



INQUIRIES MAY BE ADDRESSED TO

District Chief, Water Resources Division U.S. Geological Survey Suite F-240, 225 John Knox Road Tallahassee, FL 32303

Secretary, Department of Environmental Regulation 2862 Executive Center East Tallahassee, FL 32301

Chief Hydrologist U.S. Geological Survey 620 National Center Reston, VA 22092

U.S. Department of the Interior Geological Survey

REPORTS AND FIELD PAPERS OF THE GEOLOGICAL SURVEY OF THE UNITED STATES



Official Business

WATER-RESOURCES INVESTIGATIONS IN FLORIDA, 1977

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SUBJECTS

ARTESIAN WELLS

Foster, J.B., 1962, Well design as a factor contributing to the loss of water from the Floridan aquifer, eastern Clay County, Florida. Inf. Circ. 55.

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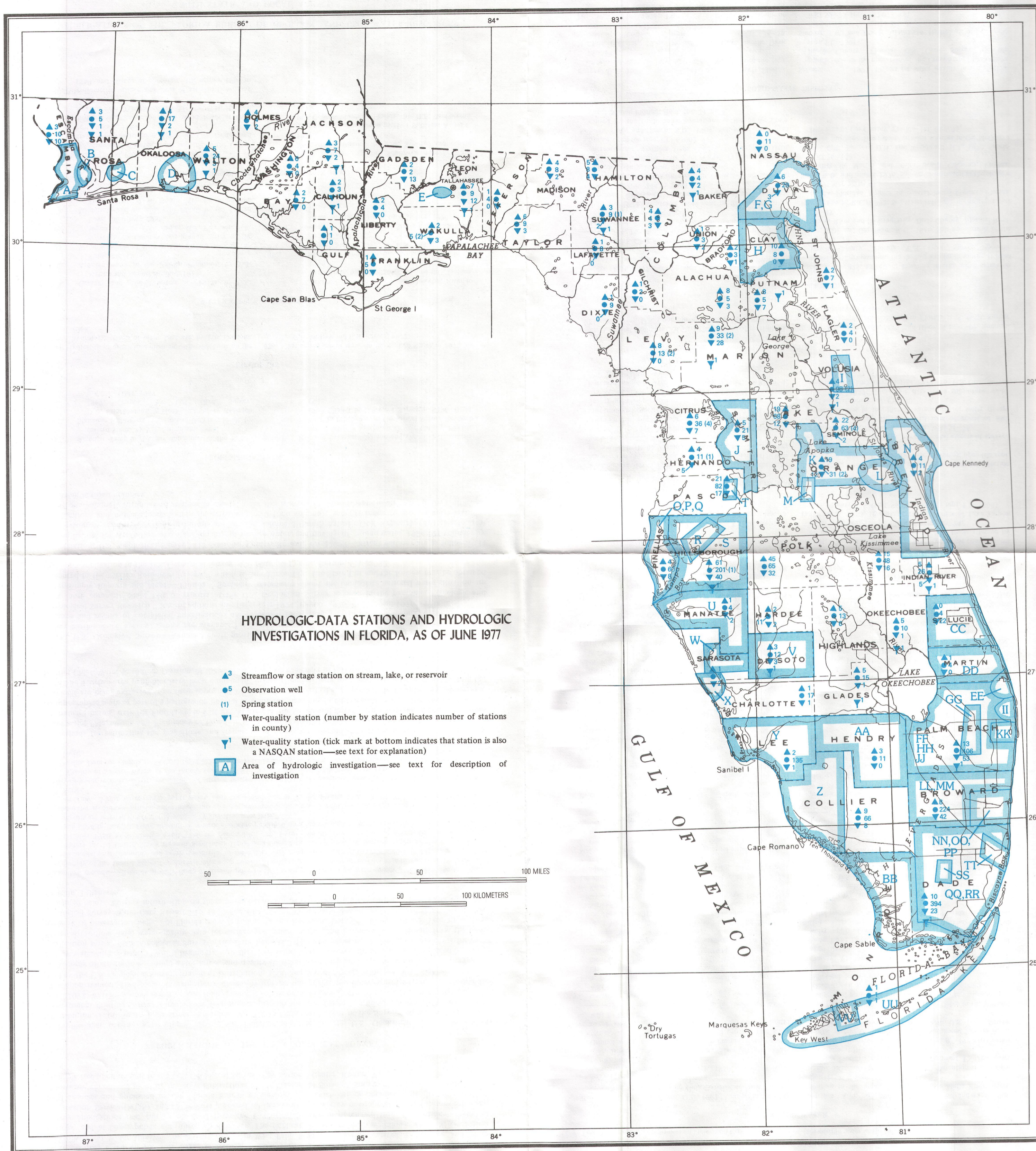
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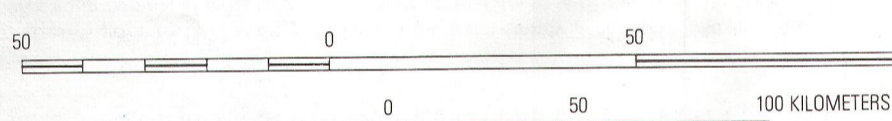
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HYDROLOGIC DATA STATIONS AND HYDROLOGIC INVESTIGATIONS IN FLORIDA, AS OF JUNE 1977

- ▲ Streamflow or stage station on stream, lake, or reservoir
- Observation well
- Spring station
- ◇ Water-quality station (number by station indicates number of stations in county)
- ◇ Water-quality station (tick mark at bottom indicates that station is also a NASQAN station—see text for explanation)
- A Area of hydrologic investigation—see text for description of investigation



WATER-RESOURCES INVESTIGATIONS IN FLORIDA, 1977

INTRODUCTION

The U.S. Geological Survey, through its Water Resources Division, investigates the occurrence, quantity, quality, distribution, and movement of the surface and underground waters that compose the Nation's water resources. It is the principal Federal water-data agency and, as such, collects and disseminates about 70 percent of the water data currently being used by numerous State, local, private, and other Federal agencies to develop and manage our water resources. This nationwide program, which is carried out through the Water Resources Division's District (State) offices and 4 Regional offices, consists of the collection of basic hydrologic data, areal resource appraisal and interpretive studies, research projects, and the analysis and dissemination of the data and results of its investigations. Much of the work is a cooperative effort in which planning and financial support are shared by State and local governments and other Federal agencies. The Geological Survey also is responsible for the coordination of specific water-data acquisition activities by other Federal agencies. Information on these activities is consolidated into a central file known as the "Catalog of Information on Water Data," which is maintained by the Geological Survey. Many State and local agencies and private organizations that have related water-data acquisition activities also contribute information to this catalog. Indexes to the catalog are published at selected intervals.

This folder contains a brief description of the water-resources investigations in Florida in which the Geological Survey participates and a list of selected references. The map shows the location of hydrologic-data stations and the extent of the hydrologic investigations. Additional or more detailed information can be obtained from the District Chief, Water Resources Division, in Tallahassee, Fla.

COOPERATORS

In Florida, various parts of the Geological Survey program are conducted in cooperation with: Broward County Environmental Quality Control Board, East Central Florida Regional Planning Council, Englewood Water District, Florida Department of Environmental Regulation, Florida Department of Transportation, Florida Division of Parks and Recreation, Florida Keys Aqueduct Authority, Florida Game and Fresh Water Commission, Lake Worth Utilities Authority, Lake County Water Authority, Leachahatchee Environmental Control District, Manatee Basin Board, Northwest Florida Water Management District, Old Plantation Water Control District, Reedy Creek Improvement District, St. Johns River Water Management District, South Florida Water Management District, Southwest Florida Water Management District, Suwannee River Authority, Suwannee River Water Management District, U.S. Air Force, U.S. Army Corps of Engineers, U.S. Bureau of Land Management, U.S. Department of Housing and Urban Development, U.S. Environmental Protection Agency, U.S. Forest Service, U.S. National Park Service, U.S. Navy, U.S. Water Haven Lake Region Boat Course District, Windward Water and Navigational Control District, the following counties—Brevard, Broward, Clay, Collier, Dade, Escambia, Gadsden, Hendry, Hillsborough, Lake, Lee, Manatee, Marion, Martin, Monroe, Orange, Palm Beach, Pinellas, Polk, Sarasota, Seminole, Sumter, Volusia, Walton, and the following cities—Boca Raton, Bradenton, Clearwater, Cocoa, Deerfield Beach, Fort Lauderdale, Gainesville, Hallandale, Highland Beach, Hollywood, Jacksonville, Juno Beach, Miami, Miami Beach, Pensacola, Perry, Pompano Beach, Riviera Beach, St. Petersburg, Sarasota, Tallahassee, Tampa, Tequesta, and West Palm Beach.

HYDROLOGIC DATA PROGRAM

Hydrologic data stations are maintained by the Geological Survey at selected key locations throughout Florida to constitute a basic-data network for obtaining records on stream discharge or stage, reservoir and lake storage, ground-water level, spring discharge, and the quality of surface and ground water. Every year stations are added and others are terminated; thus, the Water Resources Division has both a current and a historical file of hydrologic data. All data collected are stored in the Geological Survey's National Water Data Storage and Retrieval System (WATSTORE) and are available upon request to water planners and others involved in making decisions affecting the State's water resources. These data can be retrieved in machine-readable form or in the form of computer-printed tables or graphs, statistical analyses, and digital plots. Local assistance in the acquisition of services or products from WATSTORE can be obtained from the District Chief, Water Resources Division, in Tallahassee. For information on data reports that are published periodically as part of this program see the "Selected References" section of this folder.

SURFACE WATER

Surface-water discharge (streamflow) and water-quality data are collected for general hydrologic purposes such as assessment of water resources, areal analysis, determination of long-term trends, research and special studies, or for management and operational purposes. Discharge and stage data currently are being obtained at the number of stations given in the following table.

Station classification	Number of stations
Stream stations	663
Continuous record	219
Discharge and stage	120
Stage only	61
Darial record	101
Peak (maximum) flow only	162
Low (minimum) flow only	162
Peak and low flow	3
Lake and reservoir stations	218
Stage and content	3
Stage only	215
Total	881

Shown on the map are only those stream stations with continuous record of discharge and stage and lake stations. Water-quality data are obtained at 800 of the surface-water stations listed in the preceding table and also at 119 other surface-water sites where discharge and stage are not measured routinely. These stations are used to monitor the quality of surface water in Florida. Some of these stations also are part of a U.S. Geological Survey nationwide network known as the National Stream Quality Accounting Network (NASQAN), which is used to detect nationwide trends in water quality. The types of data determined at these sites are given in the following table. Inasmuch as several types of data may be determined at a particular site, and not all types of data are determined at each site, the number given in the following table will not equal the total number of sites given earlier.

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Data classification	Number of sites
Physical data:	
Water temperature	745
Specific conductance	364
pH	179
Sediment data	74
Chemical data:	
Inorganic constituents	297
Organic constituents	335
Pesticides	15
Radiochemical data	237
Biological data	237

The map shows the distribution of stations for which data on organic constituents and pesticides are being collected.

GROUND WATER

Water level in wells, discharge of springs, and water-quality data are key parameters for monitoring ground-water trends; however, they must be interpreted with other observations and ground-water system studies in order to have the fullest meaning and usefulness. A basic network of observation wells is maintained in Florida for monitoring fluctuations in water levels. Other wells known as "project wells" are used for specific (generally short-term) studies and, although they are not part of the basic observation-well network, data obtained from them also are available. The number of wells and springs currently being measured are given in the following table.

Station classification	Number of sites
Observation wells:	
Levels	2,144
Project wells	1,901
Springs (discharge)	21

Shown on the map are the basic network observation wells and the spring stations. Water-quality data are obtained at 801 of the observation wells and 21 of the springs listed in the preceding table. The types of data determined at these sites are listed in the following table. The numbers given in the following table will not equal the total number of sites inasmuch as several types of data may be determined at a single site.

Data classification	Wells	Springs
Physical data:		
Water temperature	801	21
Specific conductance	801	16
pH	288	7
Chemical data:		
Inorganic constituents	326	11
Organic constituents	93	17
Biological data	147	13

The map shows wells for which data on organic constituents are being collected.

HYDROLOGIC INVESTIGATIONS

Hydrologic investigations include areal resource appraisals, data collection other than that which is part of the Hydrologic-Data Program, and research activities. Current investigations in Florida are listed below; generally, the areal investigations are outlined on the principal map and the statewide and topical investigations are not.

DISTRICT PROJECTS

(These projects are under the direction of the Florida District Chief)

SHOWN ON MAP

- A. Water resources, Pensacola area. To determine the quality and quantity of water available from the sand-and-gravel aquifer, and to provide a basis for predicting the movement of contaminants.
- B. Waste fluid injection wells, Pensacola area. To evaluate some of the hydrologic and geomechanical effects of acidic industrial wastes on a limestone aquifer.
- C. Deep wells for waste injection, Santa Rosa County. To evaluate the hydrology and geochemistry of the saline aquifer system and the fate of injected liquid waste.
- D. Hydrology, Ft. Walton area. To determine the effects on the Floridan aquifer water levels by various pumping patterns or by a connected-well system on water levels, or by limiting or reducing pumping rates.
- E. Spraying treated effluent, Tallahassee. To assess the hydrochemical effects of sewage effluent disposal on land by spray irrigation.
- F. Water resources, Duval County. To evaluate the potential water resources and to monitor changes in quantity and quality of ground and surface waters.
- G. Shallow aquifer, Jacksonville area. To determine the yield, transmissivity, storage coefficient, and recharge potential of the shallow aquifers.
- H. Water resources, Clay County. To describe and make a preliminary assessment of the surface- and ground-water resources in the county.
- I. Hydrology, central Volusia County. To provide management with information necessary for the withdrawal of water from central wetlands by the most beneficial method.
- J. Water resources, Juniper Creek area. To describe the general surface-water hydrology of this watershed, in west-central Sumter County.
- K. Water resources, Orange County. To evaluate the water resources with emphasis on areas of natural and artificial recharge and the disposal of liquid waste by deep wells.
- L. Hydrology, Cocoa well field. To investigate interconnection between the fresh and salty zones of the Floridan aquifer in the well field.
- M. Urban hydrology, Bay Lake area. To evaluate hydrologic effects being brought about by the urbanization of virgin territories.
- N. Hydrology of the shallow aquifer, Brevard County. To evaluate the potential yield of existing well-field area and two areas in northern Brevard.
- O. Subsurface liquid-waste disposal, Pinellas County. To determine if transmissive zones exist at depth on the peninsula and whether or not these zones can safely dispose of waste-treatment plant effluent.
- P. Subsurface storage of storm and waste water, Pinellas County. To determine the hydrological effects of injecting storm runoff and waste-treatment plant effluent on the aquifer system.
- Q. Geology of landfill area, Pinellas County. To determine the effects on water resources of land disposal of solid waste in a coastal area having a high water table overlying a limestone aquifer.
- R. Water-supply assessment, Hillsborough River. To make an areal water-supply assessment of the Hillsborough River basin under both current and future conditions.
- S. Solid-waste disposal, Hillsborough County. To determine the effects on water resources of landfill operations in sandy areas with a high water table overlying a limestone aquifer.
- T. Ground-water use, Dade City area, Pasco County. To evaluate the effect of pumping on ground-water levels, the hydraulic characteristics of the Floridan aquifer, and the potential for additional yield from the aquifer.
- U. Hydrology, Manatee County. To establish an adequate hydrologic data base to permit evaluation of regional effects of development on the hydrologic system.
- V. Geohydrologic studies, DeSoto County. To evaluate the aquifer system and test hydrologic conditions and to determine effects associated with artificial recharge to the artesian aquifer.
- W. Hydrology, west-central Sarasota County. To assess areas suitable for the development of public water supplies and monitor effects of sanitary landfills on the shallow aquifer.
- X. Urban hydrology, Englewood area, Sarasota County. To monitor the fluctuations in water level and in chemical quality of water in the area.
- Y. Water resources, Lee County. To delineate potential water-quality sources and to provide data necessary to reclaim contaminated sources of supply.
- Z. Water resources, western Collier County. To delineate areas of potential water supply and to monitor salt-water movement.

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- AA. Water resources, Hendry County. To provide adequate information on the water resources for future development and effective water management.
- BB. Hydrologic studies, Everglades National Park. To determine historical and present water conditions in the Park and to evaluate ecological changes taking place.
- CC. Water resources, St. Lucie County. To provide information on the water resources so that management may protect hydrologically and ecologically sensitive areas.
- DD. Water resources, Martin County. To evaluate the general water resources of the county with emphasis on salt-water encroachment and effects of urbanization.
- EE. Water resources, Tequesta. To evaluate the hydrogeology and water quality of the shallow aquifer as a potential source of water supply.
- FF. Water resources, Palm Beach County. To describe and assess the availability of additional potable ground-water supplies for coastal and inland areas.
- GG. Hydrology of sandy flatlands, Palm Beach County. To evaluate the hydrologic base necessary for the development of ground-water supplies from an increase in land development.
- HH. Hydrology of a shallow aquifer, Palm Beach County. To define the areal extent, thickness, and hydraulic characteristics of the high permeability zone and to determine the impact of waste disposal leachates on the ground-water system.
- II. Hydrology, Riviera Beach area. To investigate and define the aquifer system and to determine the movement of leachate from a sanitary landfill.
- JJ. Injecting liquid wastes in a saline aquifer, West Palm Beach. To provide information necessary for the evaluation of the potential use of a deep saline aquifer for waste disposal or storage.
- KK. Ground-water resources, Lake Worth area. To determine the extent, thickness, and water-yielding characteristics of various zones in the shallow ground-water system.
- LL. Water resources, Broward County. To provide the hydrologic base necessary for intensive management of the water resources of the area.
- MM. Quality-of-water studies, Broward County. To monitor and evaluate changes in water quality in the primary canal system and the Biscayne aquifer.
- NN. Hydrologic studies, Ft. Lauderdale area. To monitor salt-front and to evaluate the availability of water supplies in central Broward County.
- OO. Ground-water availability, Hallandale area. To evaluate potential areas of water supply and to monitor salt-water intrusion.
- PP. Ground-water availability, Hollywood area. To delineate the areas with the best potentials for the development of ground-water supplies.
- QQ. Hydrologic studies, Dade County. To prepare an annual report summarizing hydrologic conditions in Dade County and evaluate salt-water encroachment conditions.
- RR. Storage of fresh water in a saline aquifer, Dade County. To evaluate the hydrologic and geomechanical factors pertaining to the storage of fresh water in saline aquifers underlying southeast Florida.
- SS. Interior well field sites, Dade County. To evaluate various areas for potential water supplies and to develop analog models to simulate effects of large withdrawals.
- TT. Infiltration study, Miami Canal. To determine the effects of bottom sediments on infiltration rates and on water quality.
- UU. Ground water for desalination, Florida Keys. To collect data on wells which will help define the availability of brackish water in the Floridan aquifer in the Keys.
- VV. Fresh-water resources, Big Pine Key. To determine the volume of fresh water in a shallow aquifer during various seasons and to determine the areal boundaries of the aquifer.

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- Bridge-site studies, statewide. To provide the State Department of Transportation bridge designers with sufficient hydraulic data for the safe and economic design of waterway structures.
- Hydrologic studies, statewide. Short-term special studies including water use, stresses on hydrologic system, deep-well water injection, and salt-water intrusion.
- Salt-water studies, Dade County. To evaluate salt-water encroachment for existing hydrologic conditions and predict movement of salt water for future conditions.
- Map representation of hydrologic data, statewide. To prepare a series of map reports designed to portray generalized hydrological, geological, and related information.
- Lake hydrology, statewide. To develop a basic understanding of the nature and causes of lake-level fluctuations and to participate in hydrologic investigations involving lakes.
- Environmental studies, statewide. To determine the overall quality of Florida surface and ground waters in relation to controlling environmental and geomechanical factors.
- Flood studies in small basins, statewide. To define regionally the magnitude and frequency of floods on selected drainage areas in Florida of less than about 20 square miles.
- River basin modeling, west-central Florida. To determine frequency under both current and anticipated levels of development and evaluate digital streamflow models for use in the study.
- Subsurface storage of liquid waste, statewide. To provide the scientific information needed for planning-management decisions on the potentialities and possible consequences of subsurface waste storage.
- Potentiometric mapping and well-field hydrology, west-central Florida. To prepare potentiometric maps of the Floridan aquifer and to evaluate the hydrologic characteristics of potential well-field areas.
- Flood hazard mapping, statewide. To prepare flood-prone area maps of the entire State on the topographic 7½-minute quadrangle maps.
- Hydrology of lakes, west-central Florida. To provide a definitive hydrologic description of specific lake basins.
- Estuarine hydrology, Tampa Bay. To provide background information on hydrodynamics, water quality, sediment quality, bottom configuration, and other related factors in Tampa Bay.
- Water-supply potential, Green Swamp area, central Florida. To determine the hydrologic characteristics of the aquifer system and to evaluate potential ground-water withdrawals against surface-water retention and land-use practices.
- Quality of storm water, south Florida. To determine storm-water runoff loads for a wide variety of environmentally important water-quality constituents.
- Urban hydrology, Tampa Bay area. To establish an urban runoff data base for the study area including streamflow, physiographic, climatic, and chemical quality of water data.
- Aquifer modeling, west-central Florida. To determine by aquifer modeling the effects of large ground-water withdrawals on the potentiometric surface of the Floridan aquifer in west-central Florida.
- Aquifer mapping, south Florida. To prepare a series of maps showing hydrologic data for the aquifers which are being utilized or which have potential utilization.
- Hydrology, Ochlockonee River basin, northwest Florida. To evaluate the total water resources of the basin through the development of quantitative and qualitative data.
- Hydrology, Santa Fe River basin, north Florida. To evaluate the total water resources of the basin through the development of quantitative and qualitative data.
- Aquifer characteristics, west-central Florida. To conduct controlled aquifer and specific capacity tests on a continuing basis and to evaluate the aquifer characteristics.
- Remote hydrologic-data acquisition, west-central Florida. To acquire, test, and evaluate a telemetry system composed of one satellite and one landline telemetry.
- Geohydrology, Ocala National Forest, north Florida. To evaluate effects of possible phosphate mining on water resources of Ocala National Forest.
- Low flow of streams, northwest Florida. To provide data on which water-management decisions can be made as they relate to the adequacy of low flows as a source of water supply for various purposes.
- Regional flood-frequencies, west-central Florida. To develop regional flood-frequency information for the Southwest Florida Water Management District.
- Water-use inventory, statewide. To provide water-use information for the various categories on an annual basis.
- Summary reporting of hydrologic conditions, west-central Florida. To prepare annual reports providing hydrologic information for planning, management, and regulation of water resources by the Southwest Florida Water Management District.
- Modeling of Loachahatchee River, south Florida. To identify the route of travel of treated waste water and to design a water-quality monitoring network for the ground-water system.
- Technical support of Water Management Districts, statewide. To provide the staffs of the Water Management Districts with expertise, advice, and on-the-job training in the fields of ground-water, surface water, and water-quality hydrology.

RESEARCH AND REGIONAL PROJECTS

(These projects are under the direction of the Assistant Chief Hydrologist for Research and Technical Coordination, Reston, Va.)

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- Summary appraisals of the Nation's ground-water resources. Summary of the distribution, availability, and quality of ground water and its importance in the water supply of 21 water-resources regions, Florida is located in the South Atlantic-Gulf Region (Project Chief: D.J. Cederstrom).