Lake Harris and Lake Howard. (Lake Harris is outside the District but is typical of lakes in the northern part of the area.)

below normal. At year end most lakes were below normal. Lake Howard at Winter Haven (fig. 17) illustrates the general pattern of lake stage change.

Crooked Lake near Babson Park (typical of lakes in the east-central part of the District) established new lows for the months October through January. During February, Crooked Lake, though still extremely low, did not establish a new monthly low thereby ending a pattern of new monthly lows that had persisted for 25 consecutive months. Although no new lows were established during the remainder of the year, Crooked Lake continued in the lowest 25 percent of its long-term range of stages throughout the year, a trend which has continued for more than a year.

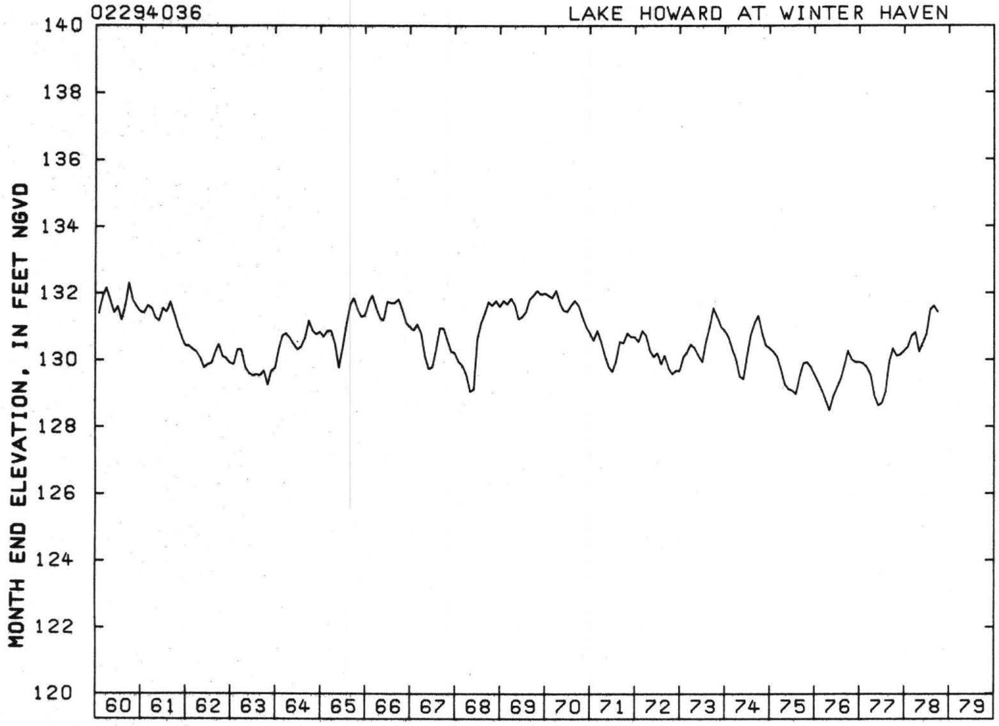
Following are descriptions of annual and long-term variations in stages of selected lakes in the District. Lakes were selected on the basis of relative size and importance and for areal coverage. Locations of lakes described are shown in figure 16.

Lake Howard and Lake Hamilton.--Lake Howard is in the Winter Haven Chain of Lakes and its stage is controlled to some extent by a concrete dam at the outlet of Lake Lulu, a downstream lake in the chain. During 1978, lake stages recovered somewhat from the low stages of 1977 and were more nearly normal (fig. 18a). The stage of Lake Hamilton is also regulated by a control structure. Stages for the lake also recovered from those of 1977 when a minimum low for the period of record was established (fig. 18a). The year-end lake stage was about 4 feet higher than the low experienced in 1977.

Lake Otis and Crooked Lake.--The stages of Lake Otis at Winter Haven remained fairly uniform throughout 1978 (fig. 18b) and were 3 to 4 feet higher than the record lows of 1976 and 1977. Stages of Crooked Lake near Babson Park also were higher than those of 1977 (fig. 18b). A minimum of record lake stage (112.72 feet NGVD) had been established on May 27, 1977. Stages at the end of the 1978 water year were about 3 feet higher than the 1977 low. Lake Otis is unregulated whereas Crooked Lake has a control structure on its outlet.

Lake Carroll and Lake Magdalene.--The stages of Lake Carroll near Sulphur Springs and Lake Magdalene near Lutz remained relatively uniform during 1978 and were at about the same stages as in 1977 (fig. 18c). Lake Carroll was about 1 to 2 feet lower than the long-term average. The stages of Lake Magdalene are maintained by a control structure on its outlet.

Keystone Lake, Tsala Apopka Lake, and Lake Panasoffkee.--The stages of Keystone Lake near Odessa were about normal during 1978, recovering from the unusual low stages in mid-1977 (fig. 18d). Outflow from Keystone Lake is regulated by a control structure, thus fluctuations in lake stages



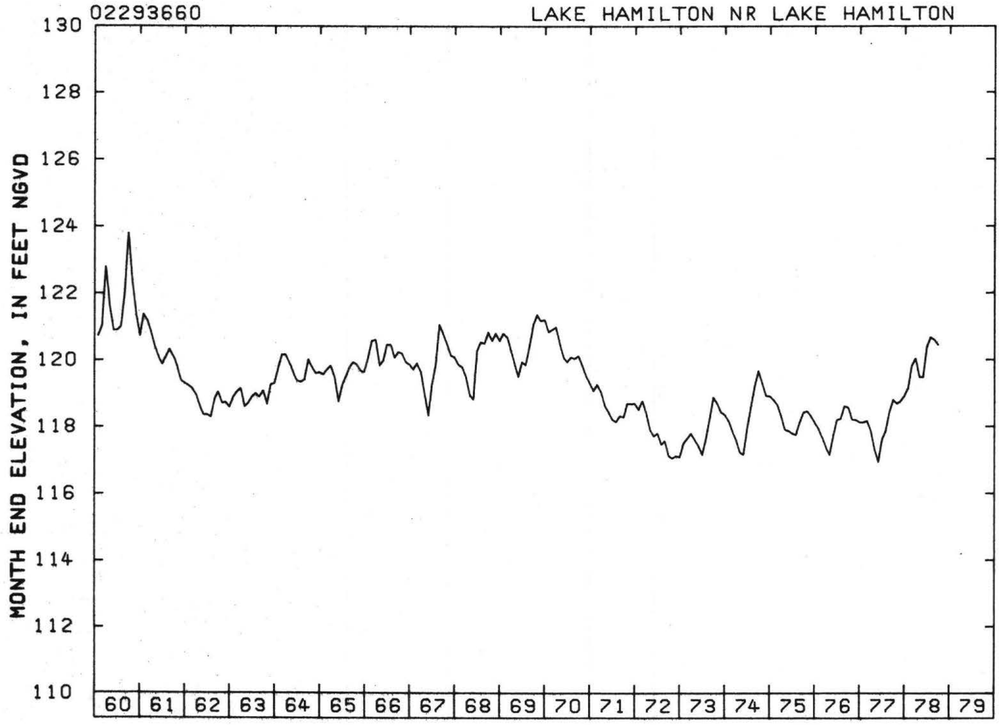
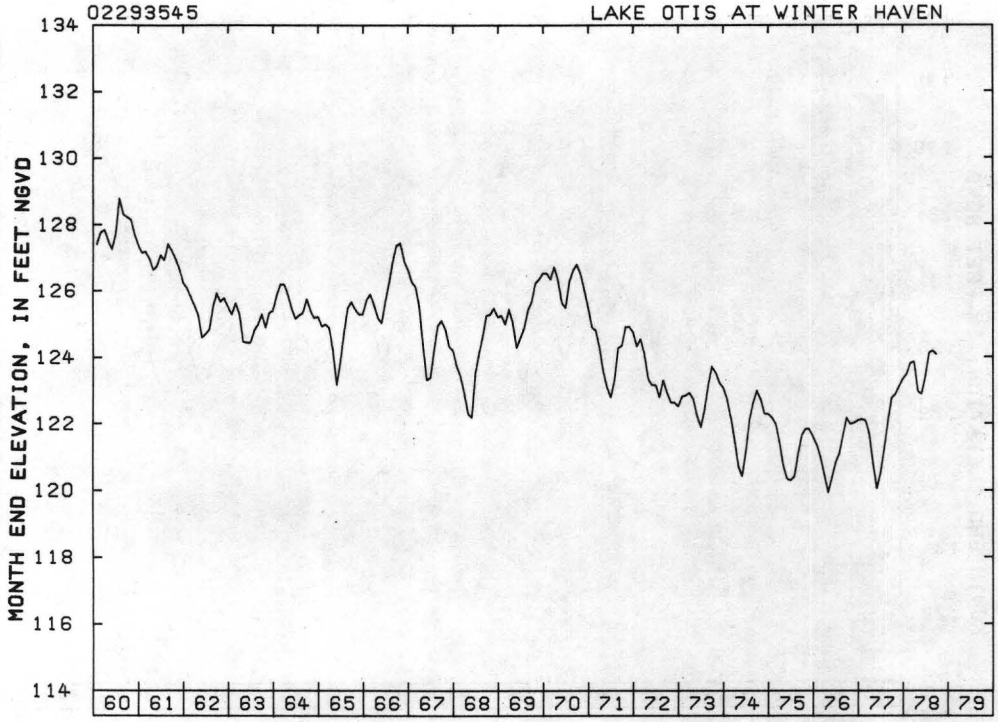


Figure 18a.--Stage hydrographs for Lakes Howard and Hamilton.



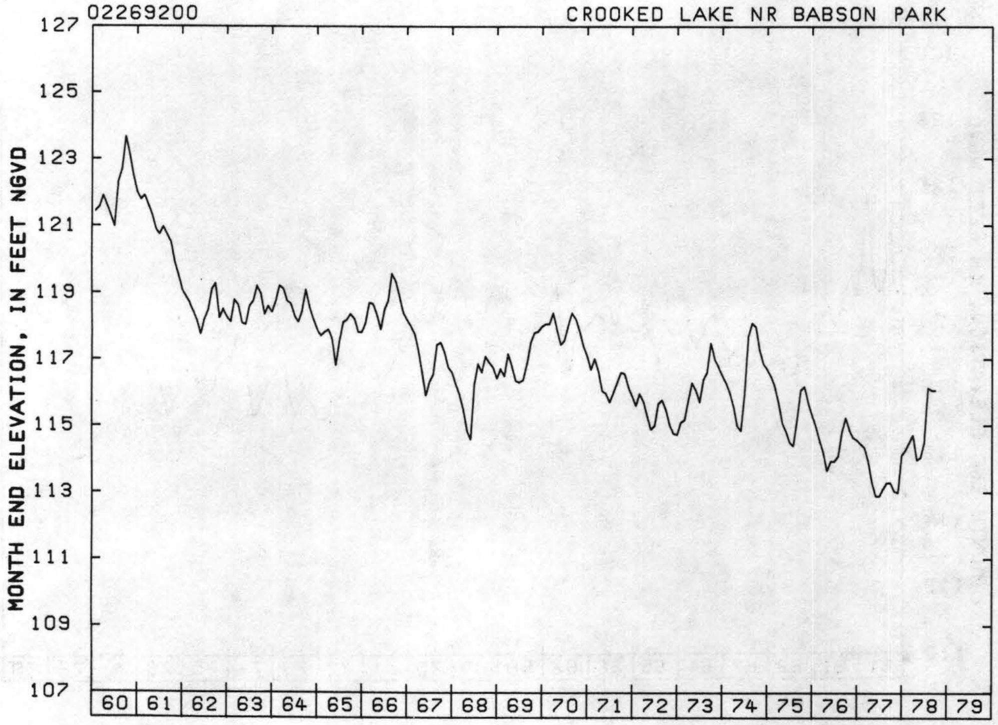


Figure 18b.--Stage hydrographs of Lake Otis and Crooked Lake.

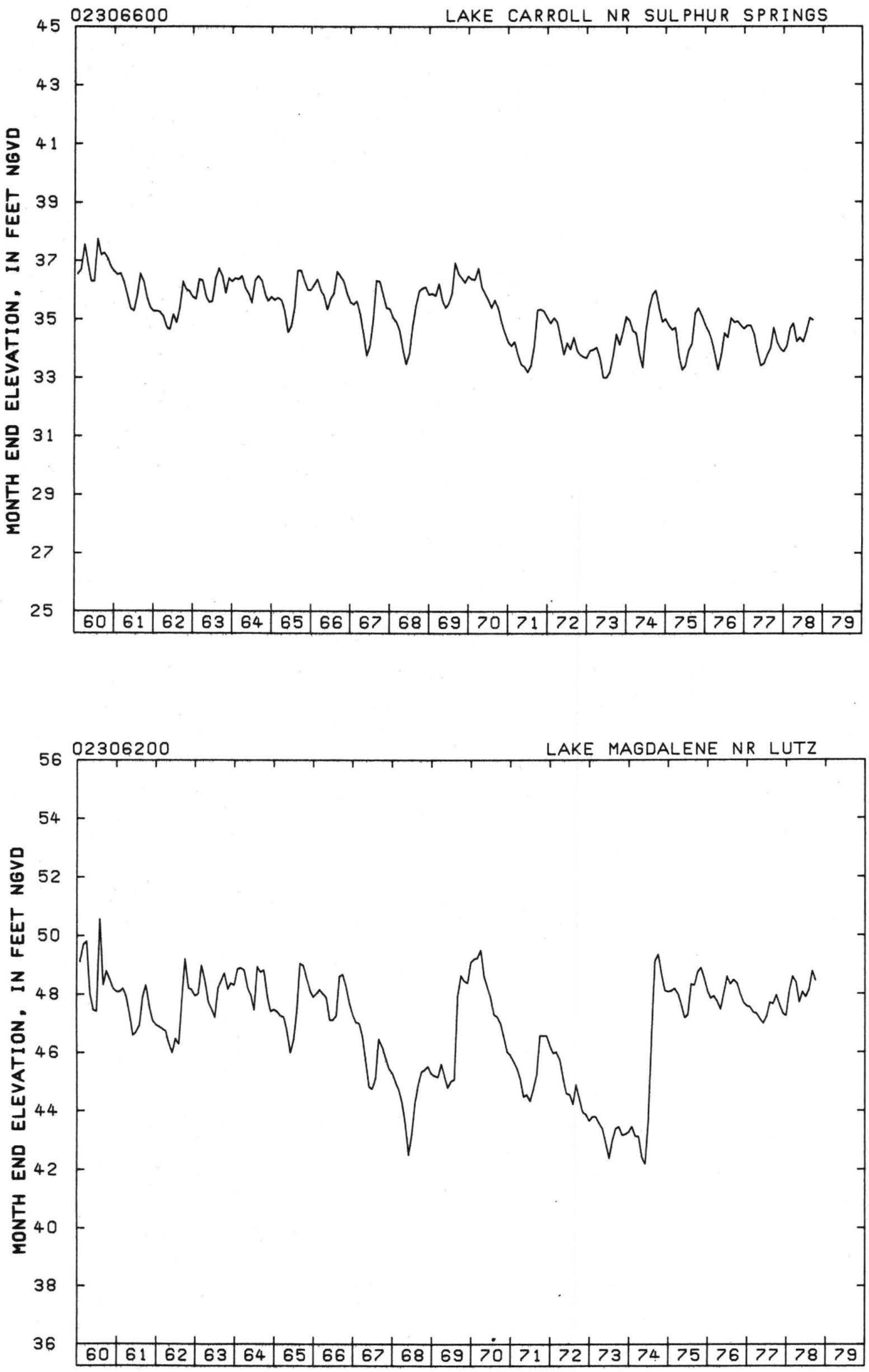


Figure 18c.--Stage hydrographs for Lakes Carroll and Magdalene.

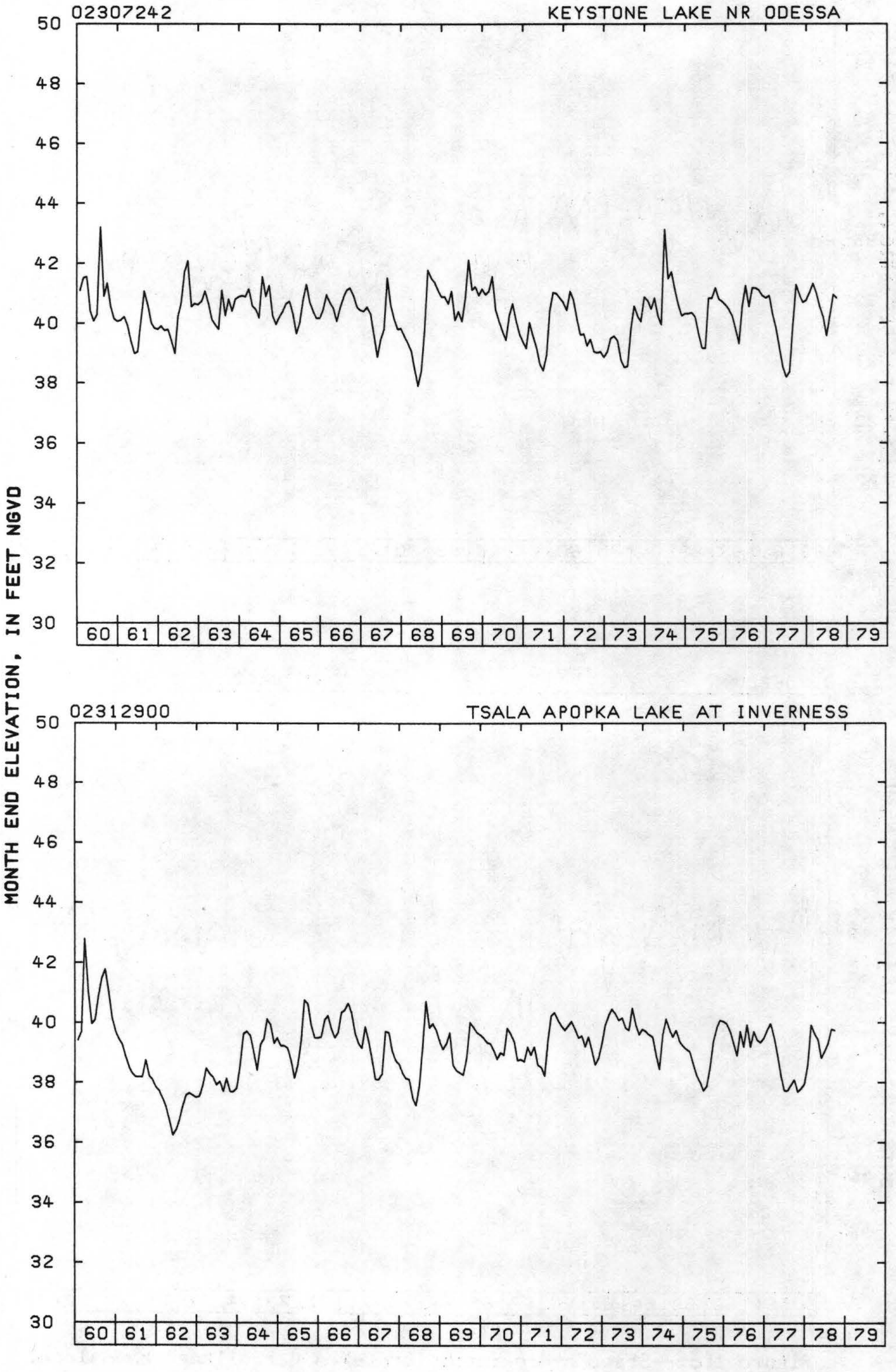


Figure 18d.--Stage hydrographs for Keystone Lake and Tsala Apopka Lake.

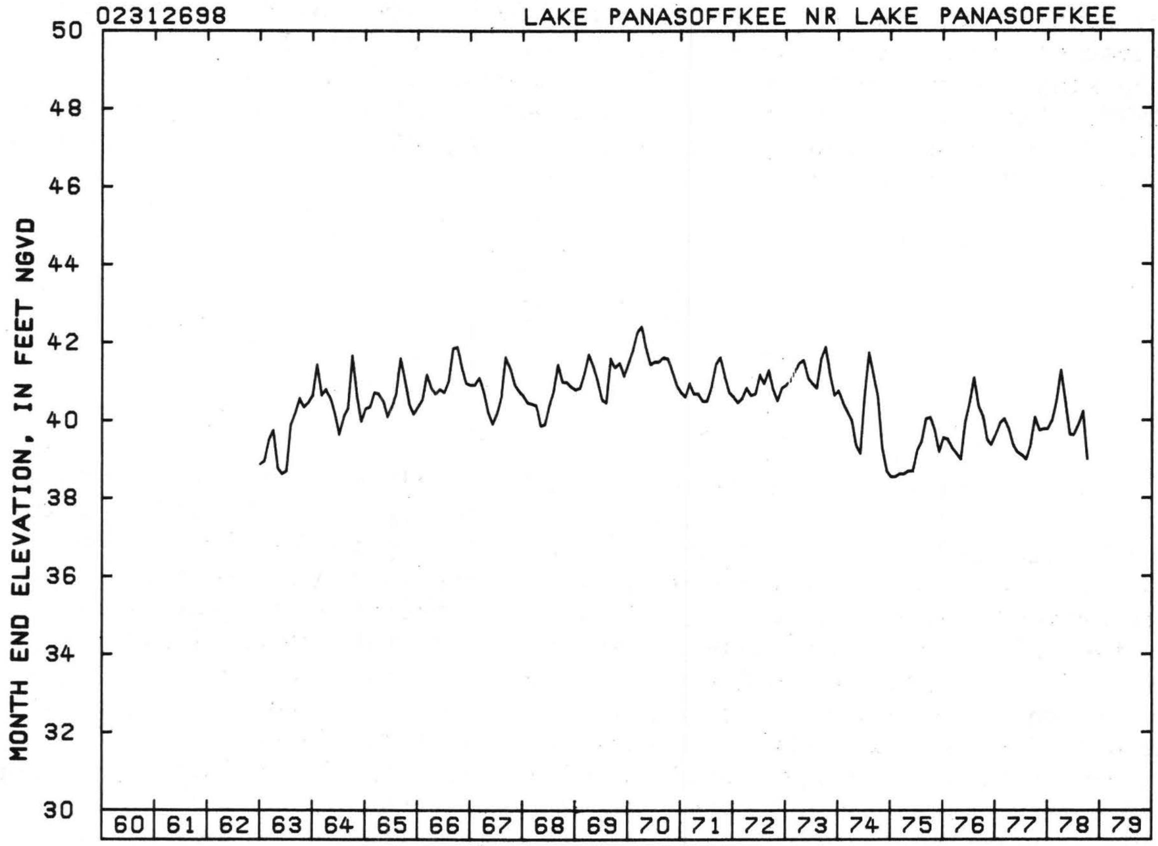


Figure 18e.--Stage hydrograph for Lake Panasoffkee.

are reduced. Tsala Apopka Lake is a large discontinuous series of shallow interconnected lakes, ponds, and marshes. The open water of Tsala Apopka Lake occurs in three separate pools or lake areas. They are the Floral City Pool (highest), the Inverness Pool (middle, reported here), and the Hernando Pool (lowest). Inflow and outflow from the pools are regulated by control structures. Stages of the lakes system, as reflected in the Inverness record (fig. 18d), show a recovery from the low stages of 1977. The stages throughout most of 1978 were about 2 feet higher than those of 1977. The stages of Lake Panasoffkee were slightly below normal throughout the year (fig. 18e). Lake stages are affected at times by backwater from the Withlacoochee River.

Ground Water

Ground-Water Monitoring Network

A network of 174 continuous and 208 periodic ground-water measurement sites was operated by the U.S. Geological Survey in the District during 1978 (fig. 19). Data from this network was supplemented by a network of 800 observation wells, where water-level data were obtained periodically, to define water table and potentiometric surface levels. Data from the networks provide information necessary for determining the effects of ground-water withdrawals for municipal, industrial, and agricultural supplies on water levels; to define the availability of water for municipal, industrial, and agricultural supply; to define the interrelationship between surface-water and ground-water resources and the effects of pumpage on surface-water bodies; to define the fluctuations in ground-water levels due to climatic factors; and to assure that the resource is being protected and used in a reasonable and beneficial manner. Data on ground-water levels are included in the report "Water Resources Data for Florida, Water Year 1978, Volume 3B: Southwest Florida."

Ground-water levels

Water levels in most observation wells open to the Floridan aquifer remained below average throughout the water year (fig. 20). October, November, and December were unusually low and some record lows were established for those months. Levels recovered to near long-term average conditions after December. Water levels declined somewhat in April but recovered again during the rainy summer period.

Hydrographs illustrating annual and long-term fluctuations of ground-water levels have been prepared for selected observation wells in the District (fig. 19). Hydrographs of month-end elevations of water level are shown in figure 21. All wells selected are open to the Floridan aquifer. The selection was made primarily on the basis of areal coverage.

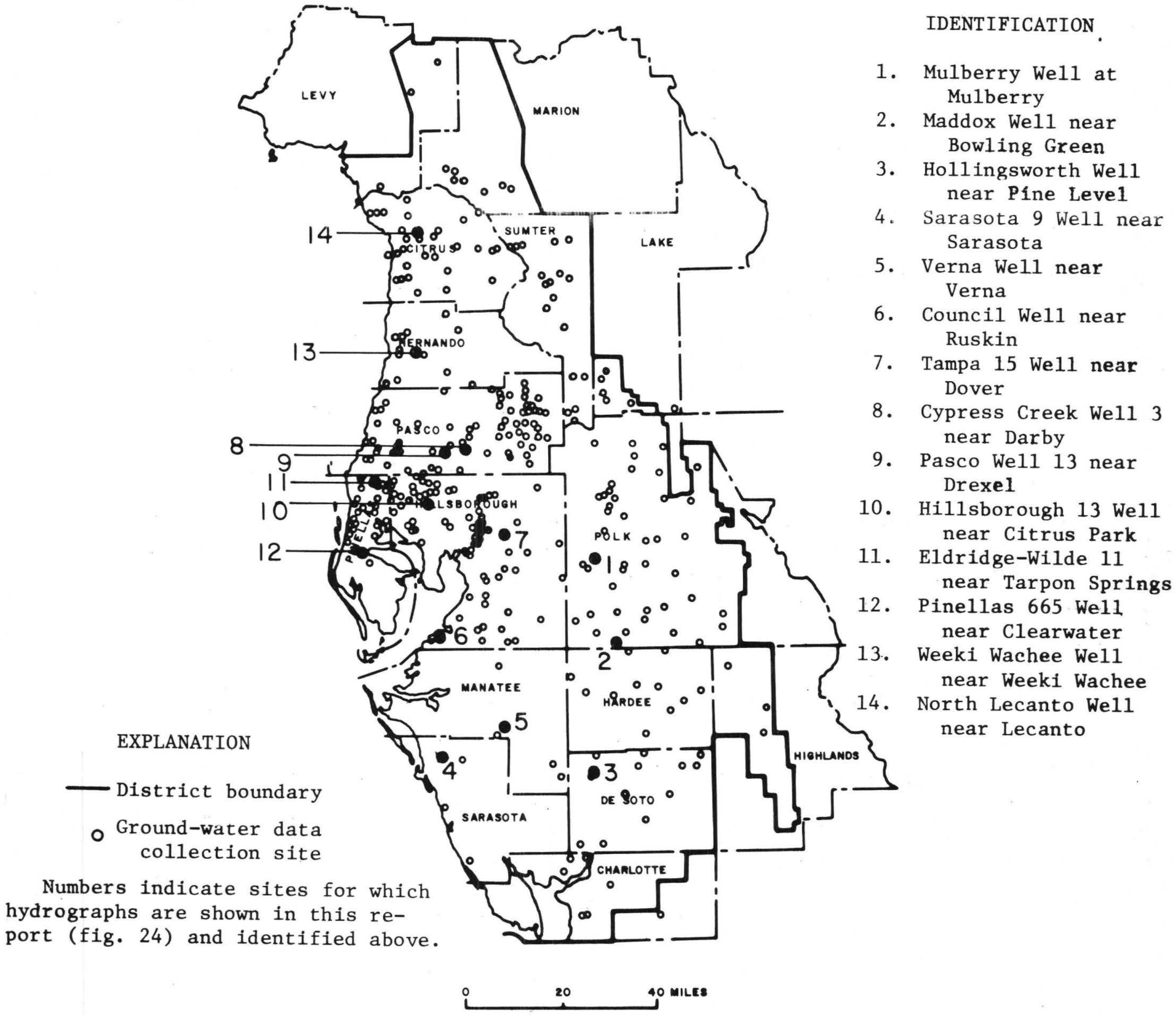


Figure 19.--Locations of observation wells.

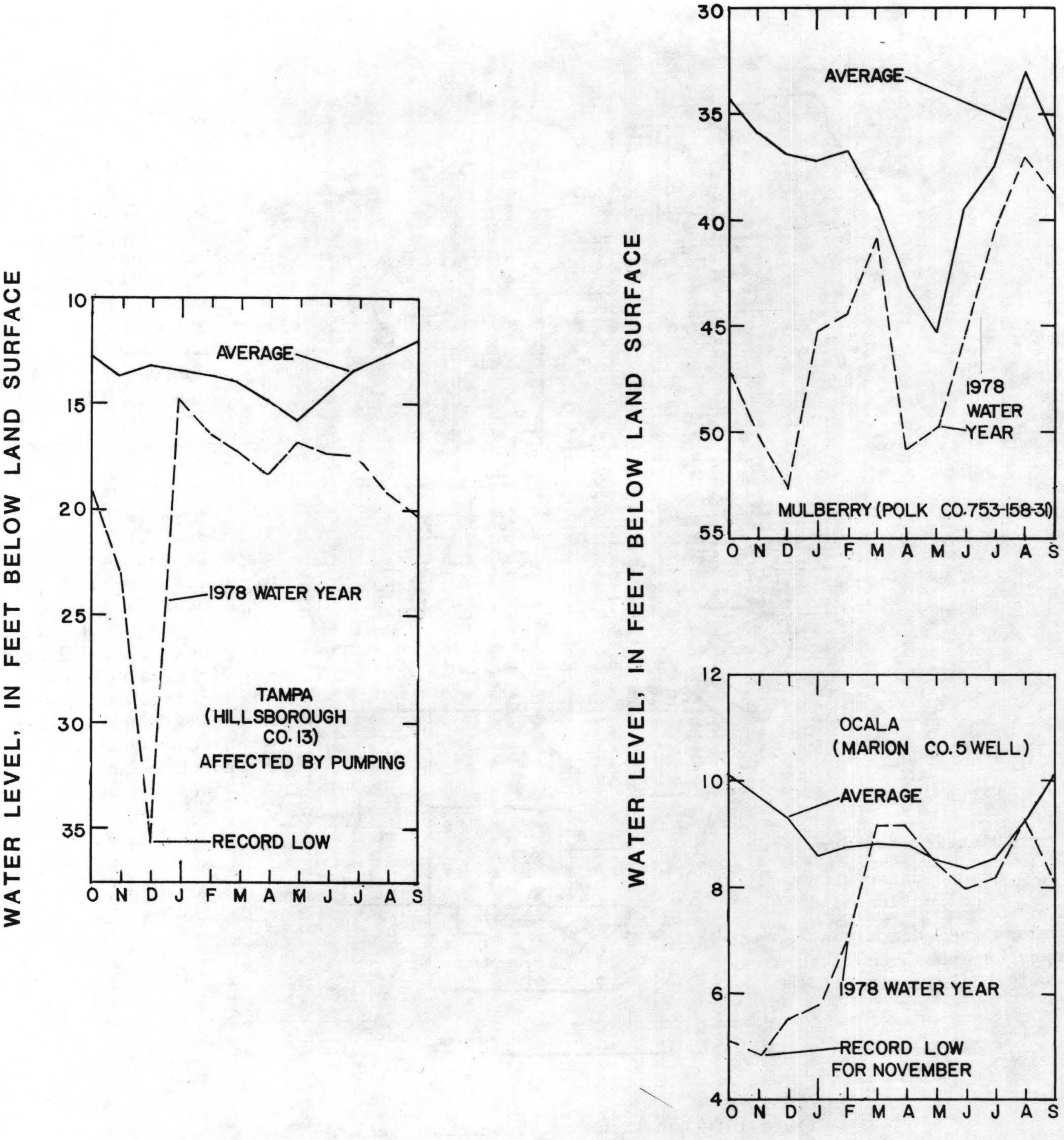


Figure 20.--Month-end average and 1978 water-year levels for selected wells. (The Ocala well is outside the District but is representative of the northern part of the District.)

Mulberry, Bowling Green, and Pine Level Wells.--Changes in water levels of the Floridan aquifer in the Peace River basin are represented by hydrographs of the Mulberry deep well at Mulberry, Maddox well near Bowling Green, and Hollingsworth deep well near Pine Level (figs. 21a and 21b). Water levels in the Mulberry and Maddox wells continued to rise from the low levels of 1975 and were substantially higher than those of 1977. The 1978 year-end levels of the Mulberry well were about 7 feet higher than those of 1977; levels of the Maddox well were about 11 feet higher. Water levels in both wells are affected by pumpage for industrial and irrigation supplies. Their levels fluctuate 25 to 30 feet annually reflecting, in part, the effects of pumping. The well at Mulberry has experienced a long-term range in levels of about 61 feet; the Bowling Green well has a range of 52 feet. Water levels of the Pine Level well for 1978 were highest since 1975, but the differences are not as great. Water levels in the well reflect changes in precipitation. Their long-term range is only about 19 feet and the annual range is about 15 feet.

Sarasota and Verna Wells.--Water levels in Sarasota well 9 near Sarasota and Verna deep well 1A near Verna showed continued recovery from the record low levels of 1975 (fig. 21b). Water levels in both wells are affected by seasonal pumping of nearby irrigation wells. These effects are reflected in the low levels of May of most years and the 15- to 20-foot seasonal variations in levels. Seasonal variations in water levels have increased in recent years reflecting greater withdrawals for irrigation.

Ruskin, Dover, and Citrus Park Wells.--Changes in water levels in Hillsborough County are illustrated by hydrographs of water levels for Council deep well near Ruskin, Tampa well 15 near Dover, and Hillsborough deep well 13 near Citrus Park (fig. 21c). Water levels in each of the wells were slightly higher than those of 1977 and continue to reflect recovery from the record low levels of previous years. Water levels in the wells near Ruskin and Dover are affected by pumpage of nearby wells for irrigation water. Levels in the Citrus Park well are affected by pumpage of nearby wells for public supply.

Drexel and Darby Wells.--Water levels in Pasco County are illustrated by hydrographs for Pasco well 13 near Drexel and Cypress Creek well 3 near Darby (fig. 21d). Levels in Pasco well 13 during 1978 were slightly higher than those of 1977 and were about 3 feet higher than the record low of June 1977. Water levels in the well show little change over the years (about 7 feet) and relatively small seasonal changes in levels (about 3 feet). Water levels in the Cypress Creek well were about 6 feet higher than the record low of 1977 but were somewhat lower than those of earlier years. The lower levels reflect the effects of pumpage from the Cypress Creek well field for municipal supply. The low levels of 1977 resulted, in part, from a pumping test conducted during that year.

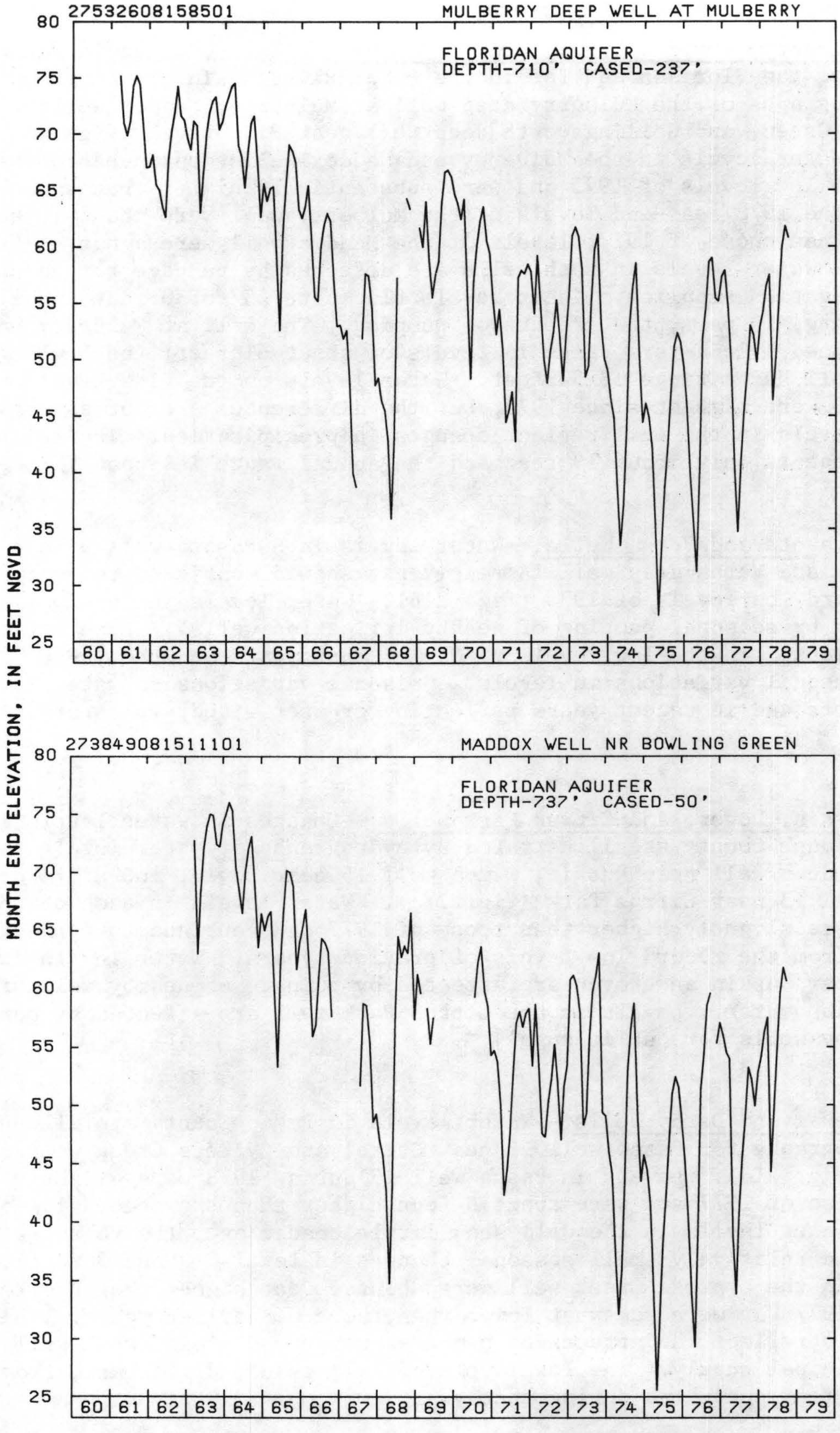


Figure 21a.--Month-end water-level hydrographs for wells at Mulberry and near Bowling Green.

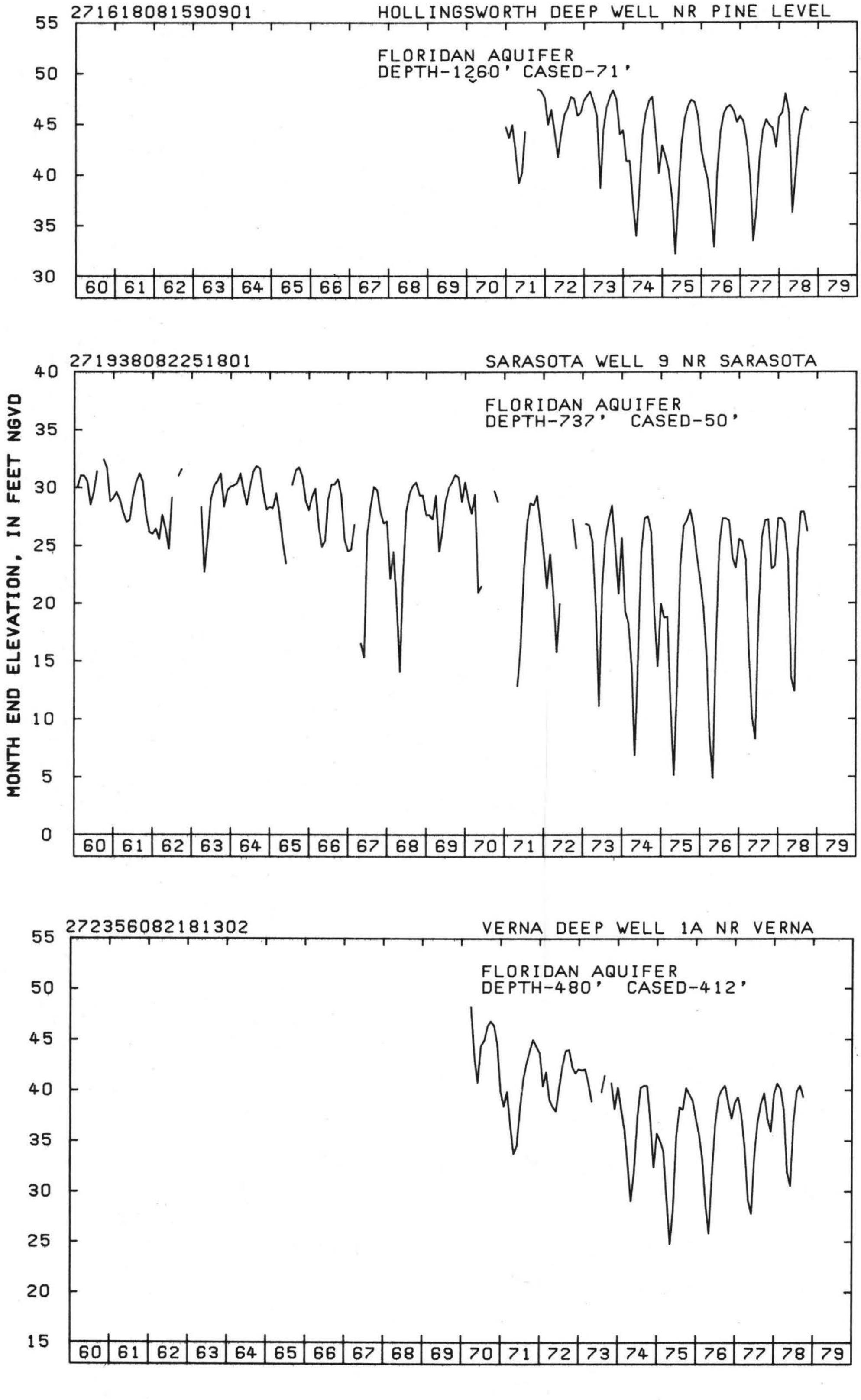


Figure 21b.--Month-end water-level hydrographs for wells near Pine Level, Sarasota, and Verna.

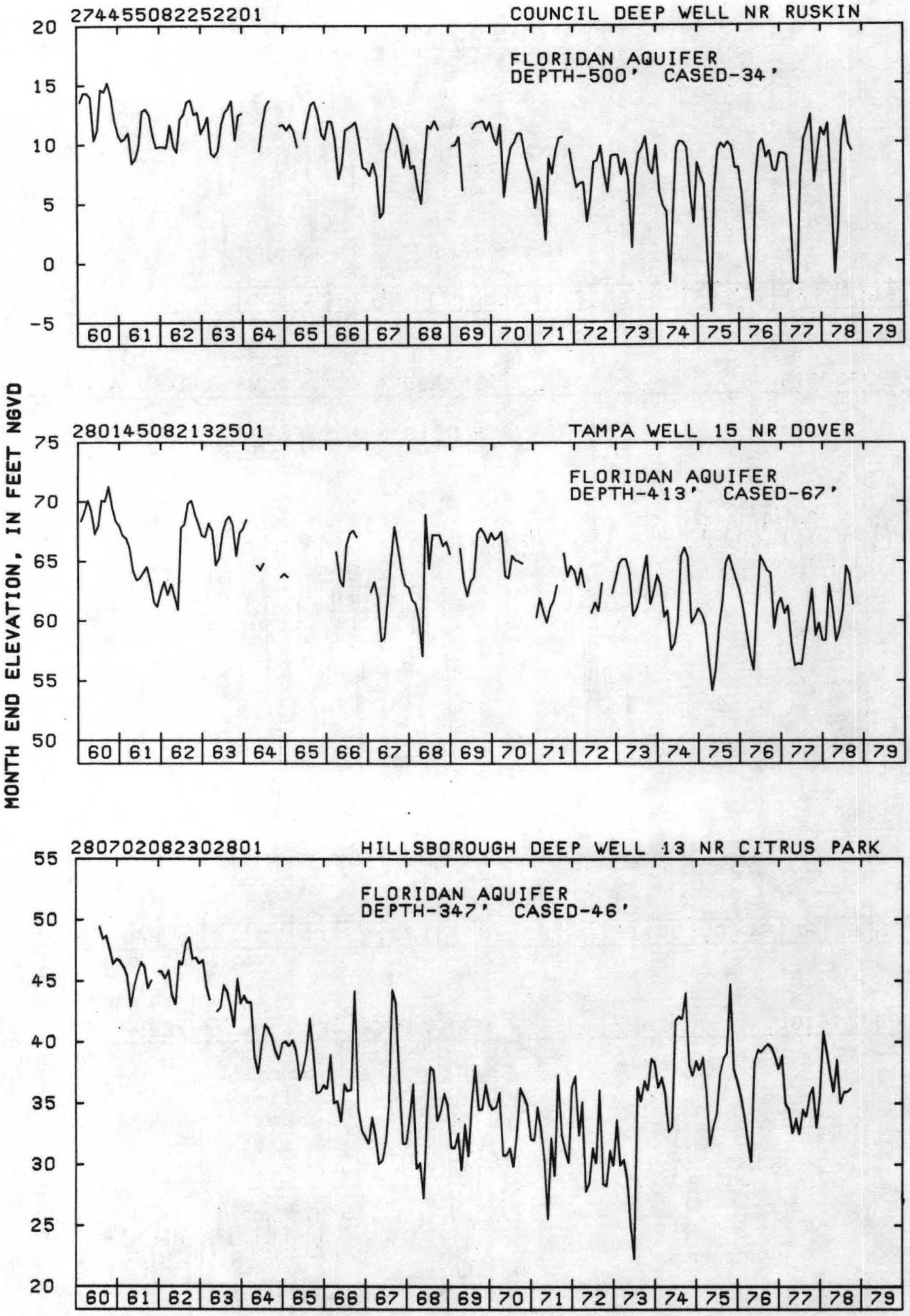


Figure 21c.--Month-end water-level hydrographs for wells near Ruskin, Dover, and Citrus Park.

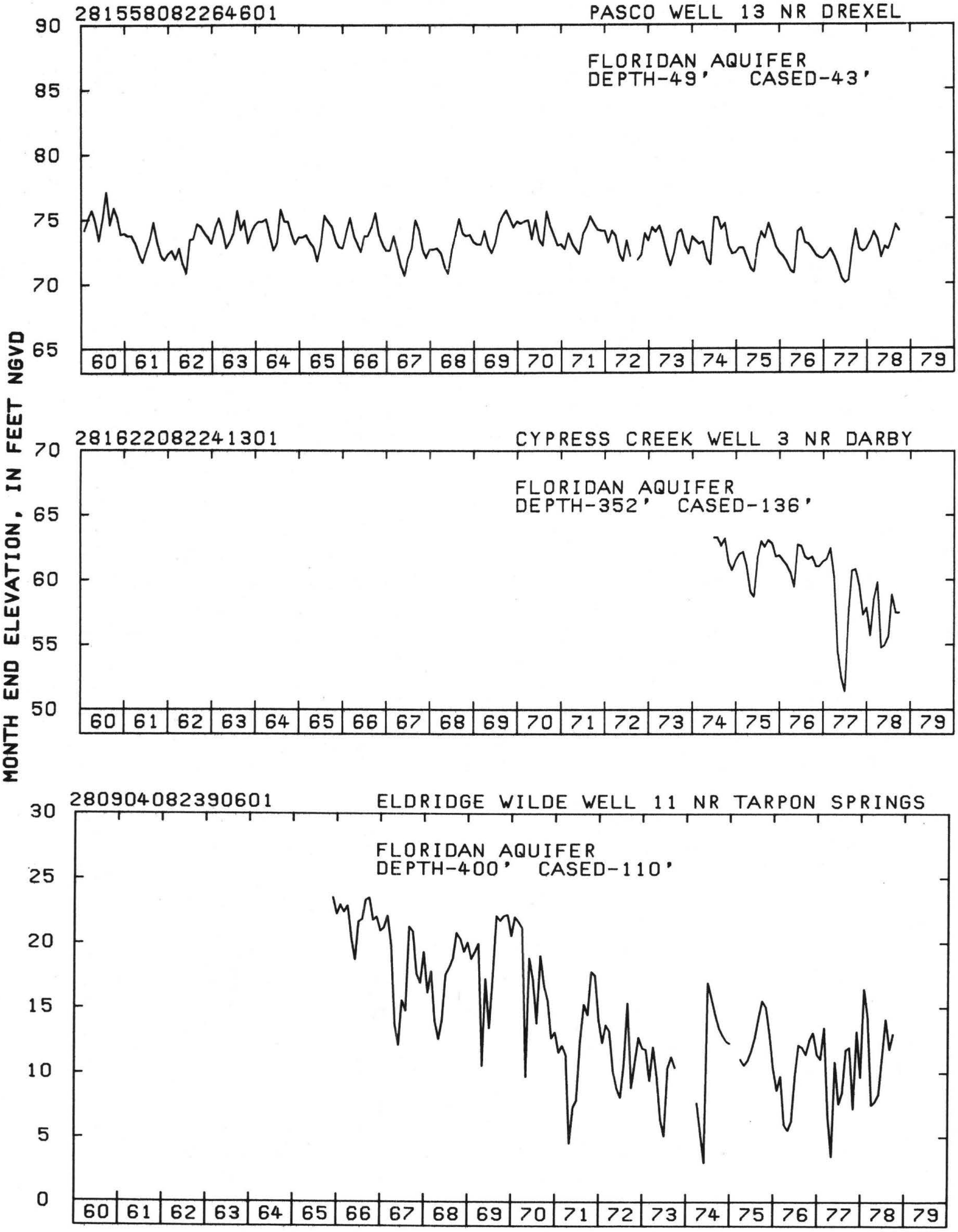


Figure 21d.--Month-end water-level hydrographs for wells near Drexel, Darby, and Tarpon Springs.

<u>Tarpon Springs and Clearwater Wells</u>.--Hydrographs of water levels in the Eldridge-Wilde well 11 near Tarpon Springs and Pinellas well 665 near Clearwater, Pinellas County, are shown in figures 21d and 21e, respectively. Levels in the Eldridge-Wilde well were slightly higher than those of 1977 but remained well below those of earlier years. Water levels of Pinellas well 665 were about the same as those for 1977. The well has exhibited a long-term gradual decline in water levels but fluctuates little seasonally. Water levels in both wells are affected by pumping of nearby wells for public supply.

<u>Weeki Wachee and Lecanto Wells</u>.--Water levels in the northern part of the District are illustrated by hydrographs of water levels for Weeki Wachee well near Weeki Wachee (Hernando County) and North Lecanto deep well near Lecanto (Citrus County) in figure 21e. Water levels in both wells are slightly higher than those for 1977 but were slightly lower than the long-term average levels. Water levels of the Lecanto well remain uniform from year-to-year and during any year. The maximum range in water level has been less than 4 feet during the period of record.

<u>Potentiometric Surface and Water Table</u>.--Potentiometric surface and water-table levels respond to rainfall, evapotranspiration, streamflow, ground-water withdrawal, lake levels, and tides. Maps of the potentiometric surface of the Floridan aquifer are prepared twice each year. Measurements of water levels are made in about 900 wells each May and September. Maps produced from these data describe water-level conditions during the dry and wet seasons. Figures 22 and 23 are reduced reproductions of maps prepared during 1978. Water levels for May 1978 reflect seasonal declines from those of September 1977 (Buono and others, 1978). Heavy rains during the normally dry winter months, however, recharged the ground-water reservoir and lessened the amount of decline. Declines throughout most of the District were generally less than 10 feet. However, declines of about 20 feet occurred in the Manasota Basin. Unusually heavy rains in the northern part of the District (fig. 8) caused water levels in May 1978 in the northern part of the Withlacoochee Basin to be slightly higher than those of September 1977. Water levels for May 1978 were about the same as those for May 1977 in the northern part of the District, but were generally 5 to 10 feet higher in the southern part.

Water levels between May and September 1978, when ground-water recharge normally is greatest, showed very little change. Levels throughout the northern half of the District were unchanged or rose only a few feet. In the southern half of the District, however, water levels were as much as 20 feet higher in September than they were in May and much of the area had levels that were about 10 feet higher. The greatest increases in levels occurred in the Manasota Basin reflecting, primarily, reduced pumpage for agricultural uses. Generally, water levels for September 1978 were about the same as those for September 1977.

Potentiometric surface and water-table maps for May and September are also prepared for selected municipal well fields. These maps illustrate the effects of local ground-water withdrawals on water levels.

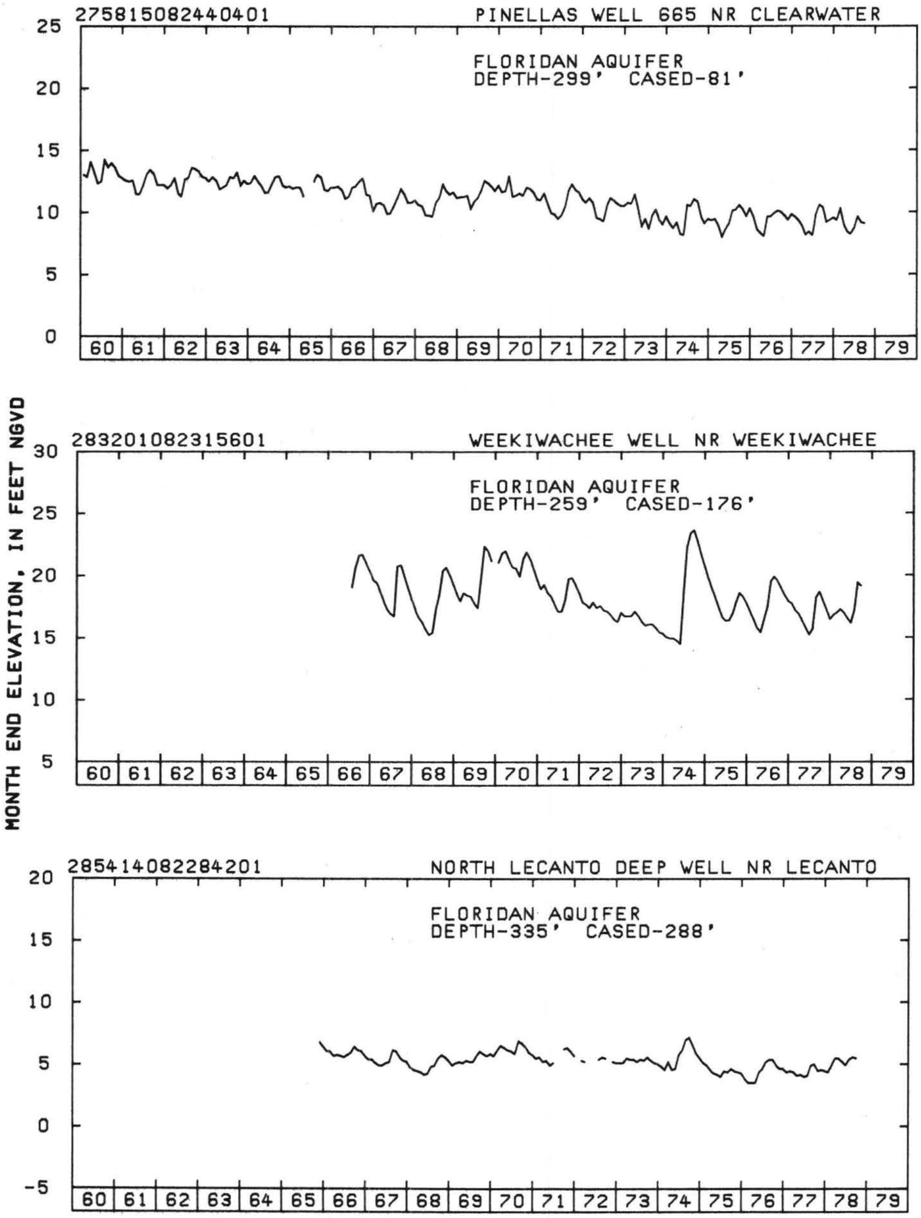


Figure 21e.--Month-end water-level hydrographs for wells near Clearwater, Weeki Wachee, and Lecanto.

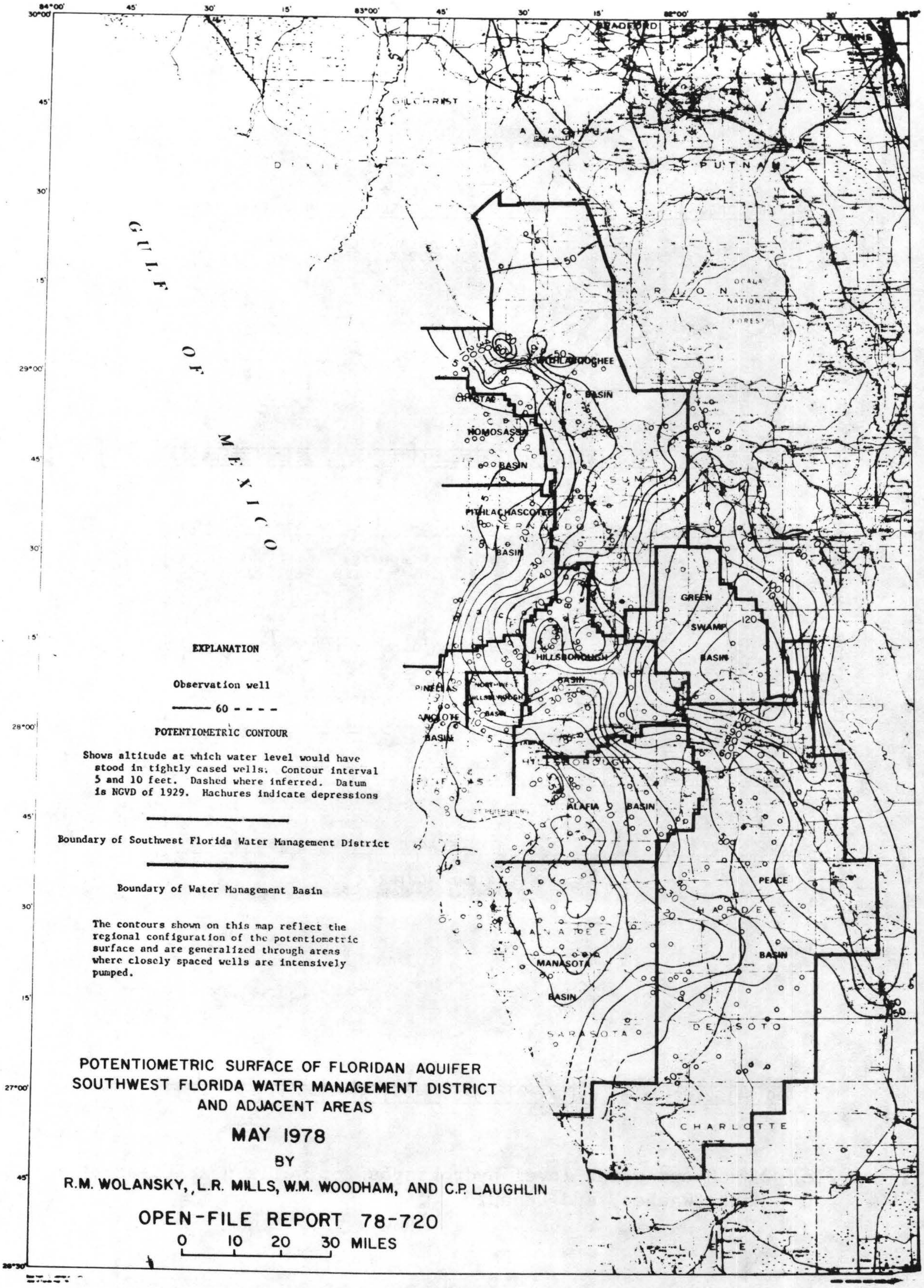


Figure 22.--Potentiometric surface of the Floridan aquifer, May 1978 (from Wolansky, Mills, Woodham, and Laughlin, 1978a).

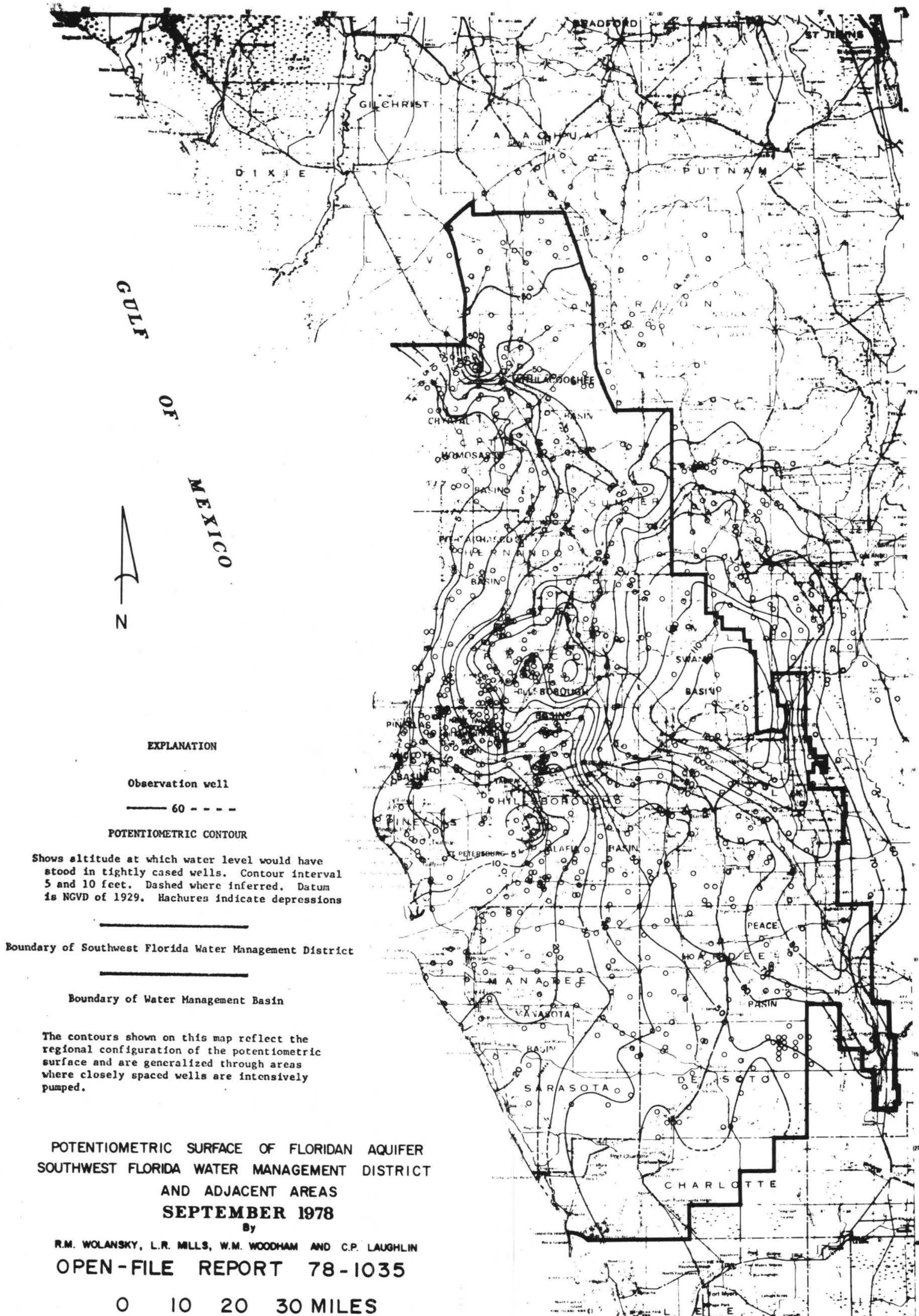


Figure 23.--Potentiometric surface of the Floridan aquifer, September 1978 (from Wolansky, Mills, Woodham, and Laughlin, 1978b).

Figures 24 to 27 are reduced reproductions of maps prepared during 1978. In May 1978, water levels in most observation wells in the surficial and Floridan aquifers (figs. 24 and 25) were lower than those of September 1977 (Buono and others, 1978). Water levels declined in spite of heavier than normal rains during the winter months. In addition to the normal seasonal decline in levels, increased pumpage also was a factor in the declines. Pumpage at the 11 well fields illustrated increased from 82 Mgal/d to 144 Mgal/d between September 1977 and May 1978.

In September 1978, water levels in most observation wells in the surficial and Floridan aquifers were higher than those of May 1978. Most of the recovery of levels reflect seasonal trends. Reduced pumpage from most well fields also was a factor in water-level recovery. Pumpage from the well fields was 107.5 Mgal/d compared to the 144 Mgal/d in May. Pumpage from the Pasco well field, however, increased from 11.9 to 15.5 Mgal/d. The increased pumpage was reflected in a decline of more than 5 feet in the potentiometric surface.

The potentiometric surface in most well fields was generally 2 to 4 feet higher in May 1978 than in May 1977. Only water levels in the Eldridge-Wilde and Morris Bridge well fields were lower. Levels in the Pasco well field were as much as 10 feet higher in May 1978 than those of May 1977. Similarily, the water table was higher in May 1978 than in May 1977. Levels were generally 2 feet higher and ranged from no change to about 4 feet higher.

The potentiometric surface in most well fields in September 1978 was generally lower than that of September 1977. The potentiometric surface was about 3 feet lower in 1978 and ranged from no change to about 8 feet lower. The water table in September 1978 was about the same or only slightly lower than that of September 1977.

Quality of Water

Quality of Water Monitoring Network

The ground- and surface-water quality monitoring network was established to provide data necessary for local agencies to: (1) define location and movement of the saltwater-freshwater interface; (2) locate areas where ground-water quality is deteriorating from sources other than seawater; (3) monitor movement of leachates from landfills and spray-effluent irrigation sites; (4) predict long-term changes in the quality of ground water, streamflow, and lakes; and (5) make water-quality management decisions.

Water samples are analyzed for major inorganic constituents, trace elements, radiochemical constituents, organics, and biological characteristics. Samples of water are collected by the U.S. Geological Survey

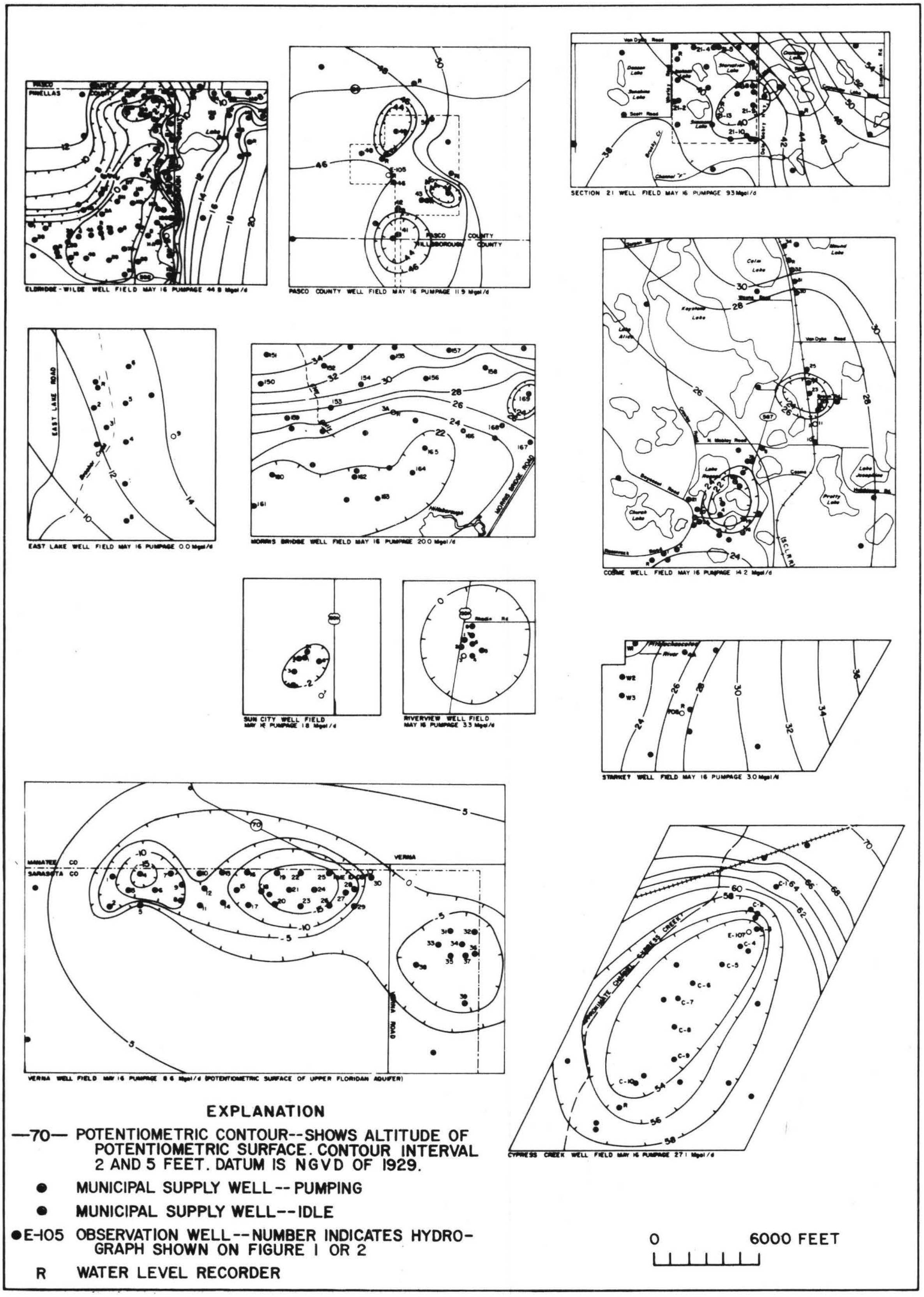


Figure 24.--Potentiometric surface of the Floridan aquifer in selected well fields, May 1978 (from Wolansky, Mills, and Woodham, 1978a).

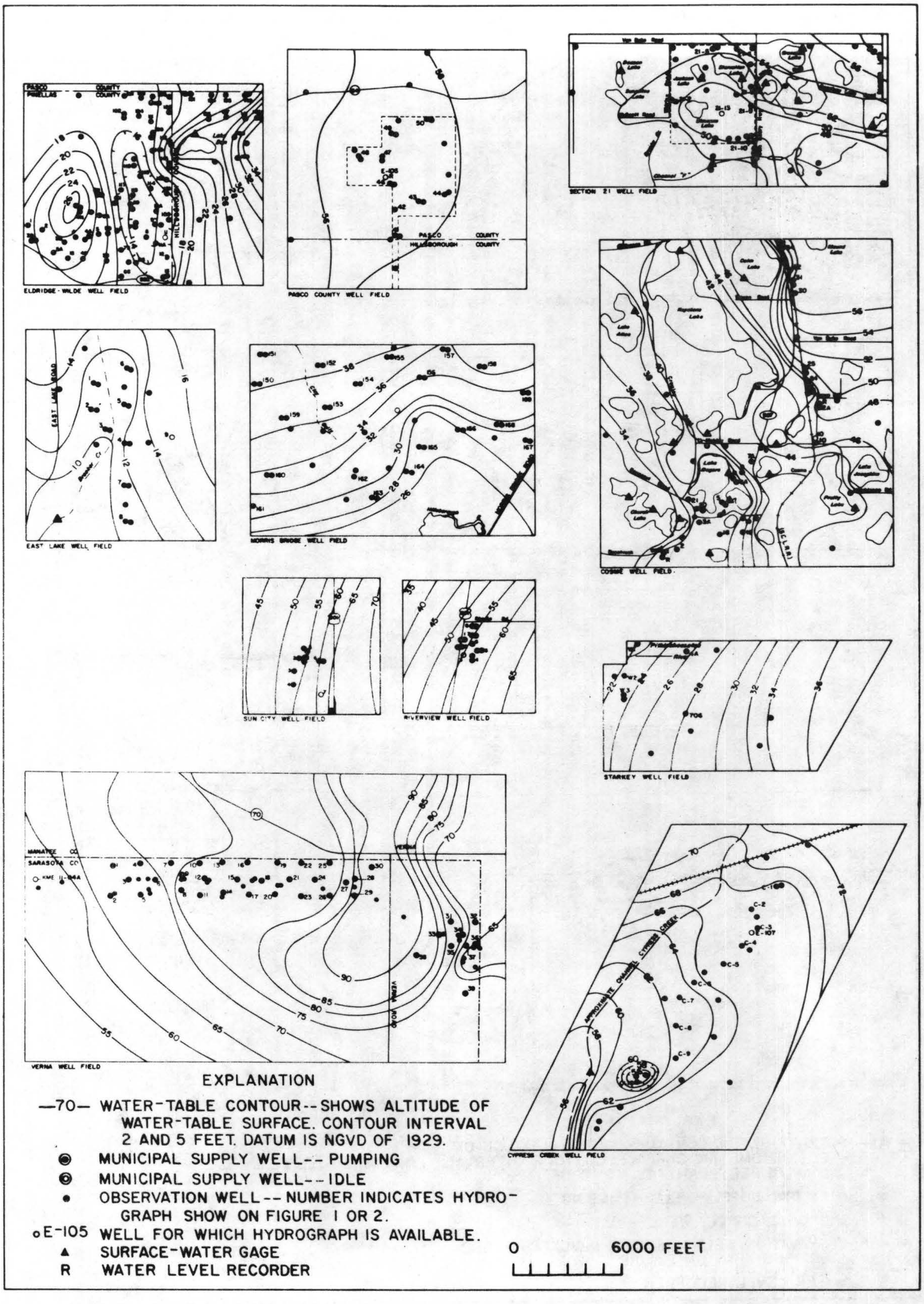


Figure 25.--Water table of the surficial aquifer in selected well fields, May 1978 (from Wolansky, Mills, and Woodham, 1978a).

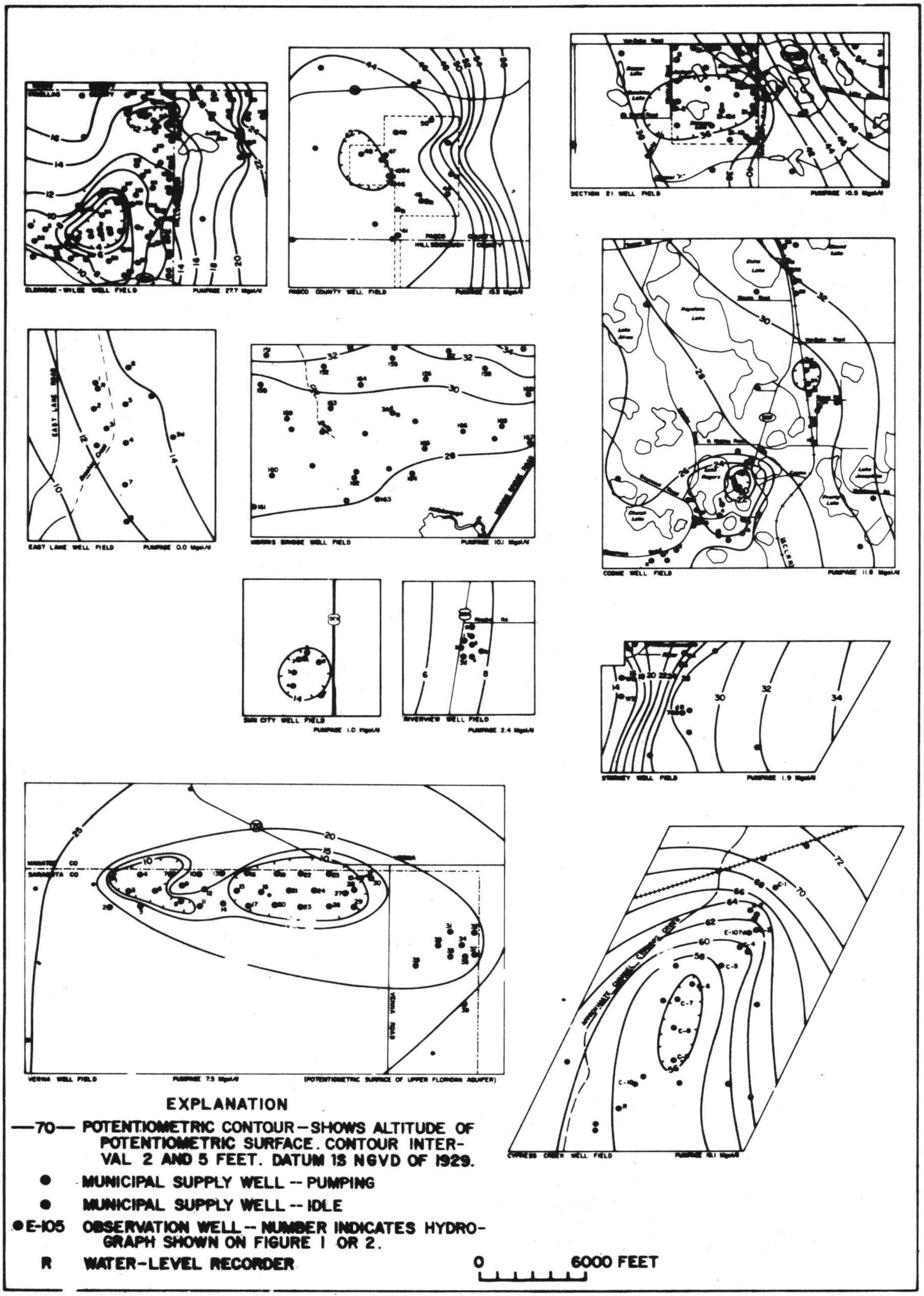


Figure 26.--Potentiometric surface of the Floridan aquifer in selected well fields, September 1978 (from Wolansky, Mills, and Woodham, 1978b).

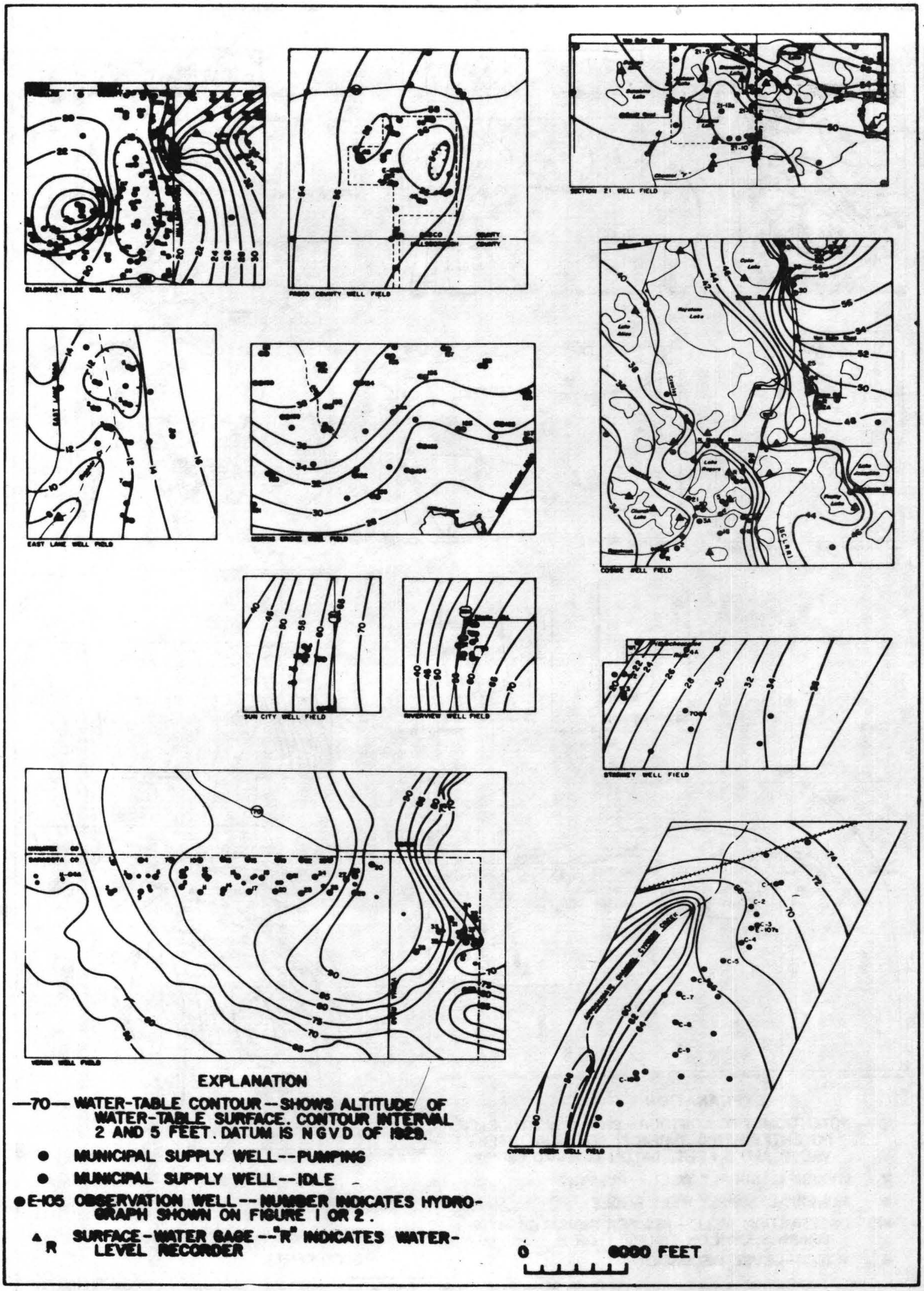


Figure 27.--Water table of the surficial aquifer in selected well fields, September 1978 (from Wolansky, Mills, and Woodham, 1978b).

from about 220 surface-water sites (fig. 28) and from 700 wells (fig. 29). The chemical analyses are included in an annual report "Water Resources Data for Florida, Water Year 1978, Volume 3: Southwest Florida."

A major component of the ground-water quality monitoring network is the chloride-monitoring network (fig. 30). Samples of water are collected at least once a year from 171 wells to monitor changes in the saltwater-freshwater interface in the coastal parts of southwest Florida. Samples of water from 28 of these monitor wells in western Pasco County are collected and analyzed semiannually. Graphs of chloride concentrations for selected wells in the monitoring network are presented in figure 31.

New Port Richey well

The chloride concentrations of samples from the New Port Richey well in Pasco County, about 2 miles from the Gulf of Mexico, increased from about 5,000 mg/L (milligrams per liter) in 1972 to about 9,000 mg/L in 1978 (fig. 31a). The artesian well is affected by pumping of nearby public supply wells. Except for short-term decreases in concentrations of chloride, the well has shown a steady increase in chloride levels.

Weeki Wachee well

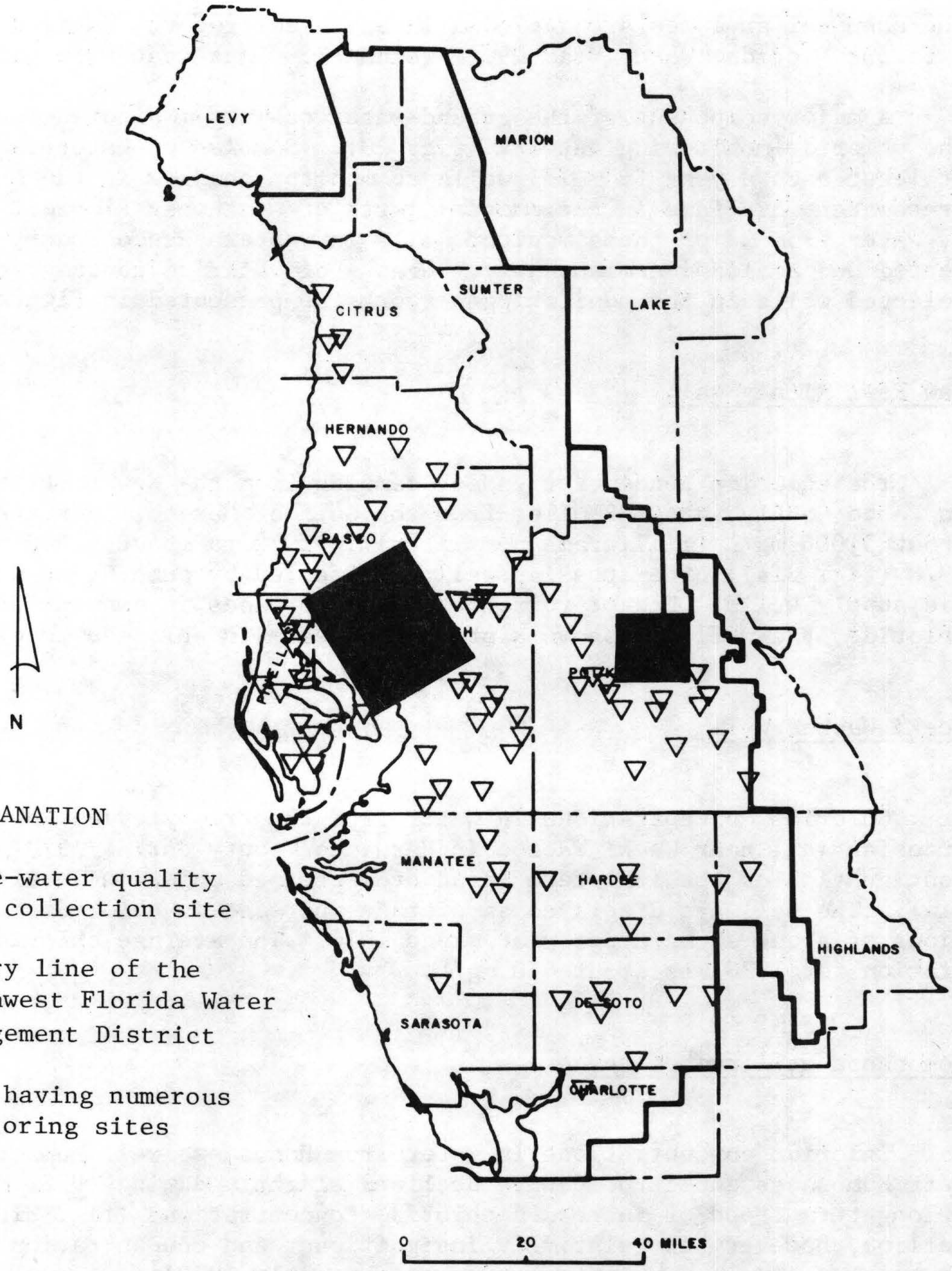
Chloride concentrations in water from the Presbyterian Youth Camp artesian well near Weeki Wachee in Hernando County during 1978 showed a continuation of the long-term trend of increased chloride levels (fig. 31a). The well has displayed an average increase in chloride concentrations of about 20 mg/L per year since 1974. The average chloride concentration for 1978 was about 660 mg/L.

Homosassa well number three

Chloride concentrations in water from Homosassa well number three near Homosassa in Citrus County declined slightly during 1978, reversing a long-term trend of increased chloride concentrations (fig. 31a). The decline, however, is relatively insignificant and concentrations continue to be about twice as high as those of the early 1970's.

SWFWMD well at Tampa

Chloride concentrations in water from the Southwest Florida Water Management District well at structure S-160 of the Tampa Bypass Canal, about 3 miles from Hillsborough Bay in Hillsborough County, remained



EXPLANATION

▽ Surface-water quality data collection site

Boundary line of the Southwest Florida Water Management District

■ Area having numerous monitoring sites

Figure 28.--Locations of surface-water quality monitoring sites.

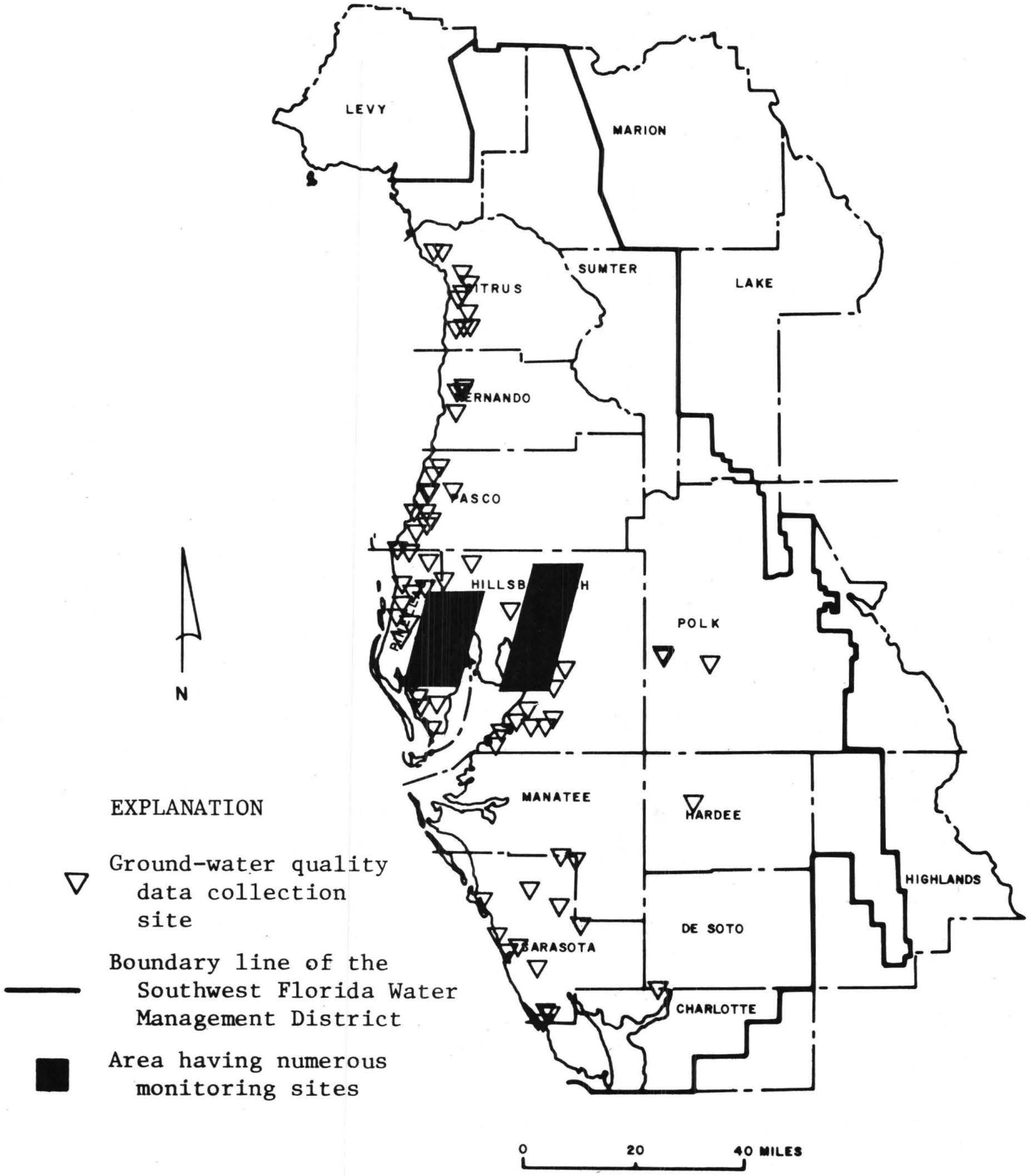
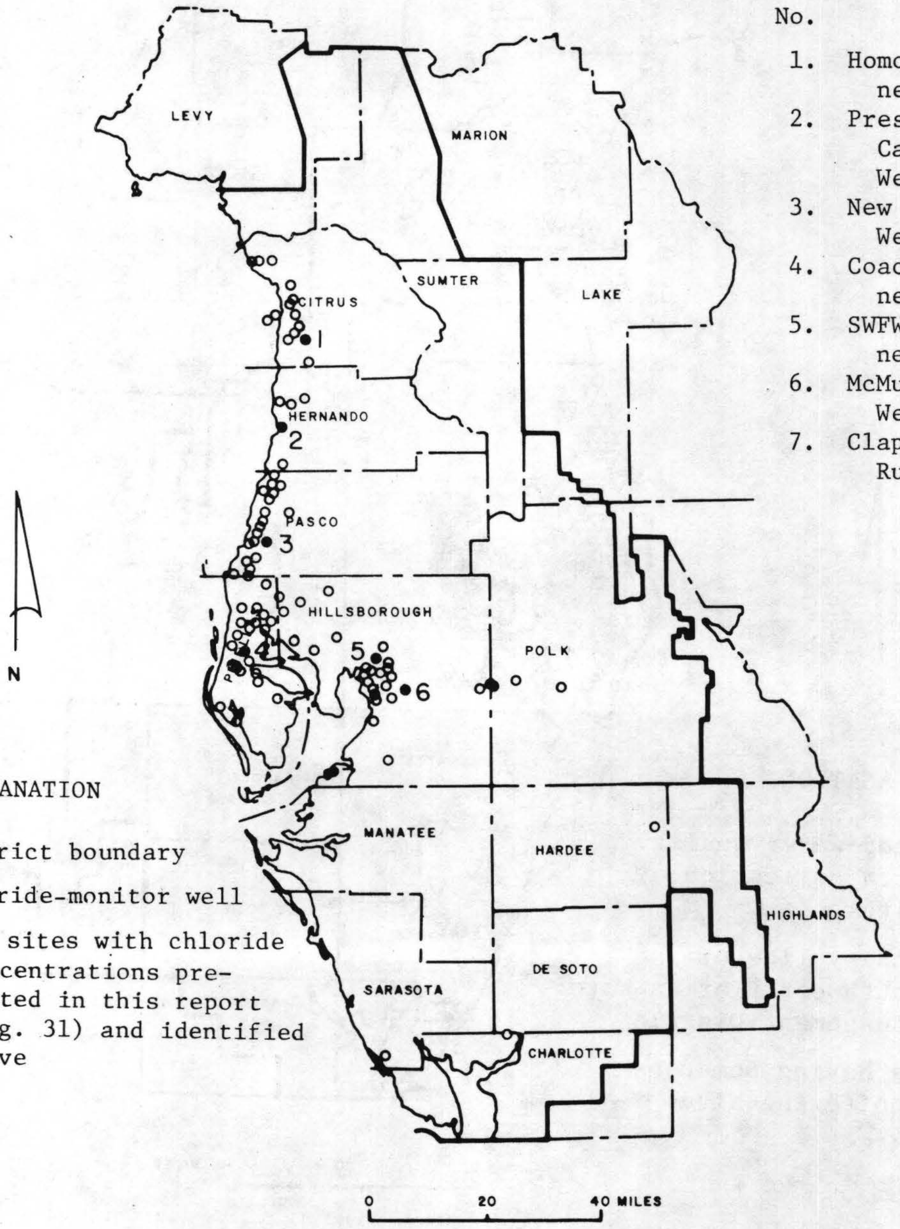


Figure 29.--Locations of ground-water quality monitoring sites.

IDENTIFICATION

No.	Well sites
1.	Homosassa Well No. 3 near Homosassa
2.	Presbyterian Youth Camp Well near Weeki Wachee
3.	New Port Richey Deep Well at Richey Lakes
4.	Coachman Road Well near Clearwater
5.	SWFWMD Well at S-160 near Tampa
6.	McMullen Campground Well near Riverview
7.	Claprod Well near Ruskin



EXPLANATION

——— District boundary

o Chloride-monitor well

●[2] Well sites with chloride concentrations presented in this report (fig. 31) and identified above

Figure 30.--Locations of chloride-monitoring wells.

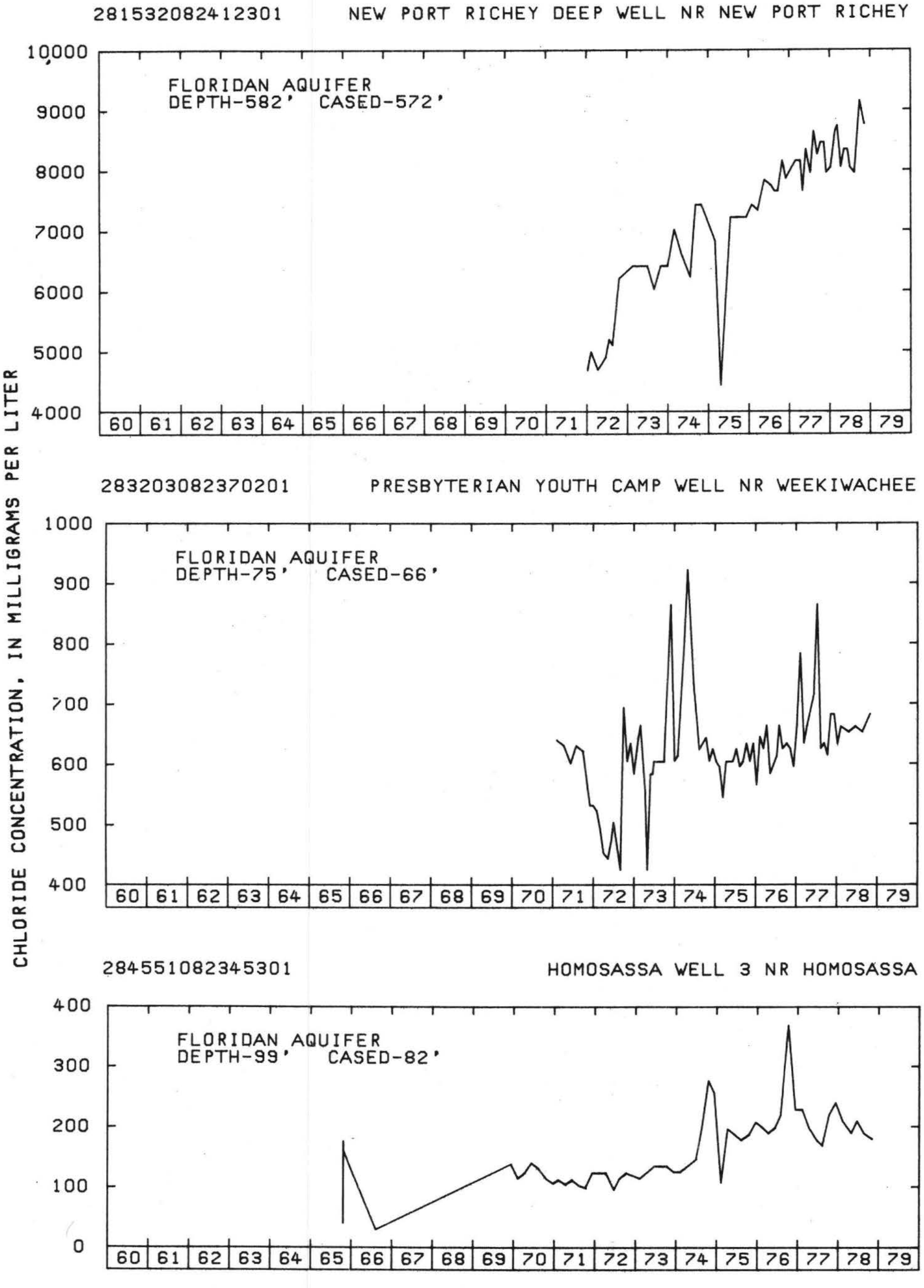


Figure 31a.--Chloride concentrations of water from wells near New Port Richey, Weeki Wachee, and Homosassa.

relatively uniform throughout 1978 (fig. 31b). Chloride concentrations of samples from the well had gradually increased in the early 1970's but have remained fairly constant since 1976.

McMullen Campground well near Riverview

Chloride concentrations in water from the McMullen Campground southeast well near Riverview, Hillsborough County, have remained essentially constant throughout the 10 years that it has been sampled (fig. 31b). The samples have shown a variation in concentration of only about 10 mg/L during the period of record.

Claprod well near Ruskin

Chloride concentrations in water from the Claprod well near Ruskin, Hillsborough County, remained relatively unchanged during 1978 (fig. 31b). Records since 1960 show little change in chloride concentrations. Variations in chloride concentration of about 20 to 30 mg/L have occurred, but they have been of short duration.

WATER USE

An average of 7.3 billion gallons of water were used each day in southwest Florida during 1977 (the latest year for which data have been compiled). About 1.5 billion gallons were freshwater, of which 70 percent was from ground-water sources. The amounts of water used for public, rural, industrial, irrigation, and thermoelectric supplies are given by county in table 1. The tabulation is for all counties entirely or partially within the Southwest Florida Water Management District. For counties that are only partially in the District, water-use figures are for that portion of the county within the District. District boundaries are those of 1977.

A comparison of the amounts of water used in each county for each type of use, except cooling for thermoelectric power, is shown in figure 32. As shown, the major water use in the southern part of the District is for irrigation. In highly developed areas along the coast, the major water use is for domestic supply. In Polk, Hillsborough, and Hernando Counties, the major use is for industry, principally mining operations.

The amounts of water obtained from ground-water and surface-water sources for each county are shown in figure 33. Ground-water sources are predominant throughout the District. The only large users of surface

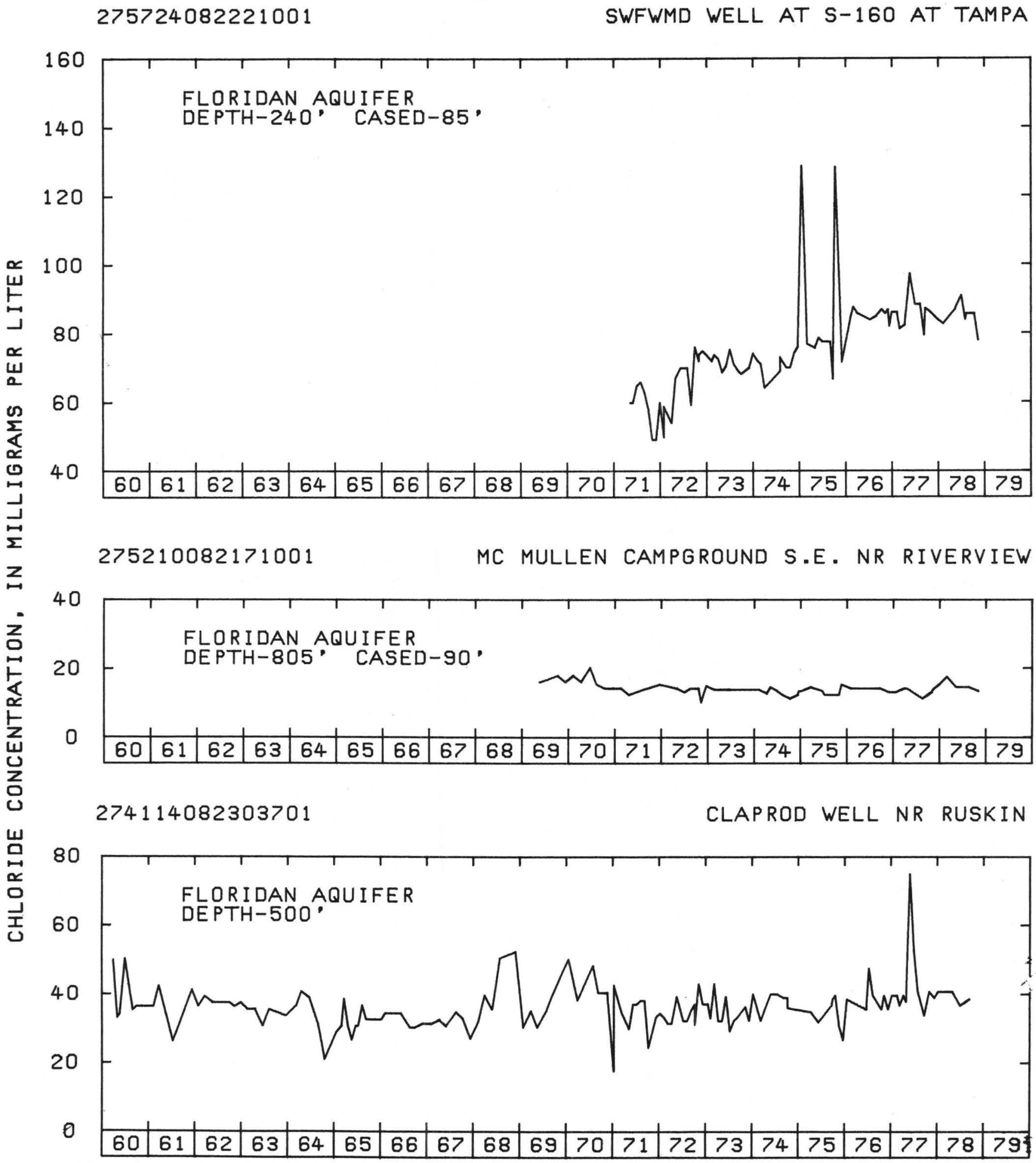


Figure 31b.--Chloride concentrations of water from wells at Tampa and near Riverview and Ruskin.

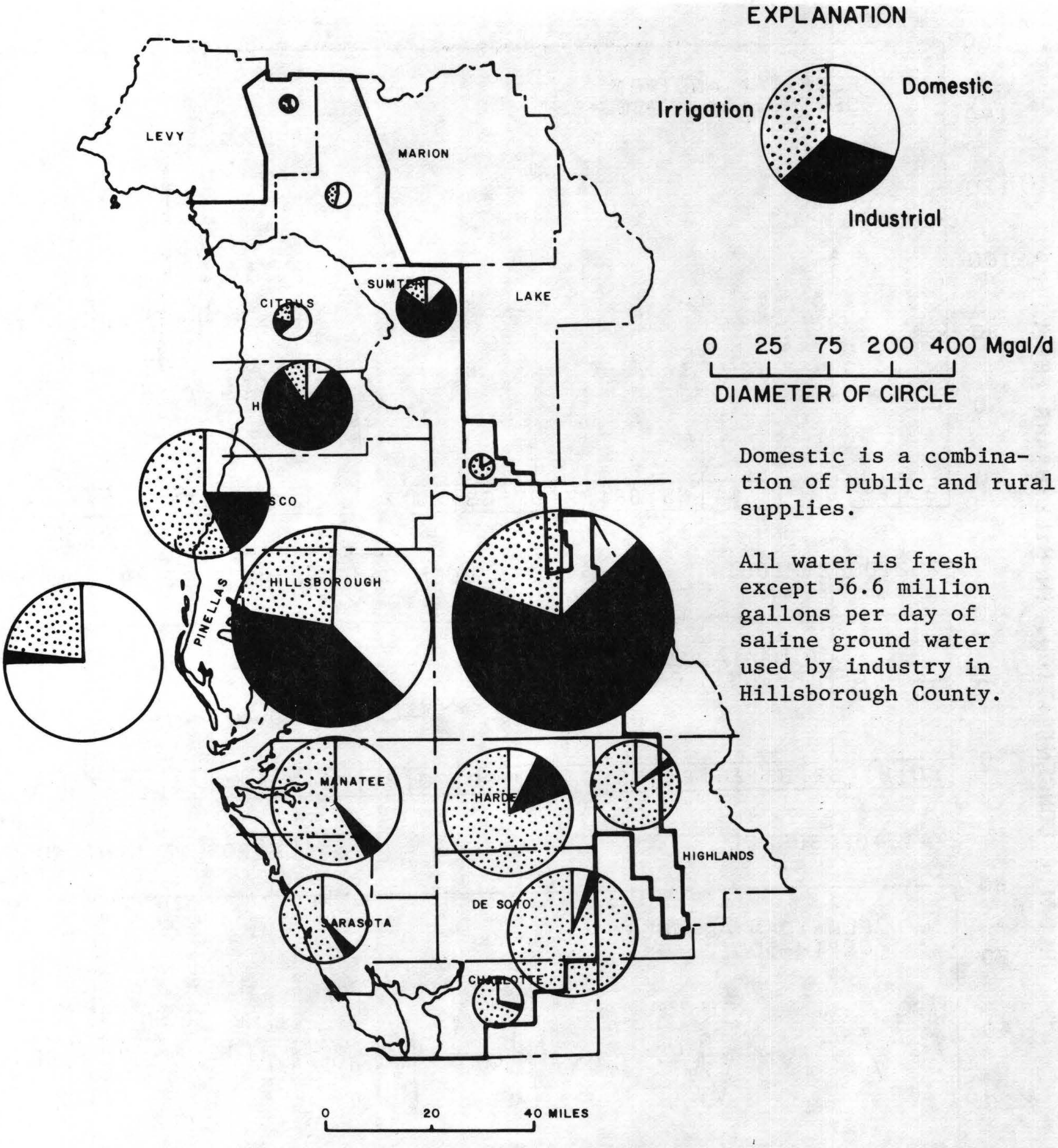


Figure 32.--Water use for domestic supply, industry, and irrigation in 1977.

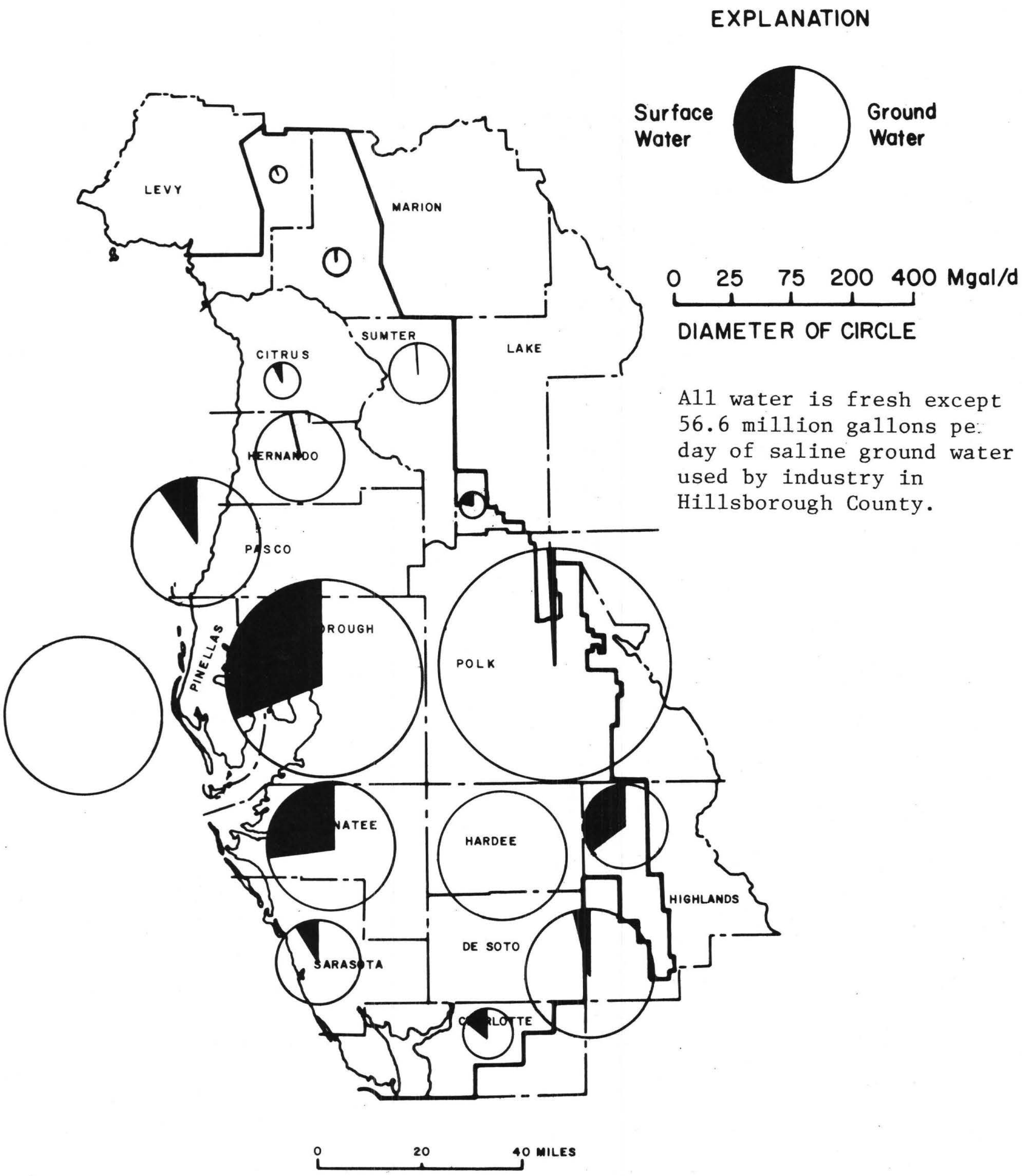


Figure 33.--Amounts of water obtained from ground and surface sources in 1977. (Water used for thermoelectric power is not included.)

Table 1.--Water use by counties in 1977

[GW - ground water used in Mgal/d; SW - surface water used in Mgal/d; s - saline water, all other is freshwater except for 56.6 Mgal/d of saline water used by industry in Hillsborough County; p - county is partially in Southwest Florida Water Management District (1977 boundaries).]

County	Amount of water used for indicated purpose										Subtotal		Total
	Public supply		Rural		Industrial		Irrigation		Thermoelectric				
	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	GW	SW	
Charlotte[p]	0.1	3.9	1.3	0	0.1	0	13.8	0	0	0	15.3	3.9	19.2
Citrus	.7	0	3.7	0	1.3	0	1.1	.4	.6	1,892.2[s]	7.4	1,892.6	1,900.0
DeSoto	.7	0	2.2	0	1.1	0	62.1	1.9	0	0	66.1	1.9	68.0
Hardee	1.0	0	2.2	0	9.9	0	56.2	0	0	0	69.3	0	69.3
Hernando	.9	0	3.1	.1	33.8	0	4.7	.8	0	0	42.5	.9	43.4
Highlands[p]	3.5	0	.8	0	.7	0	21.0	13.9	0	95.2	26.0	109.1	135.1
Hillsborough	13.4	56.6	13.1	0	83.4	7.4	47.9	2.5	1.1	1,957.6[s]	158.9	2,024.1	2,183.0
Lake[p]	0	0	.6	0	0	0	2.2	.7	0	0	2.8	.7	3.5
Levy[p]	.6	0	.5	0	0	0	.4	0	0	0	1.5	0	1.5
Manatee	0	22.4	6.5	.2	3.4	0	41.0	2.2	0	14.0	50.9	38.8	89.7
Marion[p]	.2	0	1.6	0	0	0	1.5	.1	0	0	3.3	.1	3.4
Pasco	3.6	0	13.3	0	13.2	0	29.3	7.3	.1	1,271.0[s]	59.5	1,278.3	1,337.8
Pinellas	88.7	0	3.4	0	1.3	0	28.1	0	.1	635.0[s]	121.6	635.0	756.6
Polk[p]	30.0	0	8.2	.1	233.3	0	64.3	4.0	.3	222.9	336.1	227.0	563.1
Sarasota	9.6	1.3	7.0	.2	2.9	0	22.4	2.5	0	0	41.9	4.0	45.9
Sumter	.9	0	2.2	0	16.1	0	3.2	.2	0	0	22.4	.2	22.6
Subtotal	153.9	84.2	69.7	.6	400.5	7.4	399.2	36.5	2.2	6,087.9	1,025.5	6,216.6	7,242.1
TOTAL	238.1		70.3		407.9		435.7		6,090.1		7,242.1		7,242.1

water are Hillsborough and Manatee Counties. Hillsborough County obtains some water from the Hillsborough River and Manatee County uses water from the Manatee River.

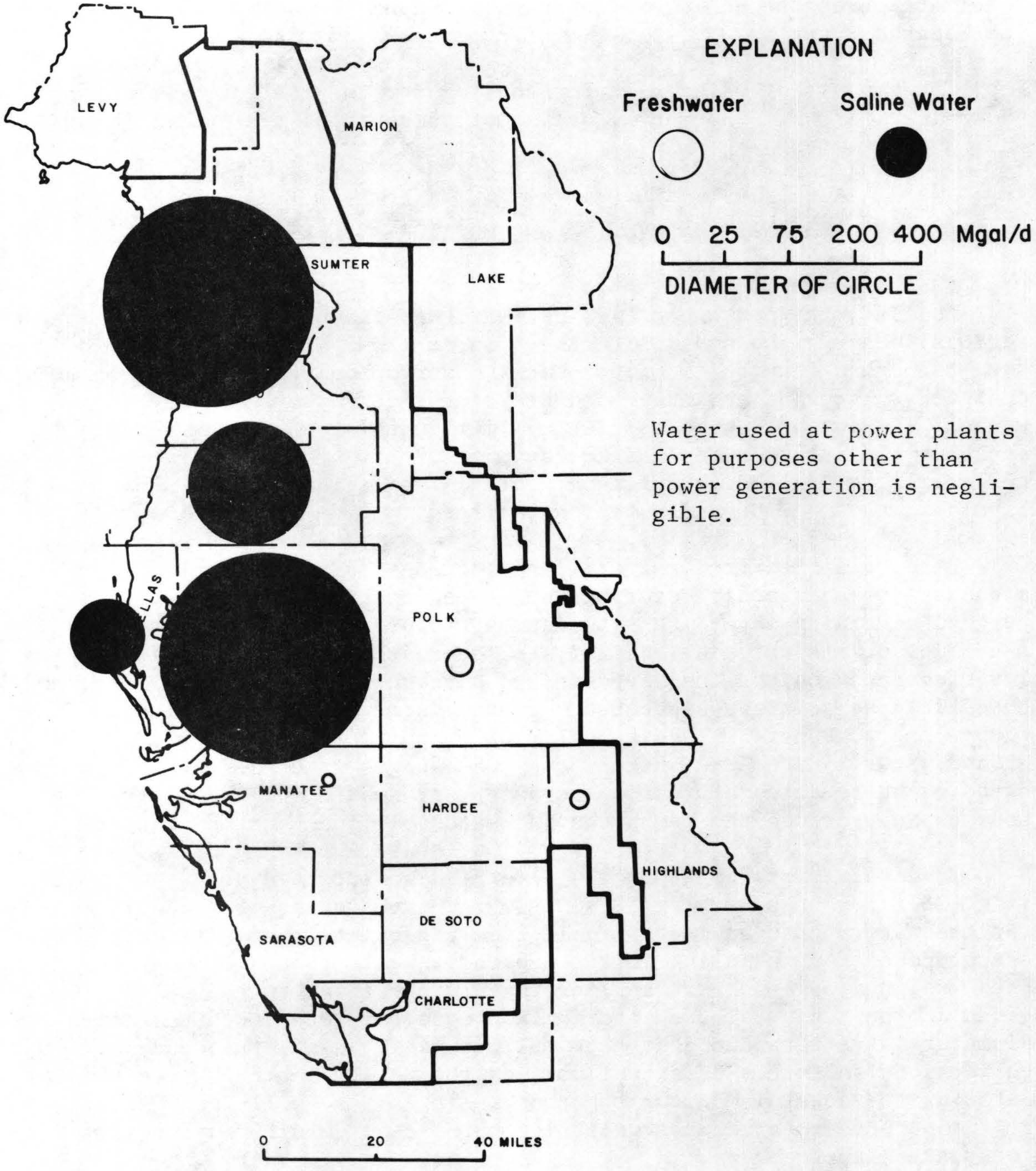
The amounts of water used for cooling for thermoelectric power are shown in figure 34. As shown, only small amounts of freshwater are used.

REGIONAL OBSERVATION AND MONITOR-WELL PROGRAM

In 1974, the Southwest Florida Water Management District initiated a regional observation and monitoring program (ROMP) to obtain hydrologic data through a network of ground-water observation wells. The program was designed to provide an integrated District-wide network of observation wells. The network, upon completion, will consist of observation wells at about 128 inland sites and 28 coastal sites. At each site one to four wells will be drilled to define hydrologic conditions and to monitor water levels in the shallow and artesian aquifers.

Data collected from the drilling and monitoring program will provide a basis: to accurately describe the geologic structure; to define aquifer and confining layer characteristics; to prepare potentiometric surface maps of the artesian aquifer; to locate the freshwater-saltwater interface and monitor its movement; to obtain quality-of-water data; and to define the relationship between ground-water levels and climatic factors. The ROMP network additionally will provide a basis for effective ground-water management. Regulatory and management decisions can be based on up-to-date information to assure protection of the water resources and yet use the resources in reasonable and beneficial ways.

To date, a total of 60 wells have been constructed at 40 ROMP sites (fig. 35). Of these wells, 50 monitor the artesian aquifer and 10 monitor the water-table aquifer. Table 2 is a tabulation of sites where wells are proposed for inclusion in the program. Wells that are completed have been assigned well numbers and information pertinent to the wells are given in the table. These data include date completed, depth, casing diameter, stratigraphic zone that well is finished in, frequency of data collection, and other data available on the well. Table 3 gives similar data for the coastal monitor transect wells. These wells are drilled in a line perpendicular to the coast for purposes of monitoring the saltwater-freshwater interface.



Water used at power plants for purposes other than power generation is negligible.

Figure 34.--Amounts of water used in cooling for thermoelectric power in 1977.

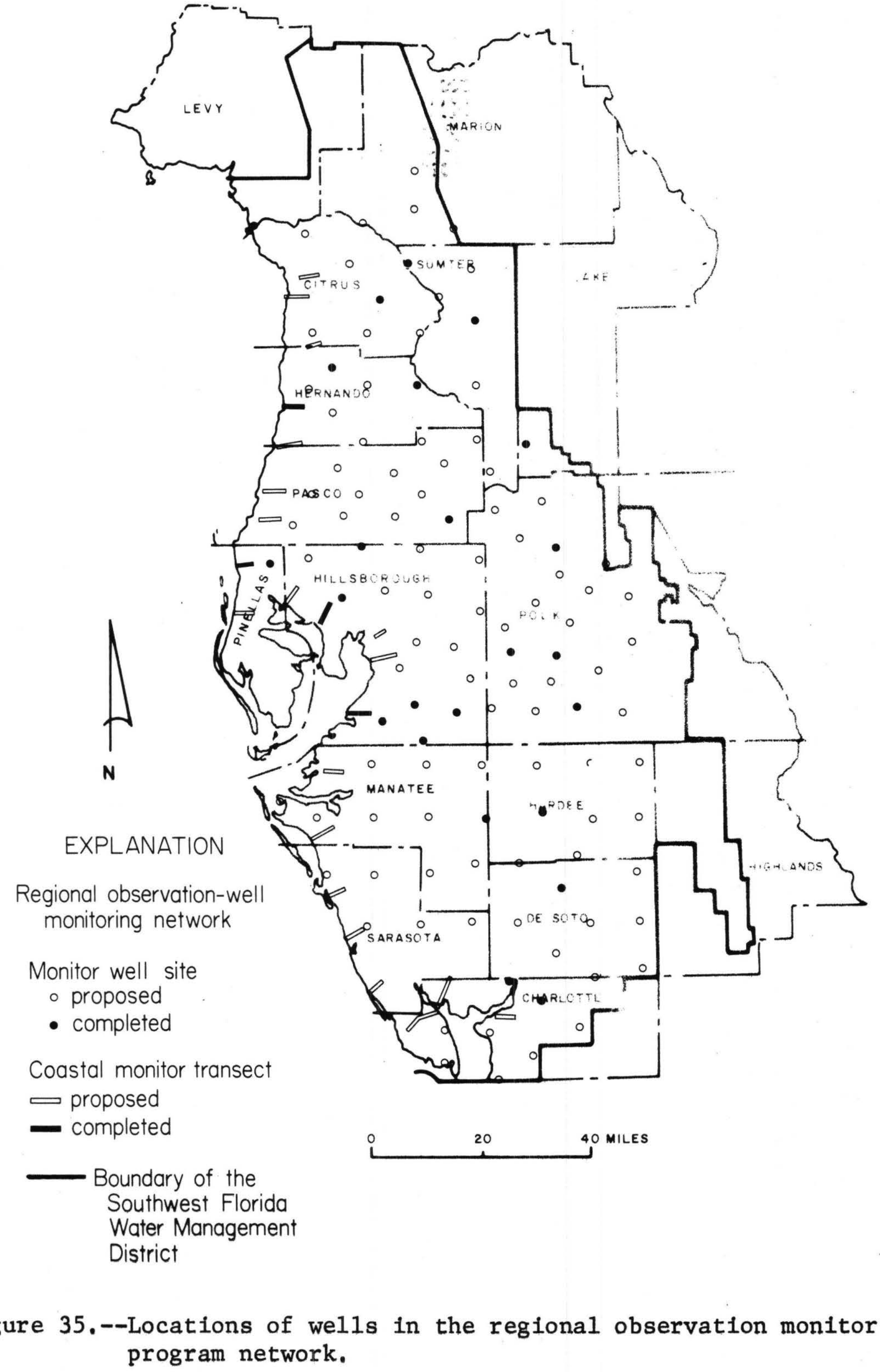


Figure 35.--Locations of wells in the regional observation monitoring well program network.

Table 2.--Data available for ROMP wells

[Data codes: A - time; B - collar; C - caliper; Cl - chloride; Con - continuous record; D - driller's; El - electric, single point; E2 - electric, 16 and 64; FC - fluid conductivity; FR - fluid resistivity; G - lithologic; H - magnetic; I - induction; J - gamma ray; K - dipmeter; k - specific conductance (umho/cm at 25°C); L - laterlog; M - microlog; N - neutron porosity; P - photograph; PT - penetration; Q - radioactive; SC - specific capacity; SG - sonograph; SP - self potential; SV - acoustic velocity; T - temperature; TV - television; U - gamma-gamma density; V - fluid velocity; Wl - water level; Z - other.]

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
	Burntstore	1	Peace River								
	Placida	2	Peace River	Punta Gorda, El Jobean							
		3	Peace River	Gilchrist							
		4	Peace River	Bermont							
		5	Peace River	Punta Gorda							
		6	Peace River	El Jobean							
		7	Peace River	Englewood, Placida	(81)						
	Well 3 of transect 4	8	Manasota	Venice, Myakka R.							
	Well 3 of transect 2	9	Manasota	Murdock							
2701520820028.04	Deep Creek	10	Peace River		4-25-75	0-10	4	Pleistocene sand	Wl T,Cl,k	12 6	Cuttings
2701520820028.02		10			4-12-75	283-555	8	Tampa and Hawthorn Limestone	Wl T,Cl,k	12 6	G to 575', C, El, J
2701520820028.01		10			5-09-75	575-897	8	Suwannee and Ocala Limestones	Wl T,Cl,k	12 6	G to 917', C, El, J, V
2701520820028.03		10			4-20-75	90-250	4	Hawthorn Limestone	Wl T,Cl,k	12 6	G to 270', C, El, J
265837081561l.01	Shell Creek	11	Peace River		7-09-75	210-324.5	4	Hawthorn Limestone	Wl	6	G to 334.6, J, T, C, FR, core
		12	Peace River	Arcadia SE							
		13	Peace River	Long Island Marsh							
		14	Peace River	Ft. Green, Arcadia SE							

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		15	Peace River	Long Island, Marsh NW and NE							
		16	Peace River	Arcadia	(79)						
	Horse Creek	17	Peace River								
		18	Manasota	Murdock NW							
		19	Manasota	Lower Myakka Lake							
		20	Manasota	Laurel							
		21	Manasota	Sarasota							
		22	Manasota	Old Myakka, Bee Ridge							
		23	Manasota	Myakka City							
		24	Manasota	Edgeville							
		25	Peace River	Limestone							
2718000814930.01	Brownsville	26	Peace River	Gardner		-60	6	Surficial	Wl	Con	G
		26				1,245	8	Avon Park			G to 1,320'; cuttings; El, C, J, FR, T
		26				105	8	Hawthorn			G to 1,320'; cuttings; El, C, J, FR, T
		27	Peace River	Gardner							
		28	Peace River	Crewsville SW							
		29	Peace River	Crewsville, Sweetwater							
		30	Peace River	Zolfo Springs	(80)						
2727140815459.01	Ona, Avon Park	31	Peace River	Ona	7-30-76	380-1,072	8	Suwannee, Ocala, Avon Park	Wl k,T,Cl	Con 6	G to 1,152', El, J, T, FR
2727140815459.02	Ona, Hawthorn	31			5-10-77	50.14-270.14	8	Hawthorn, Tampa	Wl k,T,Cl	Con 6	C, El, J, T
2727140815459.03	Ona, Shallow	31			1-14-76	+74.86-+64.86	6	Surficial	Wl	Con	G to 15'

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
2728130820349.01	Myakka Head	32	Manasota	Myakka Head	12-21-77	460-500	6	Suwannee Limestone	W1		
2728130820349.02	Myakka Head	32			12-21-77	800-1,115	6	Avon Park	W1		G, J, U, N, E2, SP, FR, C, SV, TV
	Kibler Tower	33	Manasota	Myakka City NW							
		34	Manasota	Lorraine	(81)						
		35	Manasota								
		36	Manasota								
		37	Manasota	Palmetto							
		38	Manasota	Parrish							
		39	Manasota	Rye, Keentown							
		40	Manasota	Duette	(81)						
		41	Peace River	Ft. Green							
		42	Peace River	Wauchula							
		43	Peace River	Griffins Cor., Avon Park							
		44	Peace River	Berea							
2745470814709.01	Ft. Meade	45	Peace River	Homeland	10-07-74	+11.5-70.5	4	Hawthorn	W1	Con	C, E1, J, T, core
2745470814705	Ft. Meade	45	Peace River	Homeland	2- 78	190.5-318.5	8	Suwannee			G to 440', cuttings; E1, C, J, T
2745470814705	Ft. Meade	46	Peace River	Baird	2-28-78	559-636	8	Avon Park			G to 757', E1, C, J, T
		47	Alafia	Keysville, Duette NE							
2744270820837.01	Thatcher	48	Alafia	Ft. Lonesome	2-11-76	110-436	16	Tampa, Suwannee, Ocala	W1	Con	G to 535', J, E1, T, C
2744270820837.02		48			2-17-76	+59.5-+44	8	Bone Valley	W1	Con	G to 75'
2745460821514.01	Balm	49	Alafia		1-21-76	49-474	8	Tampa, Suwannee	W1	Con	G to 620', E1, C, J, FC, T

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		49			(80)						
2742400822127.01	Sun City Center	50	Alafia	Wimauma	1-02-76	156-518	8	Tampa, Suwannee	W1	Con	G to 562', El, C, J, cuttings
2742400822127.02	Sun City Center	50	Alafia	Wimauma	1-03-76	+8-+3	6	Surficial	W1	Con	
2742400822127.03	Sun City Center	50	Alafia	Wimauma	2- 77	596-1,208	8	Avon Park	W1 k,T,Cl	Con 6	J, U, N, E2, T, C, SV, SC, V
2744160822754.01	Well 1 of transect 9	51	Alafia						k,T,Cl	6	
	Riverview	52	Alafia								
		53	Alafia	Keysville, Lithia							
		54	Alafia	Bradley Jct.							
		55	Peace River	Bradley Jct., Homeland	(81)						
		56	Peace River	Alturas							
		57	Peace River	Eloise							
		58	Peace River	Bartow							
2753140815142.01	Bartow Ball Park	59	Peace River	Bartow	5-01-74	5-930	12	Tampa, Avon Park	W1 k,T,Cl	Con 6	D to 1,400', El, C, J, FC, SC
2753140815142.02	Bartow Ball Park	59	Peace River	Bartow	5-07-74	+68-+58		Hawthorn	W1	Con	
2753140815142.03	Bartow Ball Park	59	Peace River	Bartow	5-10-74	4-24		Hawthorn	W1	Con	
2753260815858.01	Mulberry deep well	60	Alafia			136-609	10	Avon Park	W1	Con	
2754290820941.0	Pleasant Grove	61	Alafia		11-22-77	226-230	12				J, T, C, FC, El
	Clayton	62	Alafia		(81)						
	78th St.	63	Hills- borough		(79)						
2758170823250.01	Sweetwater deep	64	NW Hills- borough						W1 k,Cl,T	Con 12	
2758170823250.02	Sweetwater shallow	64							W1	Con	

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected: Type	Data collected: Frequency per year	Data available
	Florida Downs well 2 of transect 13	65	NW Hillsborough								
2802090822803.01	Chamberlain	66	Hillsborough	Sulphur Springs	4-18-76	2-210	8	Tampa	Wl	Con	G to 245', El, C, J, T
		67	Hillsborough	Thonotosassa							
		68	Hillsborough	Thonotosassa, Antioch	(81)						
		69	Hillsborough	Plant City							
		70	Alafia	Nichols, Mulberry							
		71	Peace River	Lakeland							
		72	Peace River	Auburndale							
		73	Peace River	Winter Haven							
		74	Green Swamp	Winter Haven, Gum Lake							
		75	Green Swamp	Auburndale							
2810570814950.01		76	Green Swamp	Polk City	4-29-74 revisit 79	+84-+61	6	Hawthorn	Wl	Con	Core and split spoon
		77	Green Swamp	Providence, Socrum							
		78	Hillsborough	Socrum							
		79	Hillsborough	Wesley Chapel, Zephyr Hills							
2808010823104.01	Dundee Ranch	--	Hillsborough	Odessa	2- 74	+5- -633	8	Suwannee, Ocala	Wl	Con	D to 675'
2811150822500.01	Livingston	80	Hillsborough	Lutz	5- 76	+72.7- +62.7	6	Surficial sand	Wl	Con	G to 26.5'
		80			6- 76	7-61.8	-	Suwannee			G to 143'

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
2809460823104.03	St. Pete-Pasco So.		Hills-borough	Odessa	5-09-74	-34--638	6	Suwannee, Ocala	Wl	Con	D to 700'
		81	NW Hills-borough	Odessa							
	Tarpon Sink, well 3 of trans-sect 15	82	Pinellas-Anclote								
	Star Key	83	Pithlachas-cotee								
	GTE	84	Pinellas-Anclote								
2814250821925		85	Hills-borough	Wesley Chapel	7-17-78	340-395	8	Avon Park			G to 450', El, C, J, FC, T
2815050821048.01	Zephyrhills	86	Hills-borough	Dade City		338-348	8				D to 480', C, J
		87	Green Swamp	Branch-borough	(79)						
		88	Green Swamp	Rock Ridge							
		89	Green Swamp	Clay Sink, Branch-borough							
		90	Withlacoo-chee	Lacoochee	(80)						
		91	Withlacoo-chee	Dade City							
		92	Hills-borough	Spring Lake							
		93	Hills-borough	Ehren	(79)						
		94	Pithlachas-cotee	Fivay	(79)						
		95	Pithlachas-cotee	Port Richey							
		96	Pithlachas-cotee		(80)						
2827990823599.01	Well 1 of transect 18	97	Pithlachas-cotee	Port Richey					Wl k,T,Cl	Con 6	

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
2827990823599.02	Well 2 of transect 18	97							Wl k,T,Cl	Con 6	
		98	Pithlachascotee								
		99	Withlacoochee	Lacoochee							
		100	Withlacoochee	Clay Sink							
2827170815531.01	Bay Lake	101	Green Swamp		-77	+59-273	8	Avon Park	Wl	Con	G to 374', El, C, J, FC, FR, T
2827170815537.01	Bay Lake	101	Green Swamp		4-25-77	17-309	8	Avon Park			G to 404', El, C, J, FC, T
		102	Withlacoochee	Webster							
2835370821515.01	103 deep nr Brooksville	103	Withlacoochee	Brooksville SE, St. Catherine	1- 77	57-144	8	Suwannee	Wl	Con	G to 198', C, J, T, FC, El
		104	Pithlachascotee	Brooksville							
		105	Pithlachascotee	Brooksville							
	Palm 23	106	Pithlachascotee								
2839050822725.01	Ringgold	107	Pithlachascotee	Brooksville	12-01-76	24-124	8	Ocala, Avon Park	Wl	Con	Core, G to 344.5', El, C, J, FC, T
		107			9-16-76	?-228					
	Omitted	108									
		109	Crystal-Homosassa	Brooksville							
		110	Withlacoochee	Nobleton							
2846190820351.01	G. C. Tompkins	111	Withlacoochee		9-06-74	17-179	8		Wl	Con	El, C, J, T
		112	Withlacoochee	Rutland							
2851240822456.01	Inverness west	113	Withlacoochee	Lecanto	6-07-74	+83-15	6		Wl	Con	

Table 2.--Data available for ROMP wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
	Well 2 of transect 22	114	Crystal-Homosassa	Crystal River					Wl k,T,Cl	Con 6	
		115	Withlacoo-chee	Holder							
2857200822013.01	Tsala Apopka	116	Withlacoo-chee	Tsala Apopka	6-13-74	4-20	6	Ocala?, Avon?	Wl	Con	D to 55'
		117	Withlacoo-chee	Oxford							
		118	Withlacoo-chee	Shady, Belleview							
		119	Withlacoo-chee	Dunellon SE	(79)						
		120	Withlacoo-chee	Cotton Plant, Ocala W							
		121	Withlacoo-chee	Dunellon							
		122	Withlacoo-chee	Yankeetown SE							
2740310821504.01	Starling	123	Alafia		2-09-77	65-568	8	Tampa, Su-wannee, Ocala	Wl	Con	G to 620', El, C, J, FC, T
2902000824315.01	Yankeetown	124	Withlacoo-chee	Yankeetown SE	6-21-77	194-244	8	Avon Park			G to 254', El, C, J, FC, T, V, core
2902000824315.02	Yankeetown	124	Withlacoo-chee	Yankeetown	?		6				
2809010823104.04	Dundee BM		NW Hills-borough			94-144			Wl	Con	El, C, J, FC, T, V
	Channel A										
	Channel B										

Table 3.--Data available for ROMP coastal transect wells

[Data codes: A - time; B - collar; C - caliper; Cl - chloride; Con - continuous record; D - driller's; El - electric, single point; E2 - electric, 16 and 64; FC - fluid conductivity; FR - fluid resistivity; G - lithologic; H - magnetic; I - induction; J - gamma ray; K - dipmeter; k - specific conductance (umho/cm at 25°C); L - laterlog; M - microlog; N - neutron porosity; P - photograph; PT - penetration; Q - radioactive; SC - specific capacity; SG - sonograph; SP - self potential; SV - acoustic velocity; T - temperature; TV - television; U - gamma-gamma density; V - fluid velocity; Wl - water level; Z - other.]

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		30-1	Peace River	Punta Gorda							
		30-2									
		30-3									
		29-1	Peace River	Punta Gorda, Cleveland							
		29-2			(81)						
		29-3									
		2-1	Peace River	El Jobean, Murdock							
		2-2									
		2-3 (site 9)									
		3-1	Peace River	Englewood, El Jobean	(81)						
		3-2			(81)						
		3-3 (site 7)			(80)						
		4-1	Manasota	Venice, Myakka River	(81)						
		4-2			(79)						
		4-3 (site 8)									
		5-1	Manasota								
		5-2			(81)						
		5-3									
		6-1	Manasota	Sarasota, Bee Ridge	(79)						
		6-2			(79)						
		6-3			(79)						

Table 3.--Data available for ROMP coastal transect wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		7-1	Manasota	Bradenton	(80)						
		7-2			(80)						
		7-3			(80)						
		8-1	Manasota	Palmetto	(80)						
		8-2									
		8-3 (site 37)									
2744160822754.01		9-1 (site 51)	Alafia	Ruskin		282			Wl k,T,Cl	12	G to 470', core, J, El, T, C
		9-2			(81)						
2744100822520		9-3				15		Surficial			G
		9-4 (site 50)									
		10-1	Alafia	Tampa, Bradenton							
		10-2			(79)						
2754250822227.01		10-Sh				-1.5		Surficial			G to 470', FR, El, T, J, C
		10-3									
	Maydell	11-1			(79)						
		11-2	Hills-borough	Tampa	(79)						
2758170823500.01		12-1 (site 64)	NW Hills-borough	Citrus Park		120	8		Wl k,T,Cl	Con 12	G to 260;, core, J, El, T, C, FR
2758170823500.02		12-1						Surficial	Wl k,T,Cl	Con 12	
		12-2									
		12-3			(79)						
		13-1	Pinellas-Anclote	Oldsmar	(80)						
		13-2 (site 65)									
2803540823819.01	St. Pete 101 (purchased)	13-3			7-27-62	789	6	Avon Park Limestone	Wl k,T,Cl	Con 12	G

Table 3.--Data available for ROMP coastal transect wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		14-1	Pinellas-Anclote	Oldsmar							
		14-2			(81)						
		14-3			(80)						
2807530824652.01		15-1	Pinellas-Anclote	Tarpon Springs, Elfers	7- 77	77	8	Tampa Limestone	Wl k,T,Cl	Con 6	G to 140', El, C, FR, T, core
2807470824520.01		15-2			7-16-76	40	8	Tampa Limestone	Wl k,T,Cl	Con 6	G to 201', core, El, C, J, FR, T
2807840824421.01		15-3 (site 82)			3-08-74	130	8	Tampa Limestone	Wl k,T,Cl	Con 6	G to 266', core
		16-1	Pithlachascotee	Elfers, Port Richey							
		16-2			(79)						
		16-3									
		17-1	Pithlachascotee	Port Richey							
		17-2									
		17-3 (site 95)									
		18-1	Pithlachascotee	Aripeka							
		18-2			(81)						
		18-3 (site 83)									
		19-1	Pithlachascotee	Bayport, Weeki Wachee							
2832430823657.01	Whitehurst (BM)	19-2			8-08-74	294	6		Wl k,T,Cl	Con 6	G, cuttings, C, J, T

Table 3.--Data available for ROMP coastal transect wells - continued

Site number	Site name	SWFWMD number	Basin	Quadrangle	Date completed	Depth open to aquifer (ft below mean sea level)	Casing diameter (in)	Stratigraphic zone	Data collected		Data available
									Type	Frequency per year	
		20-1	Crystal-Homosassa	Chassahowitz-ka	(81)						
		20-2			(81)						
		21-1	Crystal-Homosassa	Ozello							
		21-2									
		21-3			(79)						
		21-4									
		22-1	Crystal-Homosassa	Crystal River							
		22-2 (site 114)									

REFERENCES

Buono, Anthony, Causseaux, K. W., and Moore, J. E., 1978, Summary of U.S. Geological Survey investigations and hydrologic conditions in the Southwest Florida Water Management District for 1977: U.S. Geological Survey Open-File Report 78-331.

Parker, G. G., and others, 1955, Water resources of southeastern Florida, with special reference to the geology and ground water of the Miami area: U.S. Geological Survey Water-Supply Paper 1255.

Wolansky, R. M., Mills, L. R., and Woodham, W. M., 1978a, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, May 1978: U.S. Geological Survey Open-File Report 78-939.

______ 1978b, Water table in the surficial aquifer and potentiometric surface of the Floridan aquifer in selected well fields, west-central Florida, September 1978: U.S. Geological Survey Open-File Report 78-1045.

Wolansky, R. M., Mills, L. R., Woodham, W. M., and Laughlin, C. P., 1978a, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, May 1978: U.S. Geological Survey Open-File Report 78-720.

______ 1978b, Potentiometric surface of Floridan aquifer, Southwest Florida Water Management District and adjacent areas, September 1978: U.S. Geological Survey Open-File Report 78-1035.