WATER-RESOURCES ACTIVITIES OF THE LOUISIANA DISTRICT, 1988-89

Compiled by L.F. Farrar

U.S. GEOLOGICAL SURVEY

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Baton Rouge, Louisiana

1991

U.S. DEPARTMENT OF THE INTERIOR

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ABSTRACT

The mission of the U.S. Geological Survey, Water Resources Division, is to provide the hydrologic information and understanding needed for the use and management of the Nation's water resources. In Louisiana, the mission of the Water Resources Division of the U.S. Geological Survey is accomplished through a cooperative effort with other Federal, State, and local agencies or U.S. Geological Survey national programs. The District's water-resources activities involve a variety of hydrologic investigations including the assessment of quantity, quality, use, and movement of surface and ground water in the State.

INTRODUCTION

The U.S. Geological Survey (USGS), Water Resources Division, conducts activities in Louisiana to provide hydrologic information and knowledge to manage the State's water resources. These activities are supported through programs with other Federal, State, and local agencies. These activities can be divided into two broad categories: hydrologic data collection and hydrologic investigations and research.

A major component of USGS activities in Louisiana is the operation of statewide streamgaging, ground-water, and quality-of-water long-term monitoring networks. These extensive networks are maintained with state-of-the-art equipment such as real-time satellite telemetry instrumentation. The data from these networks are essential for assessment and management of Louisiana's water resources.

Another major component of USGS activities includes areal interpretive investigations and research. A staff of hydrologists with backgrounds in engineering, geology, chemistry, biology, and other physical and natural sciences study and address hydrologic problems such as potential organic-chemical contamination of the Calcasieu River estuary, water-quality of the Barataria basin, water quality and flood characteristics of streams, quality and quantity of freshwater in aquifers, and evaluation of ground-water resources.

This report summarizes the Louisiana District's water-resources activities during the 1988-89 fiscal years. The report includes the objective, approach, and progress for each project. It also includes a description of the District organization and a list of cooperators.

DISTRICT ORGANIZATION

The Louisiana District of the Water Resources Division, USGS, conducts data collection and water-resources investigations and research under the leadership of Darwin Knochenmus, District Chief. The District office is located in Baton Rouge and field offices are located in Baton Rouge and Ruston (fig. 1). The District organization includes a Hydrologic Surveillance Section, a Hydrologic Investigations Section, and a Reports Preparation Section, in addition to the necessary administrative and other support functions as shown in figure 2. The names, titles, addresses, and telephone numbers of key personnel in various organizational units are listed below:

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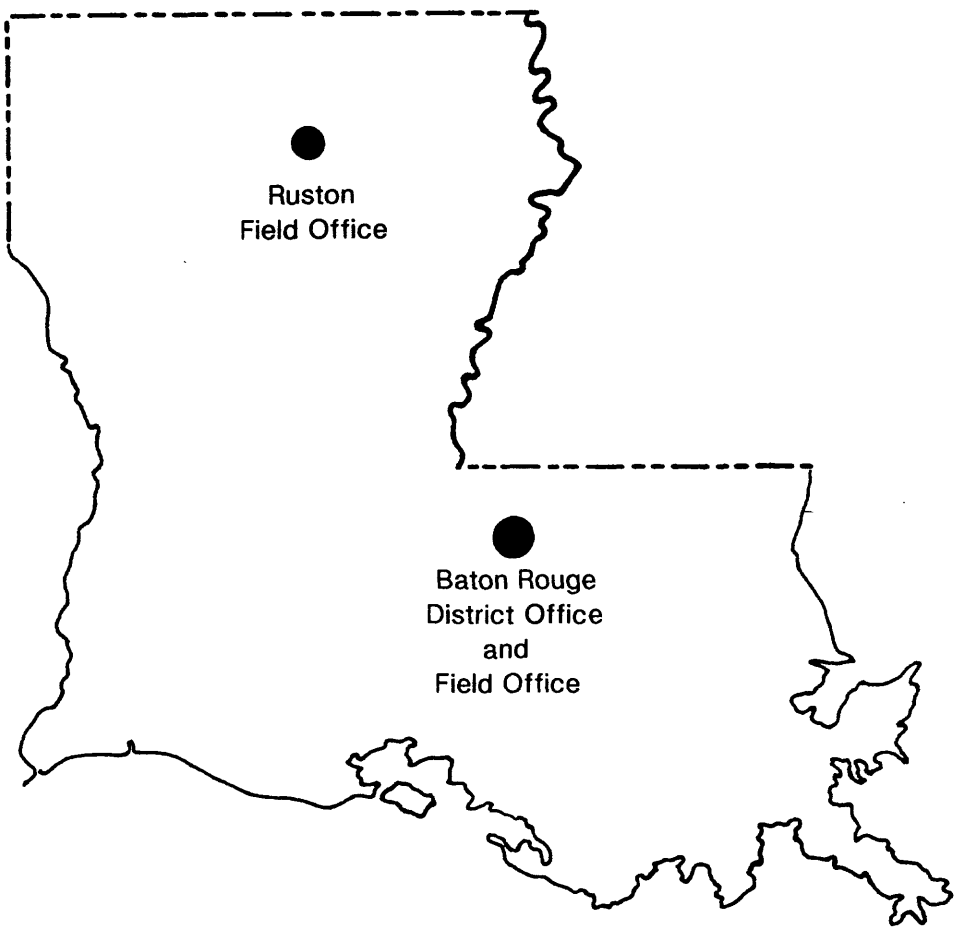


Figure 1.--U.S. Geological Survey offices in Louisiana.

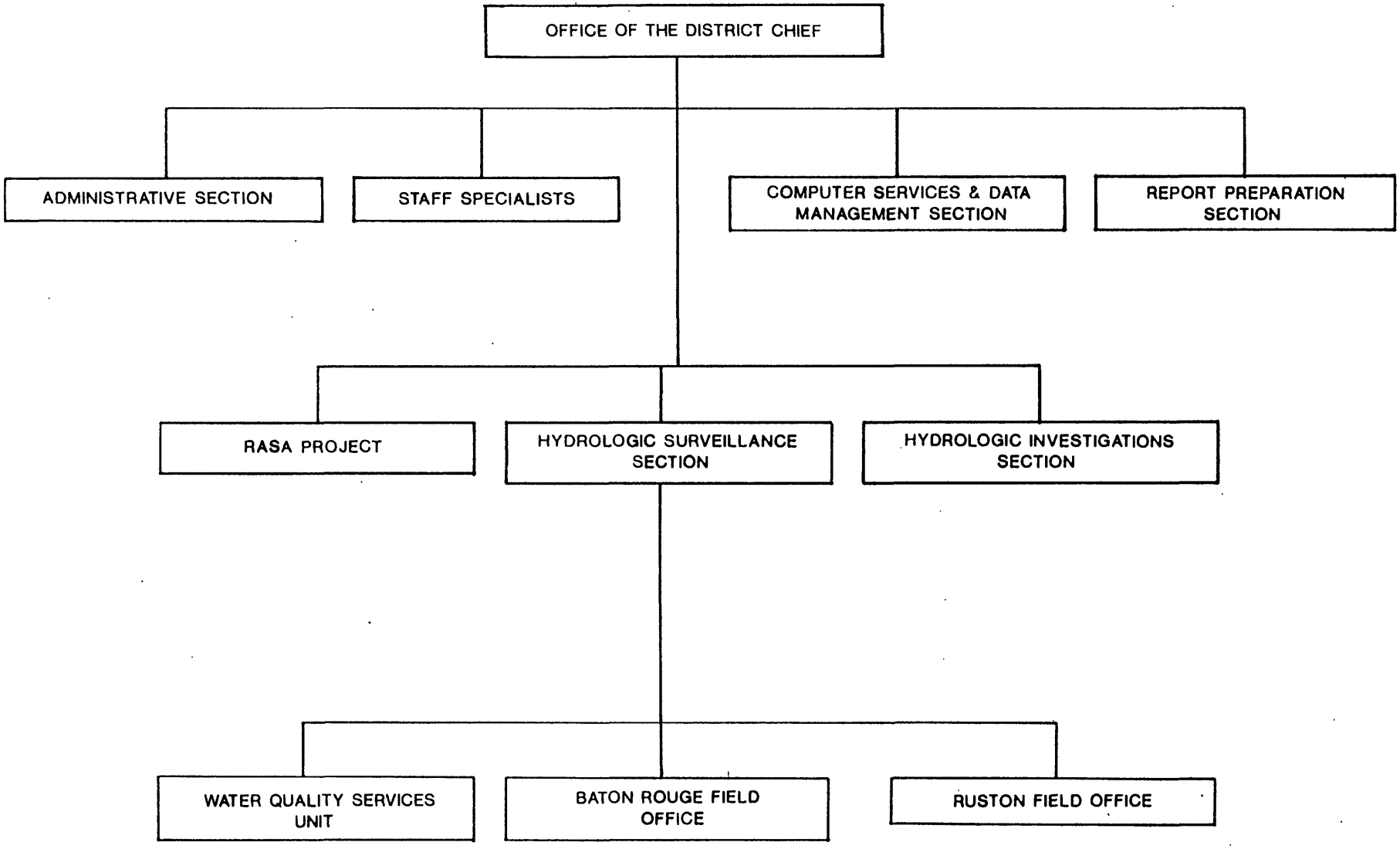


Figure 2.--Louisiana District organization chart.

THE U.S. GEOLOGICAL SURVEY COOPERATIVE PROGRAM

Hydrologic activities are conducted, in large part, through cooperation with Federal, State, and local agencies who share in the planning and financial support of the program. The sources of funding for the water-resources activities in Louisiana and the types of programs funded are shown in figure 3. The cooperators listed below have given support, both financially and professionally, to the projects and programs of the Louisiana District:

State and Local Agencies

Capital Area Ground Water Conservation Commission (CAGWCC)

City of West Monroe

East Baton Rouge Parish

Jefferson Parish

Department of Water

Department of Public Works

State of Louisiana

Department of Environmental Quality (DEQ)

Department of Natural Resources (DNR)

Department of Transportation and Development (DOTD)

Department of Wildlife and Fisheries (DWF)

Sabine River Compact Administration

Federal Agencies

Federal Emergency Management Agency (FEMA)

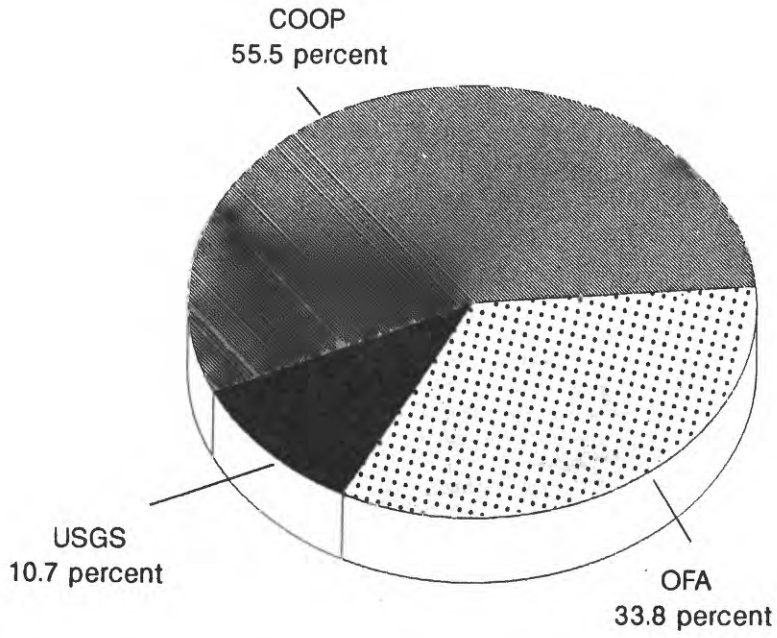
National Park Service (NPS)

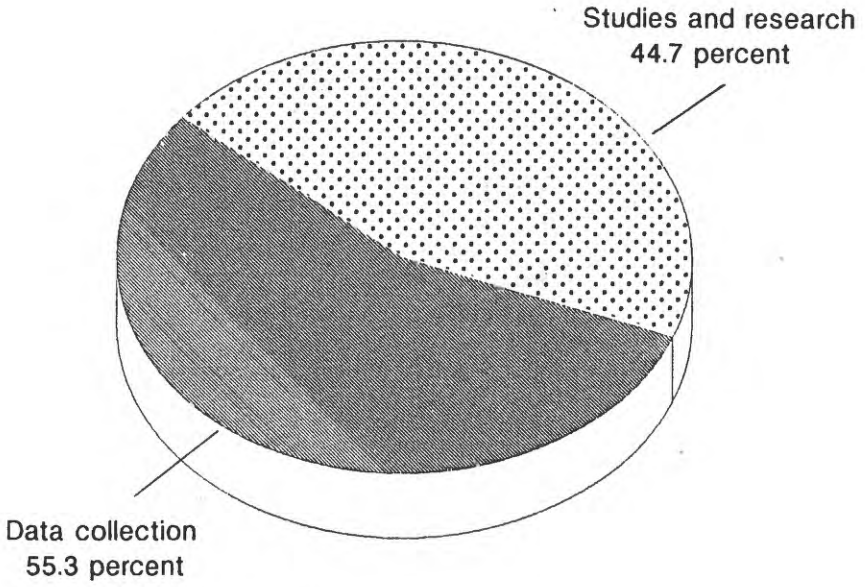
U.S. Army Corps of Engineers (COE), New Orleans District

U.S. Army Corps of Engineers, Vicksburg District

U.S. Army, Fort Polk, Louisiana

U.S. Forest Service





EXPLANATION

USGS - Research
COOP - State and local agencies
OFA - Other Federal agencies

Figure 3.--Type of funding and type of program in the Louisiana District, fiscal year 1989.

WATER-RESOURCES DATA COLLECTION ACTIVITIES

PROJECT TITLE: Surface-water stations

PROJECT NUMBER: LA00-001

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: City of West Monroe; East Baton Rouge Parish; Jefferson Parish, Department of Public Works; Department of Environmental Quality; Department of Transportation and Development; Department of Wildlife and Fisheries; Sabine River Compact Administration; and U.S. Army Corps of Engineers

PROJECT CHIEF: George J. Arcement, Jr.

PROJECT DURATION: Continuous

PROBLEM: Surface-water information is needed for purposes of surveillance, planning, design, hazard warning, operation, and management in water-related fields such as water supply, hydroelectric power generation, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development.

OBJECTIVE: Collect surface-water data sufficient to satisfy needs for current uses such as assessment of water resources, operation of reservoirs or industries, forecasting, assimilation of wastes and implementation of pollution controls, calculation of water-quality load, meeting river compact and legal requirements, and research or special studies. Collect data necessary for analytical studies to define hydrologic characteristics of streams, lakes, estuaries, and other water bodies for use in planning and design.

APPROACH: Standard streamflow measurement techniques as described in the series Techniques of Water-Resources Investigations of the USGS will be used to determine streamflow at a network of continuous and partial-record gaging stations throughout the State (fig. 4).

PROGRESS: Hydrologic data for continuous-record, partial record, and reservoir surface-water stations in Louisiana have been collected for 184 stations (fig. 4). The following reports have been published: "Index to surface-water data in Louisiana, 1989" and the annual data reports for the 1987 and 1988 water years. A one-dimensional model is being used for determining daily discharges at a number of slope-affected stations. A number of electromagnetic flowmeters have been installed at stations in the coastal areas where flow velocities are low.

PLANS FOR 1990: Publish data for 1989 water year. Continue operation of the surface-water data network. The data network will be evaluated and the cooperators will be consulted as to any necessary changes. There will be a continued effort in using the one-dimensional flow model for computing daily discharges at backwater and tide affected stations. Satellite telemetry data collection platforms will be installed at a number of stations where electromagnetic flowmeters are operating and at selected locations to collect stage and rainfall data to help determine where significant rainfall has occurred.

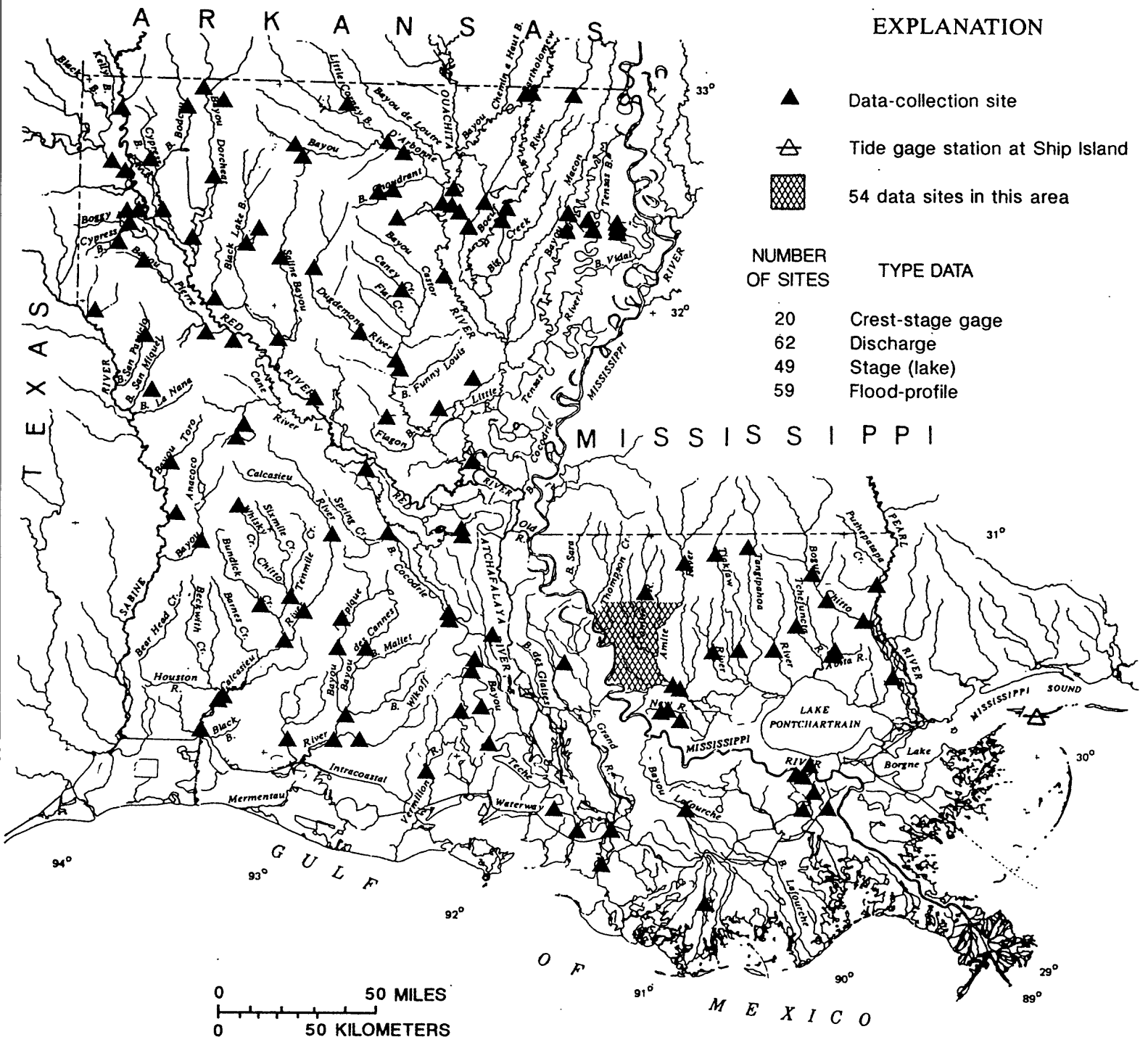


Figure 4.--U.S. Geological surface-water gaging stations in Louisiana.

PROJECT TITLE: Ground-water sites

PROJECT NUMBER: LA00-002

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: Capital Area Ground Water Conservation Commission; Department of Environmental Quality; Department of Transportation and Development; and U.S. Army Corps of Engineers

PROJECT CHIEF: George J. Arcement, Jr.

PROJECT DURATION: Continuous

PROBLEM: Long-term water-level records and other ground-water data are needed to evaluate the effects of climatic variations on recharge to and discharge from ground-water systems, provide a data base from which to measure the effects of development, assist in the prediction of future supplies, and provide data for management of the resource.

OBJECTIVE: Collect water-level data sufficient to provide a minimum long-term data base necessary to describe the general response of the hydrologic system to natural climatic variations and induced stresses so that potential problems can be identified early enough to permit proper planning and management. Provide a data base against which the short-term records acquired in areal studies can be analyzed. Data typically are needed to (a) provide an assessment of the ground-water resources, (b) allow prediction of future conditions, (c) detect and define pollution and supply problems, and (d) provide the basis for management decisions.

APPROACH: Maintain a ground-water network consisting of 370 water-level observation wells (fig. 5) and the Ground Water Site Inventory file. The network is reviewed at regular intervals, and quality control of collected data is achieved on a regular basis. Network provides broad coverage of hydrologic conditions in the geologic provinces of the State and data for all major aquifers. Special emphasis is given to problem areas where serious water-level declines and movement of saltwater are occurring.

PROGRESS: The water-level data for observation wells were compiled and published for the 1987 and 1988 water years in the annual data reports. Areal and special projects were supported by furnishing data in a variety of computer output formats. The Director's approval was obtained and the report "Louisiana ground-water map no. 2: Potentiometric surface 1987, of the Gonzales-New Orleans aquifer in southeastern Louisiana" was published.

PLANS FOR 1990: Publish data for 1989 water year. Continue operation of the ground-water data network. Consult cooperators on any relevant changes in the data network and make revisions as necessary. Continue to maintain the Ground-Water Site Inventory file by inputting water levels and well schedules for wells registered with the State.

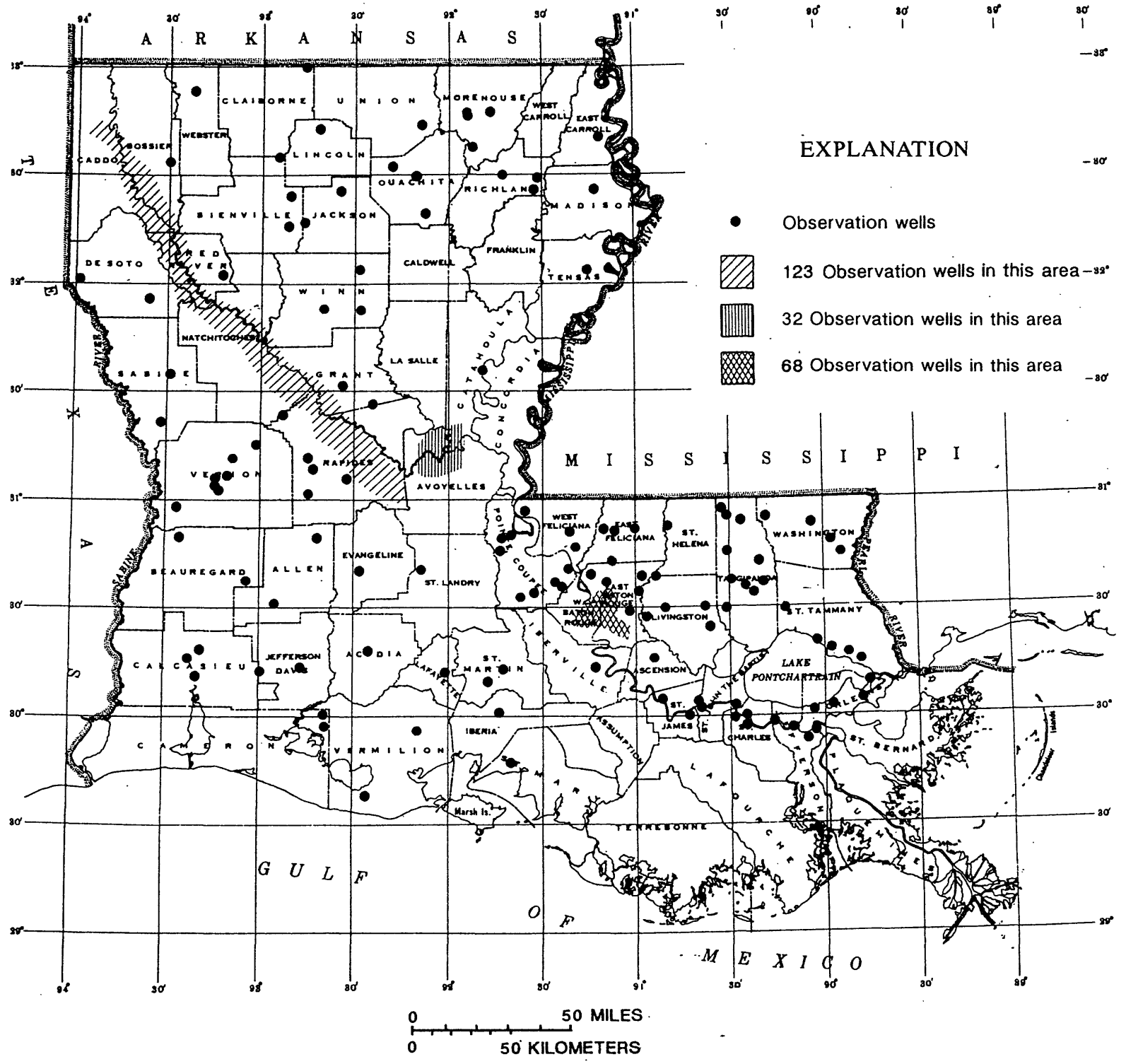


Figure 5.--U.S. Geological Survey ground-water-level observation wells in Louisiana.

PROJECT TITLE: Quality-of-water stations

PROJECT NUMBER: LA00-003

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: Department of Natural Resources; Department of Transportation and Development; Sabine River Compact Administration; National Park Service; U.S. Army Corps of Engineers; U.S. Forest Service

PROJECT CHIEF: George J. Arcement, Jr.

PROJECT DURATION: Continuous

PROBLEM: Water-resource planning and water-quality assessment requires that the chemical, physical, and biological quality of the rivers, streams, lakes, and aquifers in the State be monitored.

OBJECTIVE: Provide a statewide, water-quality data base sufficient to satisfy current needs for the assessment of water resources, operation of reservoirs or industries, assimilation of wastes and implementation of pollution control techniques, calculation of water-quality loads, meeting river compact and legal requirements, and research or special studies.

APPROACH: Operate a water-quality network consisting of 221 wells and 38 surface-water stations (figs. 6 and 7). Water-quality data will be collected to provide chemical concentrations, loads, and time trends as required by planning and management agencies.

PROGRESS: Water-quality data for rivers, streams, lakes, and aquifers were compiled and published for the 1987 and 1988 water years in the annual data reports. The water-quality network was evaluated and adjusted as needed.

PLANS FOR 1990: Publish data for 1989 water year. Continue operation of network, reviewing station requirements and making any necessary adjustments to the network.

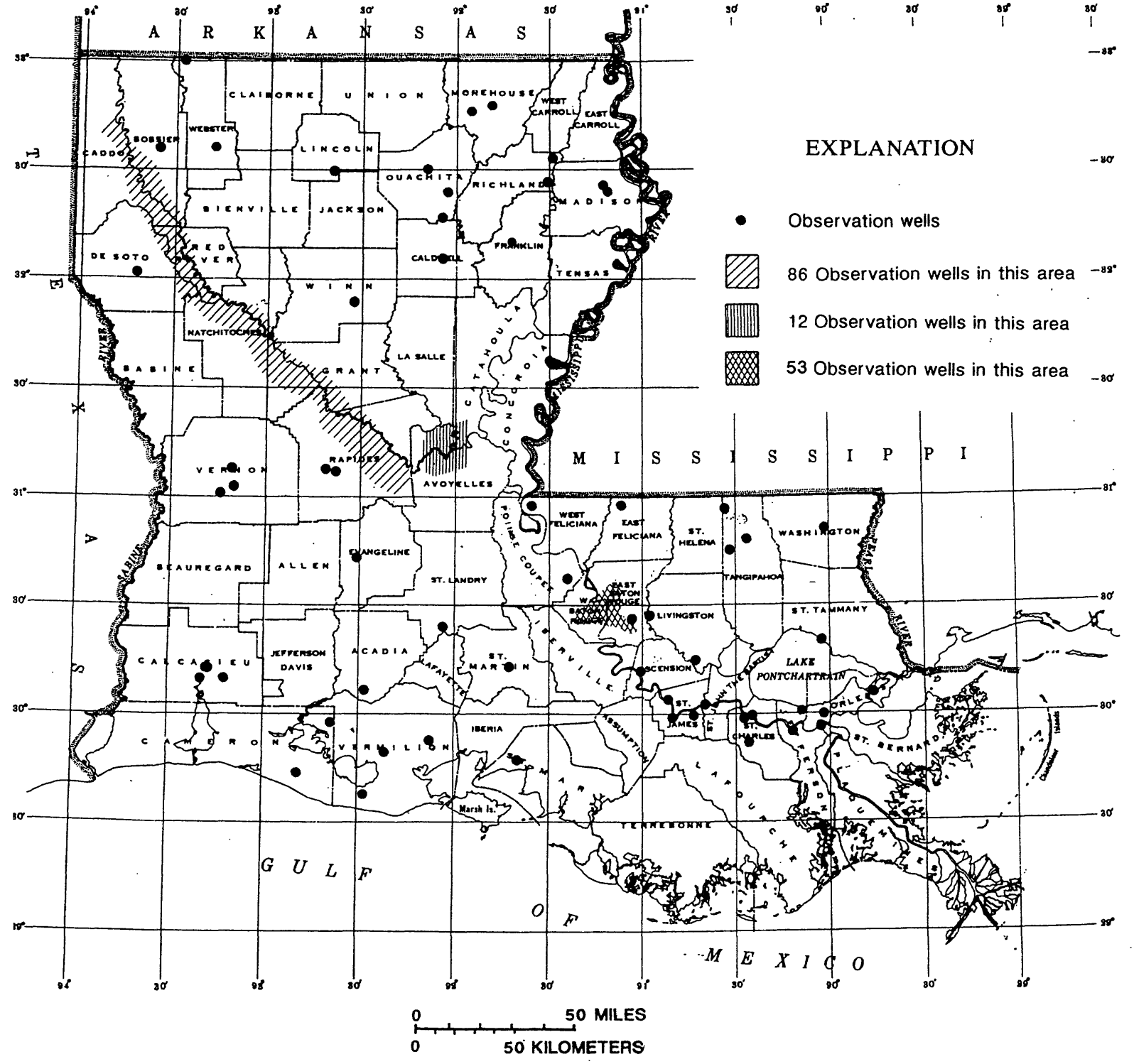


Figure 6.--U.S. Geological Survey ground-water-quality observation wells in Louisiana.

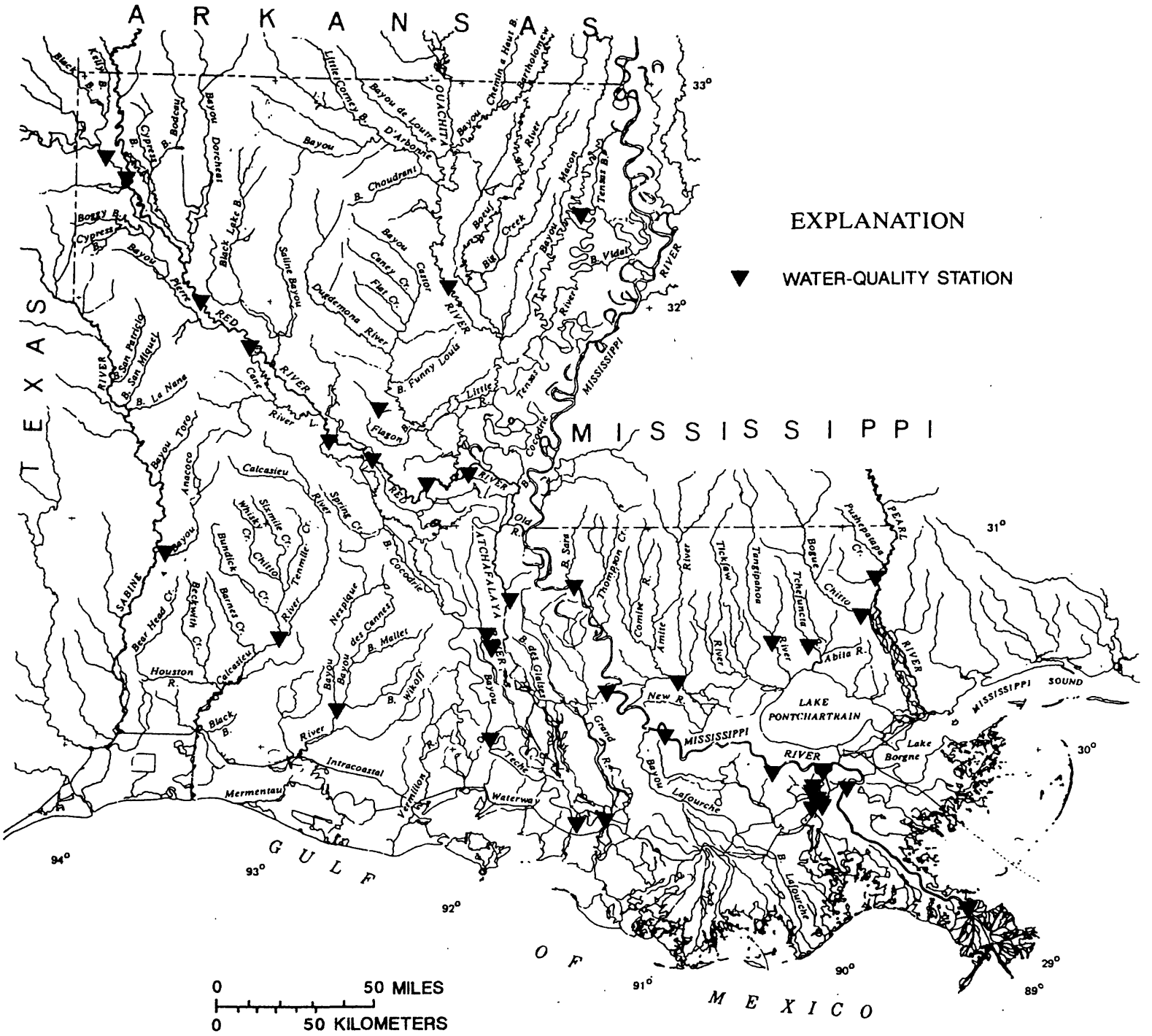


Figure 7.--U.S. Geological Survey surface-water-quality stations in Louisiana.

PROJECT TITLE: Sediment stations

PROJECT NUMBER: LA00-004

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCY: U.S. Army Corps of Engineers

PROJECT CHIEF: George J. Arcement, Jr.

PROJECT DURATION: Continuous

PROBLEM: Water-resources planning and water-quality assessment requires that the transport of suspended sediment in rivers and streams be monitored.

OBJECTIVE: Provide a statewide sediment data base to provide resource managers with the data needed for management of the State's waters and provide the data needed for water-quality assessment studies.

APPROACH: Establish and operate a network of sediment stations to evaluate spatial and temporal variations in sediment concentrations and yields to determine trends of sediment concentration and loads, and to define the particle size of sediment being transported by rivers and streams. The locations of sediment stations operated by the USGS in Louisiana are shown in figure 8.

PROGRESS: Sediment samples were collected and analyzed from 18 sites, including one site on the Mississippi River near St. Francisville. Sediment data were compiled and published for the 1987 and 1988 water years in the annual data reports. Figure 9 shows collection of sediment data on the Mississippi River near St. Francisville. Samples were collected at 12 additional sites by the Corps of Engineers and analyzed by the USGS.

PLANS FOR 1990: Publish data for 1989 water year. Continue operation of the network, review station requirements and adjust the network as necessary. Continue efforts to establish the pipet method for sediment analysis and further automate techniques for the analysis of sediment.

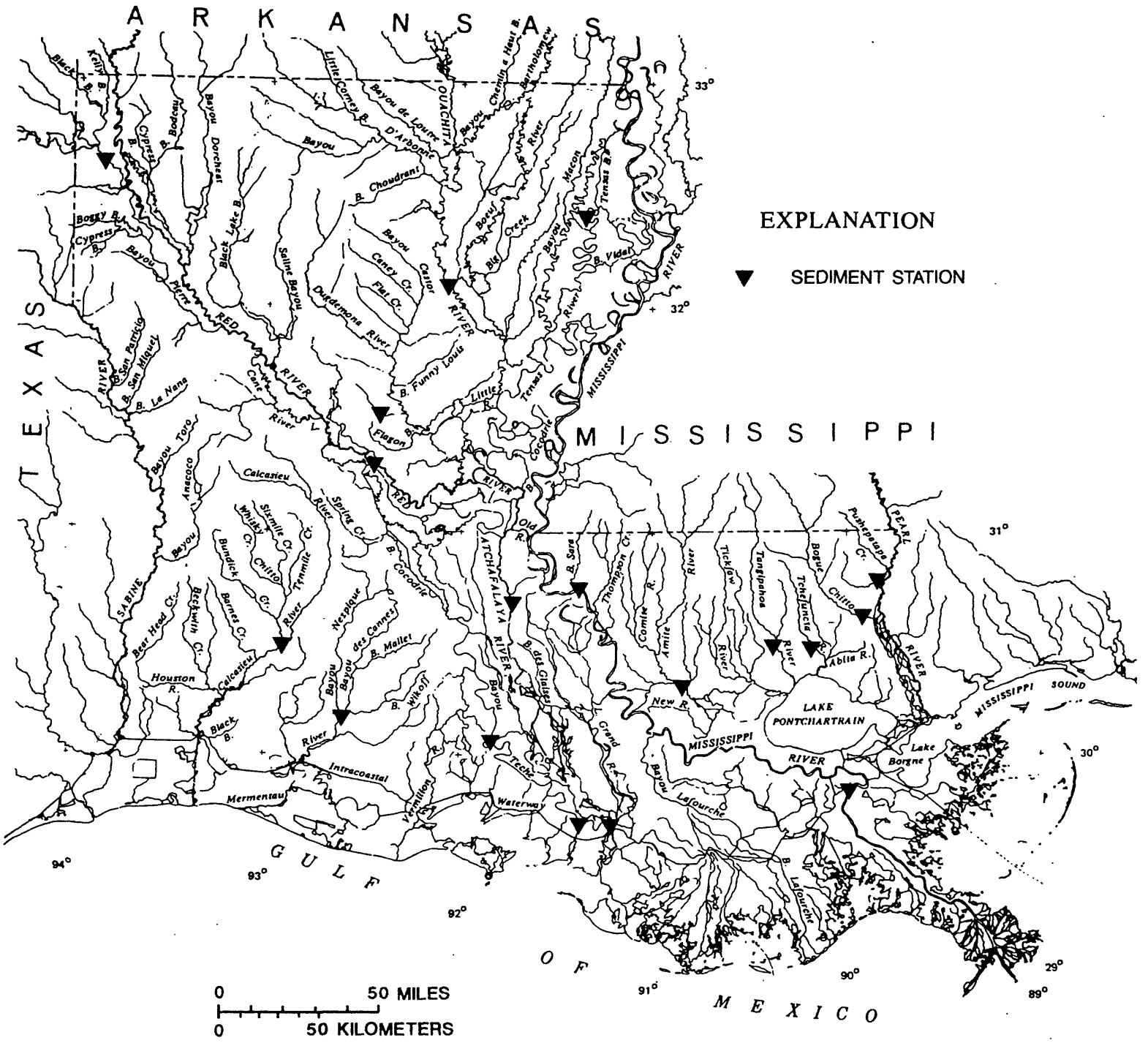


Figure 8.--U.S. Geological Survey sediment stations in Louisiana.

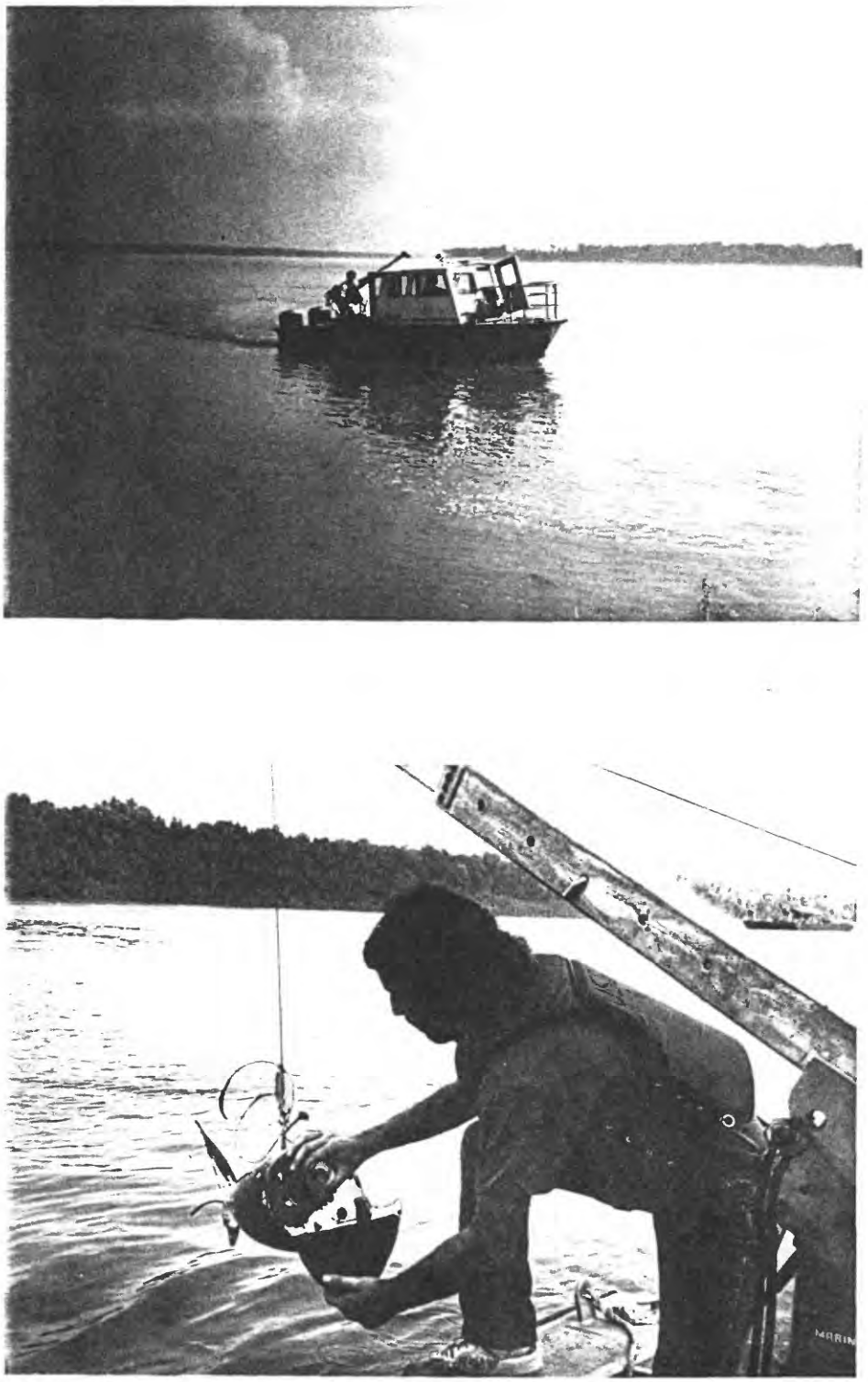


Figure 9.--Data collection on the Mississippi River near St. Francisville, Louisiana.

WATER-RESOURCES INTERPRETIVE INVESTIGATIONS AND RESEARCH ACTIVITIES

PROJECT TITLE: Synoptic Survey of the Barataria Basin

PROJECT NUMBER: LA88-003

STUDY LOCATION: Barataria Bay, Louisiana

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: Dennis K. Demcheck

PROJECT DURATION: August 1988 to September 1989

PROBLEM: The Barataria basin, especially the area surrounding Bayou Barataria, has been subjected to rapid population growth in the last 30 years. This area has historically lacked an extensive water-quality data base, and many of the current water-quality problems thought to exist in the basin are poorly documented because of this lack of data. The Barataria basin has, at one time or another, been thought to suffer from nutrient overloading, minor-element and organic-compound contamination, low dissolved-oxygen concentrations in the water column, bacterial contamination of oyster beds, saltwater intrusion, and coastal and inland erosion. Urban runoff in the upper basin, population growth along Bayou Barataria, and increased recreational and industrial use of the basin have all been mentioned as possible sources of nutrients and minor elements to the water and bottom material, as well as possible contributors to fecal coliform contamination of oyster beds in the area. Similarly, oil and gas exploration, flood control projects, and navigational projects have been mentioned as causes of coastal and inland erosion and saltwater intrusion. Unfortunately, water-quality information on the areal extent of the above problems, with the exception of oyster bed contamination and coastal erosion, has not been well documented.

OBJECTIVE: Collect water-quality information and define the areal water-quality related problems in the Barataria basin to develop a data base for an effective plan for management of this productive natural resource.

APPROACH: Sample 16 sites extensively over a 2-day period. Measure physical constituents such as dissolved-oxygen concentration, pH, water temperature, and specific conductance hourly at 4 selected sites during the study period. Collect water, suspended-sediment, and bottom-material samples and analyze these samples for nutrients, major inorganic ions, minor elements, pesticides, and manmade organic compounds. Test the water for the presence of fecal-indicator and pathogenic bacteria. Analyze oysters from the northern end of Barataria Bay for manmade organic compounds and such minor elements as mercury, lead, and cadmium. Make discharge measurements to provide information for load calculations and direction and duration of flows.

PROGRESS: Data collection has been completed and a report has been prepared in an atlas format. The report summarizes the findings, identifies water-quality problems, and highlights areas where further study is needed. The report has been returned from colleague review and suggested revisions have been incorporated into report.

PLANS FOR 1990: Obtain Director's approval and publish report.

PROJECT TITLE: Flood Investigations

PROJECT NUMBER: LA75-006

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCY: Federal Emergency Management Agency

PROJECT CHIEF: Fred N. Lee

PROJECT DURATION: Continuous

PROBLEM: The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 provide for the operation of a flood insurance program. The Federal Emergency Management Agency needs flood studies in selected areas to determine applicable flood insurance premium rates.

OBJECTIVE: Conduct the necessary hydrologic and hydraulic evaluations and studies of areas assigned by FEMA and present the results in an appropriate format.

APPROACH: Conduct the necessary evaluations or conduct surveys by ground or photogrammetric methods. Determine flood-discharge frequency relations using local historical information, gaging-station records, or other applicable information. Determine water-surface profiles using step-backwater models or other acceptable methods. Furnish the results in reports prepared to specifications of FEMA.

PROGRESS: Less Detailed Study reports have been prepared and approved for Beauregard, Allen, and Sabine Parishes and submitted to FEMA. A Limited Map Maintenance Program (LMMP) study for Minden, Louisiana, has been completed and sent to FEMA. A new LMMP study for Blackwater Bayou and tributary in north Baton Rouge has been started.

PLANS FOR 1990: Complete analyses for all community LMMP studies and submit results to FEMA for publication.

PROJECT TITLE: Water Use in Louisiana

PROJECT NUMBER: LA79-007

STUDY LOCATION: Statewide

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: John K. Lovelace

PROJECT DURATION: Continuous

PROBLEM: Information on water use is essential for planners and managers to resolve problems involving resource allocations, environmental effects, energy development, and water quality. A reliable data base is needed to provide historical water-use information to enable scientists to project hydrologic effects of future water demands.

OBJECTIVE: Collect water-use data in a thorough, precise, and timely manner. Analyze and interpret the data for use by State officials and planners. The information collected includes how much water is used, where it comes from and how much and where water is returned to the hydrologic system.

APPROACH: Establish an extensive data-collection network to facilitate the timely and regular collection of water-use information by project personnel. Collect water-use data from larger industrial, power generation, and public supply facilities, and utilize data from other Federal, State, and local agencies that collect data or compile statistics applicable to water use. Collect Water-use data for facilities outside of the data network on a 5-year basis coincident with preparation of the 5-year pumpage report. Enter the data into the District's water-use data base. Prepare water-use report at 5-year interval to summarize water use in Louisiana by use category, parish, hydrologic basin, and aquifer and describe trends in water use over the past 30 years.

PROGRESS: During the year, 130 major water users were contacted throughout Louisiana. These facilities represent approximately 80 percent of the total water withdrawals in Louisiana for public supply, industry, and power generation that was reported in 1985. These facilities now report water pumpage to the USGS District office on a quarterly basis.

PLANS FOR 1990: Preparations and data collection will begin for the 1990 water-use report.

PROJECT TITLE: Mississippi Embayment - West Gulf Coast Regional Aquifer System Analysis

PROJECT NUMBER: LA82-071

STUDY LOCATION: Statewide

FUNDING SOURCE: U.S. Geological Survey

PROJECT CHIEF: Angel Martin, Jr.

PROJECT DURATION: April 1982 to September 1989

PROBLEM: Ground-water withdrawals in some parts of the project area have progressed such that an estimated one-third of the resources has been developed with resultant declines in water levels, encroachment of saline waters, and land subsidence. Withdrawals are expected to increase with the expansion of energy related industry, irrigated agriculture, and urban growth. Reasonable projections of the regional effects of increased withdrawals are dependent upon quantifying the complex relation between the freshwater flow system and factors such as ground-water pumpage, geothermal zones, quality alternating between fresh and saline water with depth, salt domes, geopressured zones, and petroleum reservoirs.

OBJECTIVE: Analyze and interpret hydrologic information from Louisiana and southwestern Mississippi to accurately describe the flow and water chemistry of the ground-water system. Estimate the effects of future stresses on the system.

APPROACH: Assemble and analyze data in Louisiana and southwestern Mississippi from various sources. These data and the results from studies conducted in Louisiana during the course of this study will be used to obtain an understanding of the regional flow system, produce maps showing the geometry of aquifers and confining units in the study area, produce maps showing the hydrologic characteristics of the aquifers and confining units, and design and calibrate a three-dimensional ground-water flow model to quantify the flow system and estimate the effect of stresses. Prepare reports entitled "Hydrology of the coastal lowlands aquifer system in parts of Alabama, Florida, Louisiana, and Mississippi," and "Calibration and sensitivity analysis of a ground-water flow model of the coastal lowlands aquifer system in parts of Louisiana, Mississippi, Alabama, and Florida."

PROGRESS: Director's approval was received for an interim report. The Jasper and equivalent aquifers potentiometric surface map was published. Transient calibration with revised model layers has been completed. Sensitivity analyses and pumping experiments are finished. First drafts of a Professional Paper and a calibration and sensitivity analysis report have been written.

PLANS FOR 1990: Start reports through the review process and obtain Director's approval.

PROJECT TITLE: Flood Characteristics of Coastal Streams in Louisiana

PROJECT NUMBER: LA85-088

STUDY LOCATION: South Louisiana, area south of Latitude 30° 30'

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: Paul A. Ensminger and J. Josh Gilbert

PROJECT DURATION: October 1984 to September 1986 and
October 1987 to September 1990

PROBLEM: When the Louisiana Department of Transportation and Development, designs a bridge, peak flow and stage information is needed. At ungaged sites, the bridge's hydraulic design is based upon the USGS's regional regression equations. For small watershed designs, the Soil Conservation Service discharge equations are used. These existing regression equations correlate both stage and discharge. Unfortunately, at flood conditions, both the USGS and Soil Conservation Service regression equations are inaccurate for streams in Louisiana's coastal areas. In these areas, stage and discharge commonly are either minimally dependent or totally independent variables. Therefore, an accurate method to estimate peak stage and discharge in these areas is needed to eliminate current regression equation uncertainties.

OBJECTIVE: Develop a method for describing flood characteristics of Louisiana's coastal streams, using streamgaging-station records.

APPROACH: Develop a stage estimation technique based on stage records for the past 20 years. Statistically analyze Louisiana's coastal stage data, and generate stage frequency curves. Prepare a report summarizing findings and documenting the data used in the analysis.

PROGRESS: A complete comprehensive data set which contains records for all gaging stations south of latitude 30° 30' in Louisiana has been developed. The stage data have been statistically analyzed, and the 100-year peak stage has been estimated. Station location and corresponding 100-year peak stage have been mapped using Geographical Information System software. Contoured information from FEMA has been overlayed onto estimated 100-year stage information.

PLANS FOR 1990: Write report and obtain Director's approval.

PROJECT TITLE: Analysis of the Occurrence, Movement, and Fate of Selected Hazardous Substances in the Lower Calcasieu River, Louisiana

PROJECT NUMBER: LA85-093

STUDY LOCATION: Lower Calcasieu River, southwestern Louisiana

FUNDING SOURCE: U.S. Geological Survey

PROJECT CHIEF: Charles R. Demas

PROJECT DURATION: March 1985 to September 1991

PROBLEM: Information from Federal, State, and local government agencies documents the occurrence of toxic substances in the highly industrialized lower Calcasieu River. However, the processes which determine the movement and fate of these potentially hazardous substances in relation to the hydraulics of this tidal stream are not understood.

OBJECTIVE: Define the flow characteristics in the lower Calcasieu River such as rate and direction of movement, routing through loops within the system and circulation patterns within the lakes bordering the channel. Determine the biological and chemical fates of selected organic compounds, nutrients, and trace metals in the industrial reach and in the transition zones between brackish and freshwater areas and the processes involved. Identify the physical characteristics such as specific conductance, temperature, and dissolved oxygen that affect the chemical and biological processes in the lower Calcasieu River.

APPROACH: Document quantitatively the presence of toxic substances dissolved and suspended in water, in bottom material, and in biologic matter from the lower Calcasieu River using data from previous studies and results from reconnaissance sampling trips, and determine the hydraulic and transport characteristics of the riverine system using flow and transport modeling results; define processes which are important in determining the movement and fate of selected toxic substances in the lower Calcasieu River by: (1) sampling water, bottom material, biologic matter over several tidal cycles, (2) determining settling and resuspension rates, (3) determining sediment-chemical size fraction relations, and (4) analyzing tissue of selected aquatic organisms. A Water-Supply Paper summarizing project work is planned.

PROGRESS: Basic data report summarizing all data collected in the study area by Louisiana District has been completed. All chapters of the Water-Supply Paper to be prepared by Louisiana District personnel have been written. A paper on the results of a combined biological uptake, toxicity, and chemical reconnaissance study of the Bayou d'Inde-Calcasieu River ship channel has been prepared. Continued contract with U.S. Environmental Protection Agency - Region VI and Narragansett Laboratory.

PLANS FOR 1990: Complete review process for Water-Supply Paper describing results from toxicity study completed in fiscal year 1988. Submit plans for future investigations of the lower Calcasieu River.

PROJECT TITLE: Movement of Water in the "1,200-foot" Aquifer of Baton Rouge Area

PROJECT NUMBER: LA87-098

STUDY LOCATION: East Baton Rouge, West Baton Rouge, Pointe Coupee, East Feliciana, and West Feliciana Parishes

COOPERATING AGENCY: Capital Area Ground Water Conservation Commission and the Louisiana Department of Transportation and Development

PROJECT CHIEF: Keith J. Halford

PROJECT DURATION: July 1987 to December 1989

PROBLEM: The "1,200-foot" aquifer serves as a major freshwater supply for the metropolitan Baton Rouge area. Proper management of the "1,200-foot" aquifer requires a more detailed knowledge of how the aquifer responds to pumpage changes as utilization of this resource increases.

OBJECTIVE: Evaluate the movement of water and describe the water level changes in the "1,200-foot" aquifer in the Baton Rouge area. Estimate the effects of further development on water levels and flow to and from overlying and underlying aquifers.

APPROACH: Develop a three-dimensional model to simulate the hydrology of the "1,200-foot" aquifer in the study area using four layers to represent the "1,200-foot" aquifer and adjacent aquifers. Simulate the development of the "1,200-foot" aquifer from 1946 to 1988 and calibrate the model. Conduct experiments with the calibrated model to estimate the response of the "1,200-foot" aquifer to increases and decreases in pumpage. Prepare a report detailing the results of this study.

PROGRESS: This project has evaluated the movement of water and described the water-level changes in the "1,200-foot" aquifer in the metropolitan Baton Rouge area by using a three-dimensional, finite-difference, numerical, ground-water-flow model. The resulting model was used to estimate the effects of further development on water levels and flow to and from overlying and underlying aquifers. Initial draft of a final report has been prepared.

PLANS FOR 1990: Obtain Director's approval and publish report.

PROJECT TITLE: Selected Chemical Characteristics of Ground Water in Aquifers of Louisiana

PROJECT NUMBER: LA88-099

STUDY LOCATION: Statewide

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: Dan J. Tomaszewski

PROJECT DURATION: October 1987 to September 1989

PROBLEM: Ground water within the aquifers and aquifer systems in Louisiana has a wide variety of chemical characteristics. The USGS, as a part of its cooperative program with State and local agencies, including the Louisiana Department of Transportation and Development, routinely collects samples of ground water, analyzes results, and compiles and stores the data in an extensive data file on quality of ground water. Although some of this information in the data file is available in published Geological Survey and State Water Resources reports, much of the information has not been statistically compiled or formatted for presentation in a conveniently manageable and useful form. Because chemical characteristics determine the suitability of ground-water uses, planners and potential users of ground water need to be able to determine quality of water throughout the State.

OBJECTIVE: Describe the chemical characteristics of ground water in the major aquifers and aquifer systems throughout the State of Louisiana. Emphasis will be placed on selected inorganic constituents such as iron, manganese, hardness, sodium, and dissolved solids, which are most often requested by water users and planners and which affect the usefulness of ground water in the State. Identify sites where organic compounds have been sampled as part of a statewide organics sampling network.

APPROACH: Review and evaluate the existing data base on chemical constituents in ground water, and select analytical results that are characteristic of the chemical quality for selected constituents for the various aquifers. Additional data will not be collected for this part of the study. After some simple statistical analysis of the data, results will be presented on maps or graphs, by site and aquifer to indicate the distribution and variation of the selected constituents for the entire State. Prepare a report to be published in an atlas format. The final report will contain graphical and tabular summaries of selected data and contain maps of selected chemical constituents in selected aquifers.

PROGRESS: Water-quality data for 12 aquifers in Louisiana have been statistically analyzed and compiled in tabular and graphical form. Maps showing the distribution of 5 selected constituents have been drafted for 9 of the most frequently used aquifers. A map showing the distribution of organics at sites sampled as part of the statewide organics network has been prepared. A report entitled "Quality of freshwater in aquifers of Louisiana, 1988," has been prepared and submitted for colleague review.

PLANS FOR 1990: Obtain Director's approval and publish report.

PROJECT TITLE: Statistical Analysis of the Quality of Surface Water in Louisiana

PROJECT NUMBER: LA88-100

STUDY LOCATION: Statewide

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: Kenneth J. Covay and Charles R. Garrison

PROJECT DURATION: October 1987 to September 1990

PROBLEM: The Louisiana District has operated water-quality stations on streams and lakes since 1943. Results of the analyses are stored in the USGS computerized water-quality files and are often used to answer data requests and provide information for the management of Louisiana water resources. The data in these files constitute a large source of information on the quality of surface water in Louisiana; descriptive statistics need to be developed for these data. The development of descriptive statistics will make the data more usable for water managers, allow more complete answers to be given for data requests from the public, show the need and frequency for additional water-quality data at existing or new sites, and define problem areas where interpretive studies are needed.

OBJECTIVE: Statistically summarize water-quality data from about 200 quality of surface-water stations in Louisiana and present the data in such a manner that trends, overall quality, and basin-wide changes in water quality can be evaluated.

APPROACH: Obtain the analytical results to be compiled for this project from the USGS Water Data Storage and Retrieval System. Use statistical programs to generate frequency tables for sites with sufficient data. Determine the maximum, minimum, mean, median, and selected percentiles for each constituent on a basin-by-basin approach, using the basins outlined in the State Water Plan of Louisiana (1984). Summarize and reduce existing records to a manageable and useful form. Prepare maps and box plots to give the reader an overview of the distribution and relative abundance of selected constituents. Publish these statistical results, along with State and U.S. Environmental Protection Agency water-quality criteria, in a report.

The report will contain maps, graphs, data, and tables for the 10 basins and will be published in STOP format. Computer generated maps and graphs will be used in the report.

PROGRESS: Base maps for the 10 major drainage basins have been completed. Low-flow discharge statistics have been run on all basins. A table listing water-quality standards and criteria for the State has been developed. Chemical-quality box plots have been developed for seven of the basins. First draft illustrations, tables, and text have been completed for 8 of 14 chapters.

PLANS FOR 1990: All statistical tables and box plots will be completed. Text for all chapters will be written and submitted for review.

PROJECT TITLE: High Chloride Ground Water in Selected Areas of the Mississippi River Alluvial Aquifer

PROJECT NUMBER: LA88-101

STUDY LOCATION: Franklin, Morehouse, and adjacent parishes

COOPERATING AGENCY: Louisiana Department of Transportation and Development

PROJECT CHIEF: Glen F. Huff

PROJECT DURATION: January 1988 to December 1990

PROBLEM: The Mississippi River valley in northern Louisiana is one of the State's major agricultural areas for the production of cotton, soybeans, and rice. The Mississippi River alluvial aquifer supplies virtually all of the ground water used for agricultural irrigation within the valley. Recent abnormally-low rainfall and the rapid growth of agricultural irrigation in the valley have placed increased demands for usable ground water on the Mississippi River alluvial aquifer. These conditions also have been coincident with the occurrence of high-chloride ground water in previously fresh ground-water areas within the Mississippi River alluvial aquifer.

OBJECTIVE: Determine the areal extent of elevated-chloride ground waters in two to three selected areas of the Mississippi River alluvial aquifer in northern Louisiana. Differentiate between possible natural and(or) anthropogenic sources for elevated-chloride ground waters in these areas.

APPROACH: Sample wells screened at or near the base of the Mississippi River alluvial aquifer (primarily irrigation wells) for a suite of inorganic constituents. Construct subsurface apparent electrical resistivity maps of selected areas to delineate the areal extent of high-chloride ground water. Prepare a report documenting all major findings of the study.

PROGRESS: Data collection from wells in Louisiana is virtually complete. Apparent resistivity maps have been completed in draft form. The major field effort remaining is installation of observation wells in selected areas.

PLANS FOR 1990: Obtain Director's approval and publish report.

PROJECT TITLE: Alternative Water Supply for Jefferson Parish, Louisiana

PROJECT NUMBER: LA89-102

STUDY LOCATION: Lake Pontchartrain and surrounding parishes

COOPERATING AGENCY: Jefferson Parish, Department of Water

PROJECT CHIEF: Timothy R. Rapp

PROJECT DURATION: October 1989 to March 1992

PROBLEM: Jefferson Parish needs an alternative source of water supply to its current supply source, the Mississippi River. Although treated Mississippi River water is, at present, suitable for domestic use, there is mounting concern about the quality of water in the river over a long term. Potential water-quality problems include chemical spills from industries along the river and from barges on the river, introduction of pesticides and herbicides into the river from agricultural runoff, and saltwater intrusion up the river from the Gulf of Mexico.

OBJECTIVE: Delineate the areal extent and quality of freshwater and the geohydrology of the aquifer system adjacent to Lake Pontchartrain in St. John the Baptist and Tangipahoa Parishes. Determine the location of the east-west trending fault and the freshwater-saltwater interface and their relations. Estimate the effects of withdrawals on aquifers, such as decreased water levels, saltwater encroachment, and vertical leakage from aquifers containing brackish to salty water.

APPROACH: Conduct a library search and review all available data in or adjacent to the study area including seismic reflection data. Design a test hole program and drill three to five test holes to collect data on the geohydrology of the aquifers adjacent to western Lake Pontchartrain particularly in Tangipahoa and St. John the Baptist Parishes to determine the number and thickness of freshwater sands in the area. Determine the location of the freshwater-saltwater interface, and sample aquifers for water quality.

This project will generate two reports. The first report will focus on the test wells drilled in St. John the Baptist Parish, all data researched and acquired on the Covington aquifer. The second report will focus on Tangipahoa Parish, the wells drilled there, the data acquired on the aquifers, and the effect of the fault on ground-water movement.

PROGRESS: The Regional extent of the Covington aquifer in the study areas has been delineated. Historical pumping data, grain-size data, and hydrologic parameters have been compiled and evaluated in preparation for developing a two-dimensional analytical model. Test sites have been located, and a contract for drilling in Lake Pontchartrain and on land has been advertised.

PLANS FOR 1990: Drill test wells. Run pumping test to determine effect of fault on ground-water flow. Complete water-quality survey of project area. Analyze accumulated hydrologic data on aquifers in project area derived from test wells.

PROJECT TITLE: Investigation of Ground-Water Resources and Potential Contamination at Fort Polk, Louisiana

PROJECT NUMBER: LA88-103

STUDY LOCATION: Fort Polk, Louisiana

COOPERATING AGENCY: U.S. Army, Fort Polk, Louisiana

PROJECT CHIEF: Robert B. Fendick, Jr.

PROJECT DURATION: October 1988 to September 1991

PROBLEM: Fort Polk, Louisiana, is the headquarters for the U.S. Army's 5th Infantry Division (mechanized). Water supply for the fort is from ground water with approximately 15 wells supplying needs at the installation. To run the division's tanks, jeeps, and other vehicles, many petroleum tanks that are above and below ground, are located throughout the base. There is concern about the water levels and quality of water in the aquifer beneath the fort and the potential contamination from numerous petroleum storage tanks. A study is needed to monitor water levels and quality in the existing aquifer and to determine the extent of any contamination of the surficial aquifer.

OBJECTIVE: Monitor water-levels in aquifers used for water supply at Fort Polk. Determine the background chemical quality of the ground water at Fort Polk. Monitor possible contamination from leaking underground storage tanks.

APPROACH: Collect water-level data from selected wells along with pumpage data for wells supplying Fort Polk on a quarterly basis. Collect water-quality samples from selected wells, and install monitor wells needed to conduct site investigations at the underground storage tank sites. Prepare a final Water-Resources Investigations Report describing the results of the testing.

PROGRESS: Quarterly collection of water-level data at selected wells and pumpage data from Fort Polk's wells are up to date. Water-quality samples from 3 public supply wells have been collected and analyzed, and the results submitted to Fort Polk personnel. Installation of monitor wells at 8 underground storage sites is completed; a total of 15 samples were collected. Approximately 50 wells were registered, and the data input into the Ground-Water Site Inventory file as part of the data base for Fort Polk.

PLANS FOR 1990: Continue quarterly collection of water-level measurements at selected wells and pumpage data from Fort Polk's public supply wells. Water-quality samples will be collected and analyzed from three public supply wells. These analyses will include an extensive list of organic constituents. Continue the installation and monitoring of wells at selected underground storage tank sites. Complete preliminary site investigations at four motor pools located at south Fort Polk. Update and digitize monitor well information and locations.

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RECENTLY PUBLISHED LOUISIANA DISTRICT REPORTS

Louisiana District Reports

The following reports were published recently in a U.S. Geological Survey series or a Louisiana Department of Transportation and Development series:

Adams, P.A., 1989, Water resources publications of the Louisiana District of the U.S. Geological Survey, 1904-89: Louisiana Department of Transportation and Development Special Report No. 5, 104 p.

Arcement, G.J., 1988, Discharge and suspended-sediment data for the lower Atchafalaya River, Atchafalaya Bay, and Wax Lake Outlet, Louisiana, 1980-82: U.S. Geological Survey Open-File Report 87-553, 30 p.

----- 1988, Simulation of flow in the lower Calcasieu River from the saltwater barrier to Burton Landing near Moss Lake, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 87-4087, 30 p.

Arcement, G.J., Dantin, L.J., Garrison, C.R., and Stuart, C.G., 1989, Water Resources Data-Louisiana, water year 1988: U.S. Geological Survey Water-Data Report LA-88-1, 413 p.

Baker, N.T., 1988, Hydrologic features and processes of the Vermilion River, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 88-4019, 49 p.

Beddingfield, S.H., 1988, Program-maintenance manual for the conversion and validation of unit-values site-index data for the Master Water Data Index of the National Water Information System of the U.S. Geological Survey: U.S. Geological Survey Open-File Report 87-556, 138 p.

----- 1988, Operations manual for the conversion and validation of unit-values site-index data for the Master Water Data Index of the National Water Information System of the U.S. Geological Survey: U.S. Geological Survey Open-File Report 88-180, 14 p.

----- 1988, User's manual for the conversion and validation of unit-values site-index data for the Master Water Data Index of the National Water Information System of the U.S. Geological Survey: U.S. Geological Survey Open-File Report 88-189, 54 p.

Carlson, D.D., Dantin, L.J., Garrison, C.R., and Stuart, C.G., 1988, Water Resources Data-Louisiana, water year 1987: U.S. Geological Survey Water-Data Report LA-87-1, 445 p.

Carlson, D.D., Garrison, C.R., Jordan, M.M., Dantin, L.J., and Montgomery, P.W., 1989, Index to surface-water data in Louisiana: Louisiana Department of Transportation and Development Water Resources Basic Records Report 17, 228 p.

Curwick, P.B., 1988, Simulation of flow and transport in the lower Mississippi River, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 86-4361, 38 p.

Demas, C.R., 1989, Reconnaissance study of water and bottom material quality in the lower Calcasieu River, southwestern Louisiana, May 29-30, 1985: U.S. Geological Survey Water-Resources Investigations Report 88-4089, 51 p.

Demas, C.R., and Curwick, P.B., 1988, Suspended-sediment and associated chemical transport characteristics of the lower Mississippi River, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 45, 44 p.

Dial, D.C., and Huff, G.F., 1989, Occurrence of minor elements in ground water in Louisiana including a discussion of three selected sites having elevated concentrations of barium: Louisiana Department of Transportation and Development Water Resources Technical Report No. 47, 88 p.

Dial, D.C., and Sumner, D.M., 1989, Geohydrology and simulated effects of pumpage on the New Orleans aquifer system at New Orleans, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 46, 54 p.

Dial, D.C., and Tomaszewski, D.J., 1988, Geohydrology, water quality, and effects of pumpage on the New Orleans aquifer system, northern Jefferson Parish, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 88-4097, 34 p.

Fendick, R.B., Jr., 1989, Louisiana ground-water map no. 2: Potentiometric surface, 1987, of the Gonzales-New Orleans aquifer in southeastern Louisiana: U.S. Geological Survey Water-Resources Investigations Report 89-4016, map (1 sheet).

Forbes, M.J., Jr., 1988, Hydrologic investigations of the lower Calcasieu River, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 87-4173, 61 p.

Kuniansky, E.L., 1989, Geohydrology and simulation of ground-water flow in the "400-foot," "600-foot," and adjacent aquifers, Baton Rouge, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 49, 90 p.

Kuniansky, E.L., Dial, D.C., and Trudeau, D.A., 1989, Maps of the "400-foot," "600-foot," and adjacent aquifers and confining beds, Baton Rouge, Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 48, 16 p.

Martin, Angel, Jr., and Whiteman, C.D., Jr., 1989, Geohydrology and regional ground-water flow of the coastal lowlands aquifer system in parts of Louisiana, Mississippi, Alabama, and Florida--A preliminary analysis: U.S. Geological Survey Water-Resources Investigations Report 88-4100, 88 p.

Martin, Angel, Jr., Whiteman, C.D., Jr., and Becnel, M.J., 1988, Generalized potentiometric surfaces of the upper and lower Jasper and equivalent aquifers in Louisiana: U.S. Geological Survey Water-Resources Investigations Report 87-4139, map (2 sheets).

McWreath, H.C., III, and Smoot, C.W., 1989, Geohydrology and development of ground water at Fort Polk, Louisiana: U.S. Geological Survey Water-Resources Investigations Report 88-4088, 53 p.

Nyman, D.J., 1989, Quality of water in freshwater aquifers in southwestern Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 42, 22 p.

Rogers, J.E., 1988, Red River Waterway Project--Summary of ground-water studies by the U.S. Geological Survey, 1962-85: U.S. Geological Survey Water-Resources Investigations Report 87-4261, 19 p.

Sasser, D.C., Sturrock, A.M., Jr., and Covay, K.J., 1988, Meteorological and microlysimeter data for a rice irrigation study in southwestern Louisiana, 1985 and 1986: Louisiana Department of Transportation and Development Water Resources Basic Records Report No. 15, 24 p.

Smoot, C.W., 1988, Louisiana hydrologic atlas map no. 3: Altitude of the base of freshwater in major aquifers of Louisiana: U.S. Geological Survey Water-Resources Investigations Report 86-4314, map (1 sheet).

----- 1989, Louisiana hydrologic atlas map no. 4: Geohydrologic sections of Louisiana: U.S. Geological Survey Water-Resources Investigations Report 87-4288, map (1 sheet).

Smoot, C.W., and Guillot, J.R., 1988, Water-level measurements 1981-85 and chemical analyses 1978-85, Red River alluvial aquifer, Red River Valley, Louisiana: U.S. Geological Survey Open-File Report 87-541, 261 p.

Snider, J.L., and Ryals, G.N., 1988, Radiochemical analyses of ground water in Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 44, 52 p.

Stuart, C.G., and Lurry, D.L., 1988, Public water supplies in Louisiana, volume 2: Southern Louisiana: Louisiana Department of Transportation and Development Water Resources Basic Records Report No. 16, 206 p.

Tomaszewski, D.J., 1988, Ground-water hydrology of Livingston, St. Helena, and parts of Ascension and Tangipahoa Parishes, southeastern Louisiana: Louisiana Department of Transportation and Development Water Resources Technical Report No. 43, 65 p.

Wiche, G.J., Gilbert, J.J., Froehlich, D.C., and Lee, F.N., 1988, Analysis of alternative modifications for reducing backwater at the Interstate Highway 10 crossing of the Pearl River near Slidell, Louisiana: U.S. Geological Survey Water-Supply Paper 2267, 48 p.

Journal Articles and Symposium Proceedings

The following are journal articles and symposium proceedings that were published during the 1988-89 fiscal years:

Curwick, P.B., 1988, Use of dye-tracing techniques to determine mixing and circulation in the loops and lakes of the lower Calcasieu River, in Mallard, G.E., ed., U.S. Geological Survey Toxic Substances Hydrology Program--Surface-Water Contamination: Proceedings of the technical meeting, Denver, Colorado, February 2-4, 1987: U.S. Geological Survey Open-File Report 87-764, p. 67-69.

Demas, C.R., 1988, Fate and transport of organic compounds in the lower Calcasieu River, Louisiana, in Peck, D.L., Director: U.S. Geological Summary Yearbook Fiscal Year 1987, p. 83-90.

----- 1988, Objectives and preliminary results of reconnaissance sampling for selected hazardous substances in the lower Calcasieu River, Louisiana, in Mallard, G.E., ed., U.S. Geological Survey Toxic Substances Hydrology Program--Surface-Water Contamination: Proceedings of the technical meeting, Denver, Colorado, February 2-4, 1987: U.S. Geological Survey Open-File Report 87-764, p. 61-64.

Demas, C.R., Curwick, P.B. and Demcheck, D.K., 1989, The use of radon-222 as a tracer of transport across the bed sediment-water interface in Prien Lake, Louisiana, in Mallard, G.E, and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the technical meeting, Phoenix, Arizona, September 26-30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88-4220, p. 291-300.

Demas, C.R., and Demcheck, D.K., 1989, Fate and transport of organic compounds and trace elements in the lower Calcasieu River, Louisiana, in Mallard, G.E, and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the Technical Meeting, Phoenix, Arizona, September 26-30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88-4220, p. 271-281.

----- 1989, Remobilization of organic compounds from bottom material collected from Bayou d'Inde, Louisiana, upon exposure to differing ionic-strength waters, in Mallard, G.E, and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the technical meeting, Phoenix, Arizona, September 26-30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88-4220, p. 283-290.

----- 1989, Uptake of manmade organic compounds by Rangia cuneata in the lower Calcasieu River, Louisiana, in Mallard, G.E, and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the technical meeting, Phoenix, Arizona, September 26-30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88-4220, p. 309-319.

Demas, C.R., Demcheck, D.K., and Curwick, P.B., 1987, Occurrence and fate of volatile organic compounds under different wind and sampling conditions in the lower Calcasieu River, Louisiana, in Johnson, J.D., Chairman, Reprints of papers presented at the 194th National meeting New Orleans, Louisiana, August 30-September 4, 1987, v. 27, no. 2, American Chemical Society, p. 162-165.

Demcheck, D.K., 1988, Automated instrumentation used for the lower Calcasieu River study, in Mallard, G.E., ed., U.S. Geological Survey Toxic Substances Hydrology Program--Surface-Water Contamination: Proceedings of the technical meeting, Denver, Colorado, February 2-4, 1987: U.S. Geological Survey Open-File Report 87-764, p. 65-66.

----- 1988, Field equipment and techniques for sampling metals and organic compounds in the lower Calcasieu River, in Mallard, G.E., ed., U.S. Geological Survey Toxic Substances Hydrology Program--Surface-Water Contamination: Proceedings of the technical meeting, Denver, Colorado, February 2-4, 1987: U.S. Geological Survey Open-File Report 87-764, p. 71.

Demcheck, D.K., Demas, C.R., and Curwick, P.B., 1989, Estimation of volatilization-rate coefficients for volatile organic compounds in Bayou d'Inde, Louisiana, in Mallard, G.E, and Ragone, S.E., eds., U.S. Geological Survey Toxic Substances Hydrology Program--Proceedings of the technical meeting, Phoenix, Arizona, September 26-30, 1988: U.S. Geological Survey Water-Resources Investigations Report 88-4220, p. 321-327.