

WATER-RESOURCES ACTIVITIES OF THE LOUISIANA DISTRICT IN FISCAL YEARS 1986-87

Compiled by E.A. Ellsworth

U.S. GEOLOGICAL SURVEY

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1987

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WATER-RESOURCES ACTIVITIES OF THE LOUISIANA DISTRICT IN FISCAL YEARS 1986-87

**Compiled by
E.A. Ellsworth**

ABSTRACT

The U.S. Geological Survey conducts three types of water-resources activities in Louisiana--data collection, interpretive investigations, and research. These activities are conducted, in large part, through cooperation with other Federal, State, and local agencies.

This report presents information on activities being undertaken from October 1, 1985, to September 30, 1987.

INTRODUCTION

The mission of the U.S. Geological Survey, Water Resources Division, is to provide the hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources for the overall benefit of the people of the United States.

This is accomplished, in large part, through cooperation with other Federal, State, and local agencies by:

- o Collecting data on a systematic basis, needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.
- o Conducting analytical and interpretive water-resources appraisals, describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.
- o Conducting supportive basic and problem oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems sufficiently to quantitatively predict their response to stress, either natural or man-made.
- o Disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases.
- o Coordinating the activities of Federal agencies in the acquisition of water for streams, lakes, reservoirs, estuaries, and ground waters.
- o Providing scientific and technical assistance in hydrologic fields to other Federal, State, and local agencies, to licensees of the Federal Power Commission, and to international agencies on behalf of the Department of State.

Water-resources activities of the U.S. Geological Survey in Louisiana consist of collecting water-resources data and conducting interpretive hydrologic investigations and research. The water-resources data and the results of the interpretive investigations are published or released by either the U.S. Geological Survey or by cooperating agencies.

This report describes water-resources activities being undertaken from October 1, 1985, to September 30, 1987. Specifically, the report presents information on organization of the District Office, cooperating agencies, data-collection activities, interpretive studies and research activities, new publications of the Louisiana District, and sources of information in the U.S. Geological Survey.

For each activity, the following information is presented: project title, project number, study location, cooperating agency, project chief, project duration, problem, objective, approach, progress, and plans.

DISTRICT ORGANIZATION

The Louisiana District of the Water Resources Division, U.S. Geological Survey conducts water-resources investigations and data collection under the leadership of Darwin Knochenmus, District Chief. The District consists of a Hydrologic Surveillance Section, a Hydrologic Investigations Section, a Reports Preparation Section, the Alexandria Subdistrict Office, and two field offices, in addition to the necessary administrative and other support functions. See figure 1 for location of offices.

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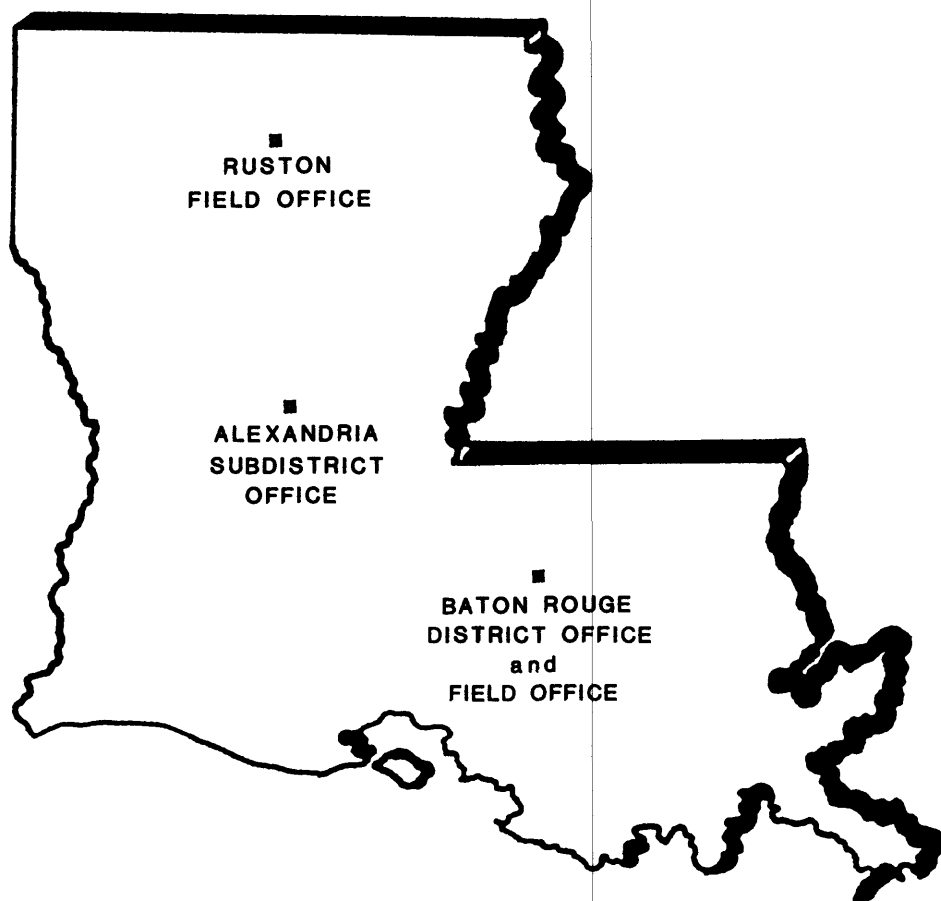


Figure 1.--U.S. Geological Survey offices in Louisiana.

COOPERATING AGENCIES

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 cooperators are:

State and Local Agencies

Capital Area Groundwater Conservation Commission

City of Slidell

City-Parish of East Baton Rouge

Jefferson Parish

-Department of Utilities

-Department of Water

Louisiana Department of Environmental Quality

-Office of Water Resources

-Office of Solid and Hazardous Wastes

Louisiana Department of Natural Resources

-Office of Conservation

Louisiana Department of Transportation and Development

-Office of Public Works

-Office of Highways

Louisiana Department of Wildlife and Fisheries

Louisiana Geological Survey

Sabine River Compact Administration

Federal Agencies

Federal Emergency Management Agency

National Park Service

U.S. Army, Corps of Engineers, Fort Worth District

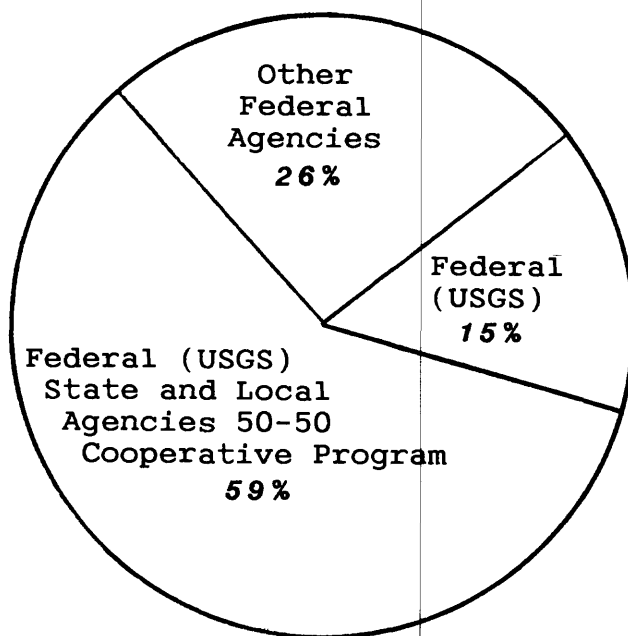
U.S. Army, Corps of Engineers, New Orleans District

U.S. Army, Corps of Engineers, Vicksburg District

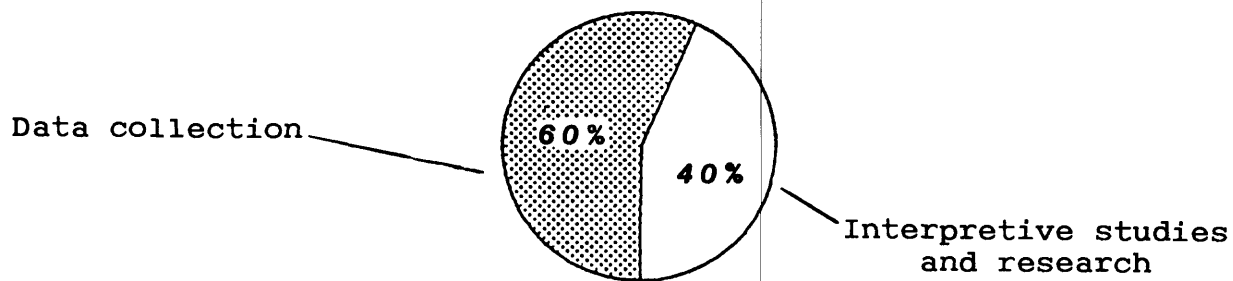
U.S. Army, Fort Polk, Louisiana

U.S. Environmental Protection Agency

U.S. Forest Service



Source of Funding



Type of Program

Figure 2.--Source of funding and type of program in the Louisiana District, fiscal year 1986.

WATER-RESOURCES ACTIVITIES

The U.S. Geological Survey, Water Resources Division, conducts three major types of activities in Louisiana, in order to provide the hydrologic information and understanding needed for the best management of Louisiana's and the Nation's water resources. The activities are:

1. Data collection and dissemination.
2. Water-resources investigations (interpretive studies).
3. Research.

Data Collection

Some of the types of water-resources data that the Louisiana District routinely collects and makes available to users are:

1. Ground-water data.
 - a. Water levels in selected wells.
 - b. Results of pumping tests of selected wells, from which hydraulic characteristics of aquifers can be determined.
 - c. Logs of wells (driller's, electrical, or gamma-ray), indicating subsurface information.
 - d. Sieve analysis of aquifer material.
 - e. Water use.
2. Surface-water data.
 - a. Volume of flow in streams.
 - b. Water elevations or stages of streams, both continuous and annual peaks.
 - c. Characteristics of drainage basins that affect streamflow (drainage area, length, width, slope, stream cross sections, and in some instances stream bottom and bank roughness).
 - d. Delineation of areas inundated by historical floods and floods of estimated probability.
 - e. Time-of-travel (velocity) data for streams.
 - f. Water use.

3. Water-quality data such as determinations of chemical constituents, physical properties, and biological and microbiological substances in water; suspended sediment; or bottom material.
 - a. Water-quality data collected monthly or less frequently at selected well, stream, or lake sites include selected inorganic constituents, specific conductance, pH, temperature, color, hardness as calcium carbonate, dissolved solids, trace metals, selected radiochemicals, selected insecticides and herbicides, and polychlorinated biphenyls and naphthalenes. In addition, data on dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, turbidity, nutrients, indicator bacteria (total coliform, fecal coliform, and fecal streptococci), chlorophyll, organic carbon, cyanide, phenols, oil and grease, sediment, and trace metals and insecticides in bottom material are collected.
 - b. Water-quality data collected at selected surface-water sites on a daily basis include specific conductance, pH, temperature, dissolved oxygen, chloride, and dissolved solids.

Current data-collection activities are described in the remainder of this section.

PROJECT TITLE: Surface-water stations

PROJECT NUMBER: LA00-001

STUDY LOCATION: Louisiana, statewide

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



PROJECT CHIEF: Darrell D. Carlson, District Office, Baton Rouge

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, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water-resources development. An appropriate data base is necessary to provide this information.

OBJECTIVE: A. To collect surface-water data sufficient to satisfy needs for current uses, such as (1) assessment of water resources, (2) operation of reservoirs or industries, (3) forecasting, (4) assimilation of wastes and implementation of pollution controls, (5) discharge data to accompany water-quality measurements, (6) river compact and legal requirements, and (7) research or special studies. B. To collect data necessary for analytical studies to define for any location the statistical properties of, and trends in, the occurrence of water in streams, lakes, estuaries, and other water bodies, for use in planning and design.

APPROACH: Standard methods of data collection will be used as described in the series, "Techniques of water-resources investigations of the U.S. Geological Survey." Partial-record gaging stations are used instead of complete-record gaging stations where they serve the required purpose.

PROGRESS: Hydrologic data for continuous-record, partial-record, and reservoir surface-water stations in Louisiana are collected and published. Some changes have been made to the network in agreement with the cooperators. The annual data report for 1985 has been published. A one-dimensional model is being used for determining daily discharges at slope-affected stations. A number of sites have been established using electromagnetic flowmeters, in the coastal areas. The surface-water network consists of 129 sites and is shown in figure 3.

PLANS FOR 1986: Continue operation of the surface-water data network. Consult cooperators on any relevant changes in the data network. Continue effort in using the one-dimensional flow model for computing daily discharges at backwater and tide affected stations. Install Handar data collection platforms (DCP's) at a number of sites where electromagnetic flowmeters are operating. Install Handar 560 DCP's at selected locations to collect stage and rainfall to determine where significant rainfall has occurred.

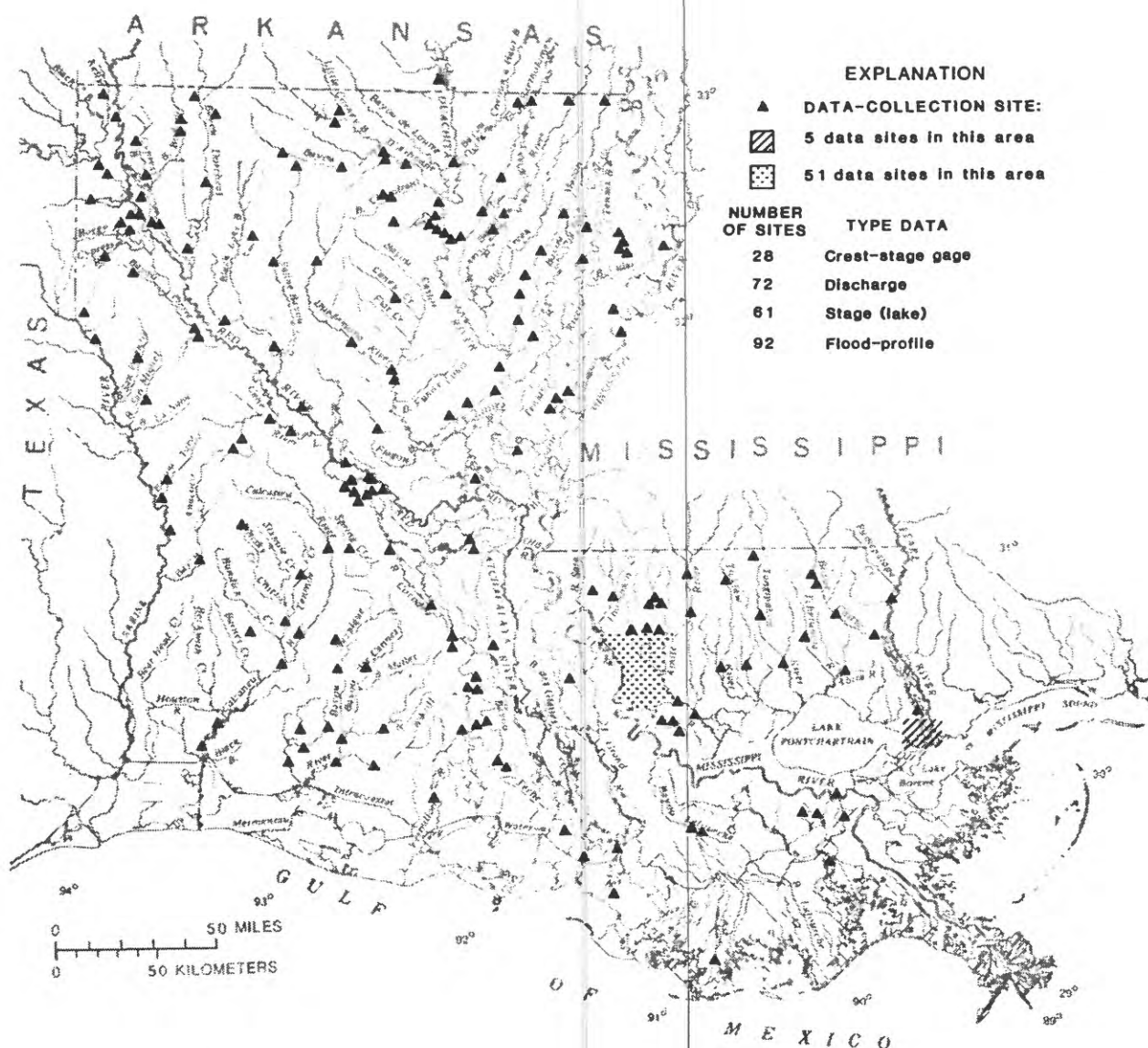


Figure 3.--Data-collection sites for streamflow and stage.

PROJECT TITLE: Ground-water stations

PROJECT NUMBER: LA00-002

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: Department of Transportation and Development, Office of Public Works; Department of Environmental Quality; U.S. Army Corps of Engineers; and Capital Area Groundwater Conservation Commission



PROJECT CHIEF: Darrell D. Carlson, District Office, Baton Rouge

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 to provide a data base from which to measure the effects of development, to assist in the prediction of future supplies, and to provide data for management of the resource.

OBJECTIVE: A. To collect water-level data sufficient to provide a minimum long-term data base so that the general response of the hydrologic system to natural climatic variations and induced stresses is known, and potential problems can be defined early enough to permit proper planning and management. B. To provide a data base against which the short-term records acquired in areal studies can be analyzed. This analysis must (1) provide an assessment of the ground-water resources, (2) allow prediction of future conditions, (3) detect and define pollution and supply problems, and (4) provide the data base necessary for management of the resource.

APPROACH: Establish and maintain data networks to meet objectives. Networks are reviewed at regular intervals, and quality control of collected data is achieved on a regular basis. Networks provide broad coverage of hydrologic conditions in the geologic provinces of the State and data for all major aquifers, including anticipation of projects in the District's long-range plan. Special emphasis is given to problem areas such as areas of serious water-level declines and movement of saltwater.

PROGRESS: Water-level and water-quality data for observation wells were compiled and published for the 1985 water year in the annual data report. Areal and special projects were supported by furnishing data in a variety of computer output formats. Completed review of the ground-water network in southwestern Louisiana and implemented in 1985 water year. The ground-water network consists of 663 water-level observation wells and 135 quality-of-water sampling wells. Locations for the ground-water sites are shown in figures 4 and 5. Obtained Director's approval to publish two ground-water reports: "Ground water resources of the Rayville-Delhi area, northeastern Louisiana," and "Potentiometric surface, 1985, and water-level changes, 1983-85, of the Chicot aquifer system in southwestern Louisiana."

PLANS FOR 1986: Continue review of the observation well network in the State. The next area planned for a thorough water-level and water-quality network review is the five-parish area around the city of Baton Rouge. Continue to maintain the Ground Water Site Inventory (GWSI) file by inputting water levels and well schedules for wells registered with the State. Download the GWSI data base to the District's Prime computer.

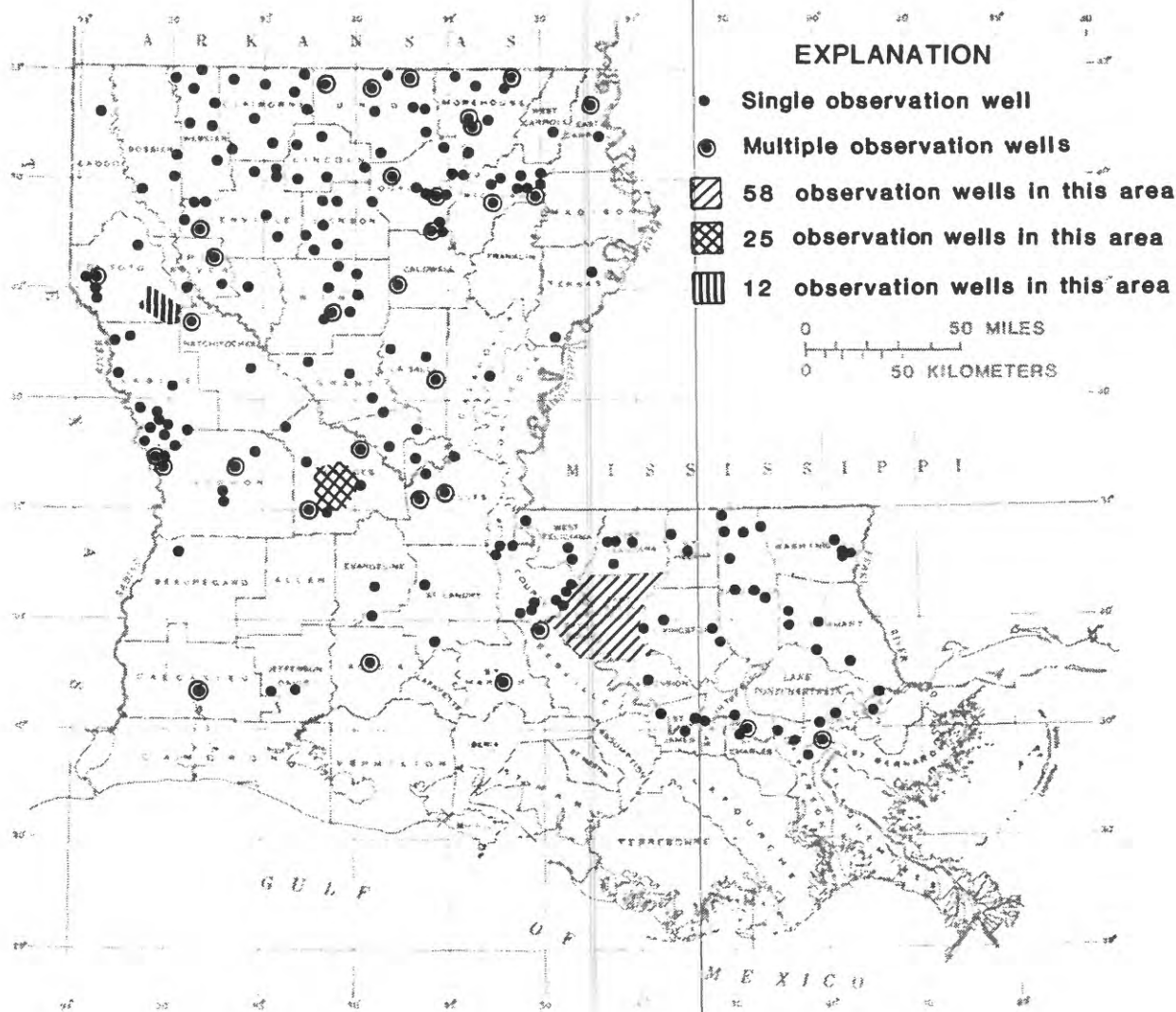


Figure 4.--Data-collection sites for ground-water levels.

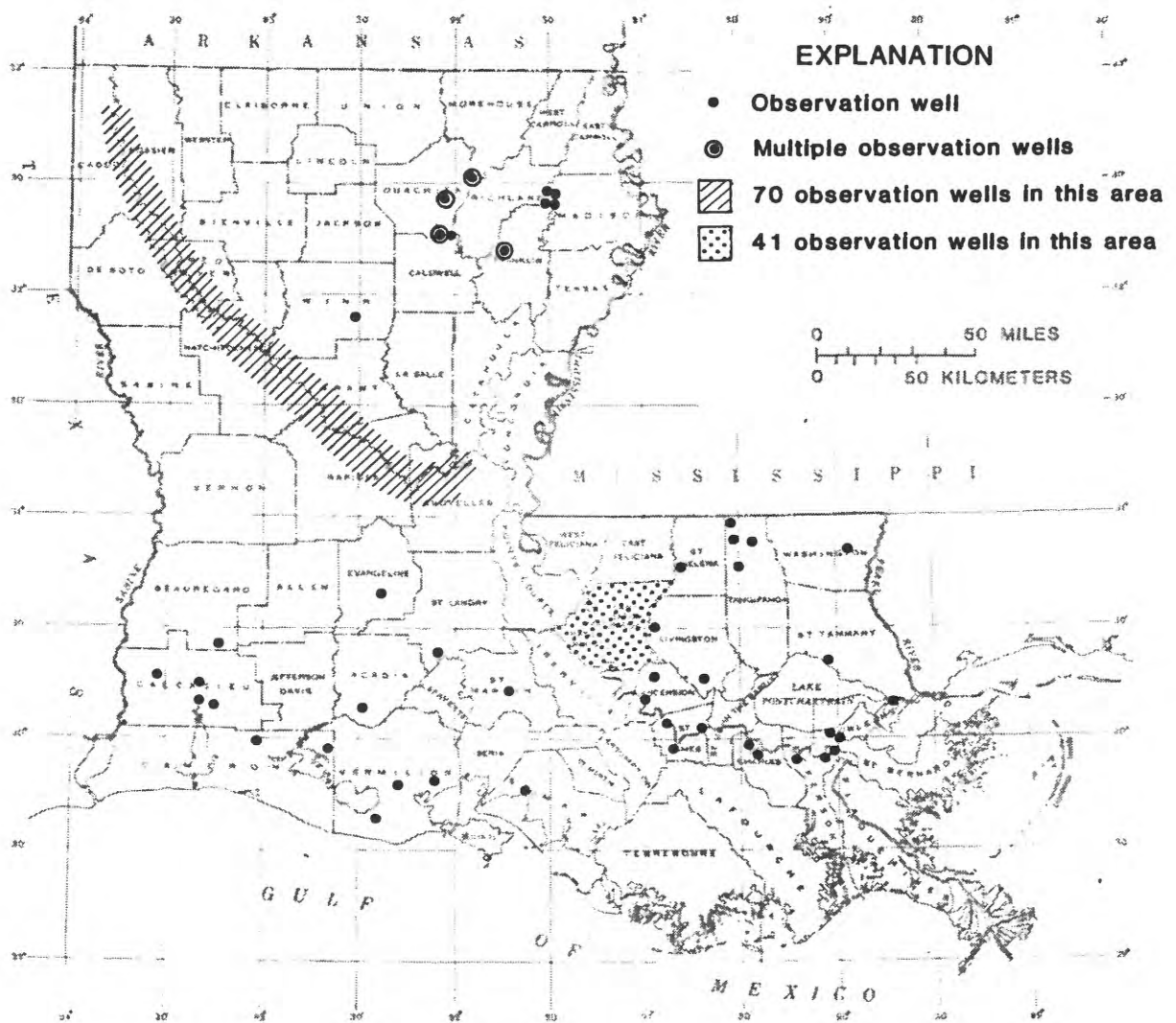


Figure 5.--Data-collection sites for ground-water quality.

PROJECT TITLE: Quality-of-water stations

PROJECT NUMBER: LA00-003

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: Department of Transportation and Development, Office of Public Works; Department of Natural Resources; Sabine River Compact Administration; U.S. Army Corps of Engineers; NASQAN (National Stream Quality Accounting Network); Benchmark Program; U.S. Forest Service; and National Park Service



PROJECT CHIEF: Darrell D. Carlson, District Office, Baton Rouge

PROJECT DURATION: Continuous

PROBLEM: Water-resource planning and water-quality assessment require a nationwide base level of relatively standardized information. For intelligent planning and realistic assessment of the water resource, the chemical, physical, and biological quality of the rivers, streams, and lakes need to be defined and monitored.

OBJECTIVE: To provide a National bank of water-quality data for broad planning and action programs and to provide data for management of the State's waters, as well as interstate and international waters.

APPROACH: Operation of a network of water-quality stations and observation wells to provide average chemical concentrations, loads, and time trends as required by planning and management agencies.

PROGRESS: Water-quality data for rivers, streams, and lakes were compiled and published for the 1985 water year in the annual data report. The water-quality network was evaluated and adjusted as needed. The water-quality network consists of 66 sites and is shown in figure 6.

PLANS FOR 1986: Continue operation of network. Review station requirements and adjust network as needed. Download the water-quality data base to the District's Prime computer.

PROJECT TITLE: Sediment stations

PROJECT NUMBER: LA00-004

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCIES: Department of Transportation and Development, Office of Public Works; Department of Natural Resources; U.S. Army Corps of Engineers; CBR Program (Collection Basic Records); NASQAN (National Stream Quality Accounting Network); and Benchmark Program



PROJECT CHIEF: Darrell D. Carlson, District Office, Baton Rouge

PROJECT DURATION: Continuous

PROBLEM: Water-resource planning and water-quality assessment require a nationwide base level of relatively standardized information. Sediment concentrations and discharges in rivers and streams need to be defined and monitored.

OBJECTIVE: To provide a National bank of sediment data for use in broad Federal and State planning and other programs and to provide data for management of the State's waters, as well as interstate and international waters.

APPROACH: Establish and operate a network of sediment stations to provide spatial and temporal averages, and trends of sediment concentration, sediment discharge, and particle size of sediment being transported by rivers and streams.

PROGRESS: Sediment data were compiled and published for the 1985 water year in the annual data report. Sediment samples were collected from 25 sites and analyzed by the USGS. At nine sites, samples were collected by the Corps of Engineers and analyzed by the USGS.

PLANS FOR 1986: Continue operation of the network. Review station requirements and adjust the network as necessary. Continue efforts to automate techniques for the analysis of sediment.

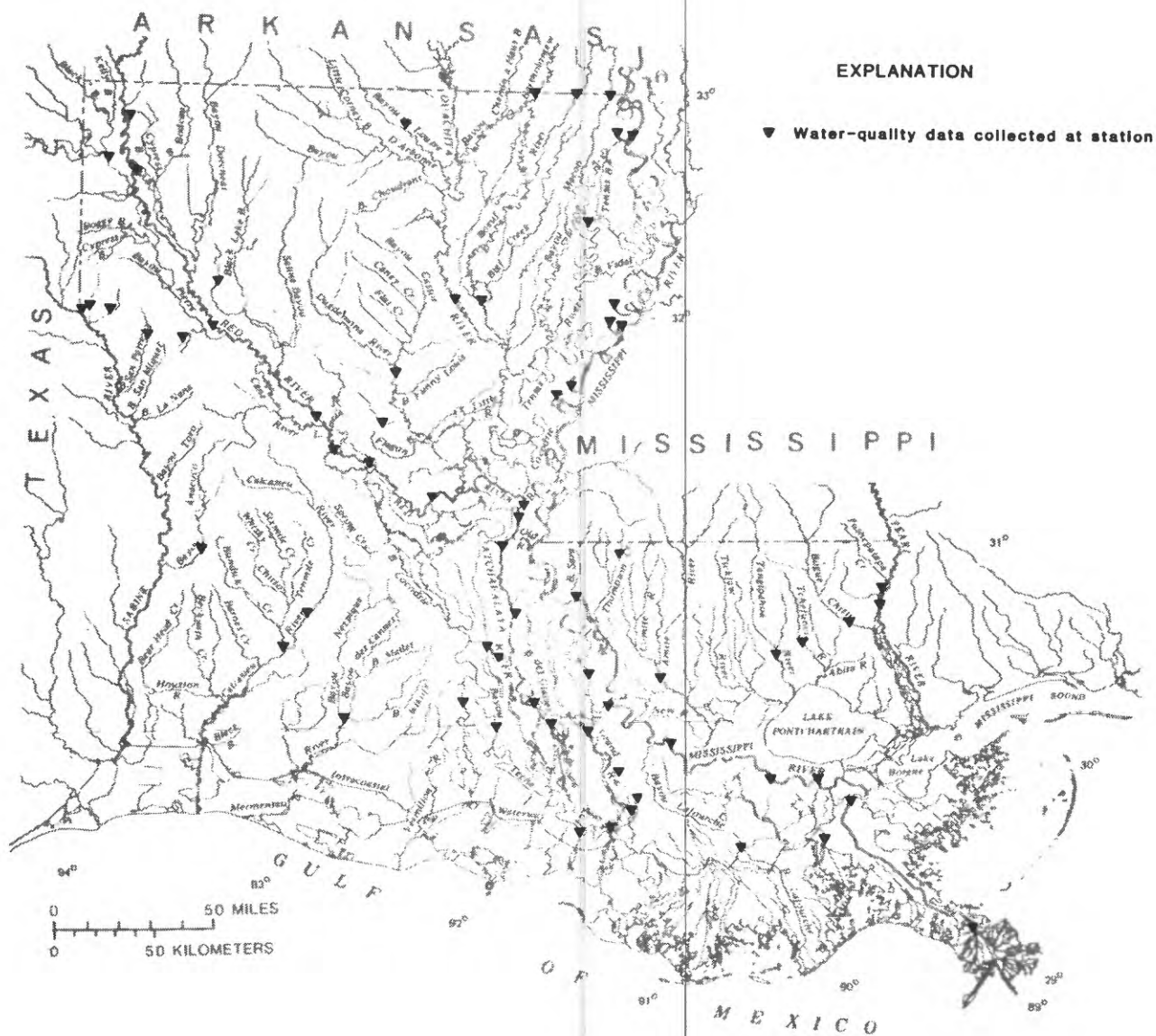


Figure 6.--Data-collection sites for surface-water quality.



Figure 7.--Boats used to collect hydrologic data.



Figure 8.--Equipment used at surface-water gaging station.

PROJECT TITLE: Water-use data system
PROJECT NUMBER: LA79-007
STUDY LOCATION: Louisiana, statewide
COOPERATING AGENCY: Department of Transportation
and Development, Office of
Public Works



PROJECT CHIEF: Dee L. Lurry, District Office, Baton Rouge
PROJECT DURATION: Continuous since April 1979

PROBLEM: Data on use of water are essential to appraise present use and plan future use of Louisiana's water resources. The Louisiana District has collected water-use data in the past and has published data aggregated by broad use categories within each parish. A system of data collection is needed so that more detailed use categories can be recognized for appraising present and future water needs. Also needed is a system to store and manipulate these more detailed data and to produce reports useful for appraising these needs.

OBJECTIVE: (1) Collect user data and store the information in a State data management system. (2) Sort and perform statistical analyses on the data. (3) Provide data to water users and planners as to how much water is used, where it comes from, how much is consumed, and how much and to where water is returned to the hydrologic system.

APPROACH: New forms for field collection of the data will be developed by both USGS and State personnel, who will jointly collect the water-use data. The State will develop a computer-based data management system, compatible with the National Water-Use Data System, to manipulate the data. This computerized system will lead to objectives (2) and (3) as stated above, including publication of periodic reports of water use.

PROGRESS: Water-use questionnaires were mailed to 1,044 municipal, industrial, and commercial users in Louisiana to collect 1985 water-use data. The Louisiana Department of Transportation and Development, the principal cooperator of the U.S. Geological Survey, is assisting in this effort. Information returned on questionnaires is being researched and verified for local well numbers and other pertinent water-use information. The report, "Public water supplies in Louisiana, volume 1: northern Louisiana," received approval for publication and was published.

PLANS FOR 1986: Obtain Director's approval for a map report on water use in Louisiana in 1985. Continue preparation of the report, "Public water supplies in Louisiana, volume 2: southern Louisiana."

Interpretive Studies and Research

PROJECT TITLE: Flood investigations

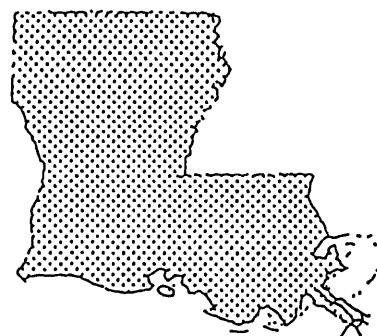
PROJECT NUMBER: LA75-006

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCY: Federal Emergency Management Agency (FEMA)

PROJECT CHIEF: Fred N. Lee, District Office,
Baton Rouge

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. FEMA needs flood studies in selected areas to determine applicable flood insurance premium rates.

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

APPROACH: To conduct the necessary evaluations or to 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 by other acceptable methods and furnish the results in reports prepared to specifications of FEMA.

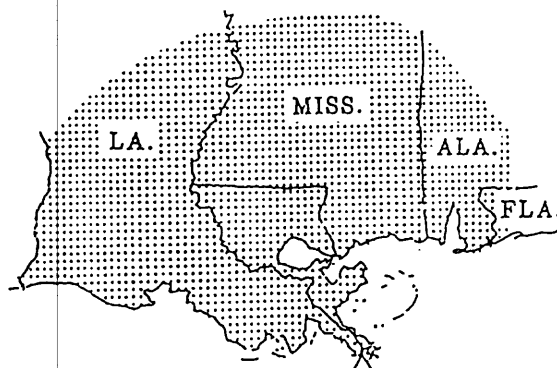
PROGRESS: Obtained approval to submit to FEMA the reports for Bogalusa, Jefferson Davis Parish, Webster Parish, Breaux Bridge, Broussard, Many, and Mansfield, Louisiana. Started two new studies of Beauregard and Allen Parishes.

PLANS FOR 1986: Complete analyses for all communities studied and submit Limited Detail Studies (LDS) reports to FEMA for publication.

PROJECT TITLE: Mississippi embayment-gulf coast regional aquifer-system analysis

PROJECT NUMBER: LA82-071

STUDY LOCATION: Louisiana, southwestern Mississippi, southern Alabama, and western Florida



COOPERATING AGENCY: Federal Thrust Program, Regional Aquifer System Analysis (RASA)

PROJECT CHIEF: Angel Martin, Jr., District Office, Baton Rouge

PROJECT DURATION: April 1982 through September 1988

PROBLEM: Ground-water withdrawals from the Mississippi Embayment and Gulf Coastal Plain regional aquifer system in Louisiana, and southwestern Mississippi have progressed such that the ground-water supply has been depleted by an estimated one third. Withdrawals from these aquifers are expected to increase as energy-related industries, irrigation, and urban development continue to grow in Louisiana and southwestern Mississippi. To evaluate the regional effects of increased ground-water withdrawals, a study quantifying the freshwater flow system is required.

OBJECTIVE: Analyze and interpret hydrologic information from Louisiana, southwestern Mississippi, and parts of Alabama and Florida to accurately describe the regional ground-water flow system and to estimate the effects of future stresses on the system.

APPROACH: Assemble and analyze hydrologic data of Louisiana, and southwestern Mississippi, and parts of Alabama and Florida from various sources. These data, and the results from studies conducted in the project area will be used to (1) understand the regional ground-water flow system, (2) produce maps showing the geometry of the aquifers and confining beds, (3) produce maps showing the hydrologic characteristics of the aquifers and confining beds, and (4) design and calibrate a quasi-three-dimensional ground-water flow model to quantify the flow system and estimate the effect of stresses.

PROGRESS: Sixty steady-state and two transient calibration runs have been completed. Four map reports have been published, including a report showing the potentiometric surface of the Catahoula aquifer. Obtained Director's approval to publish a report that statistically summarizes aquifer-test data for Louisiana.

PLANS FOR 1986: Calibrate the ground-water flow model for both steady-state and transient conditions. Publish the report, "Statistical analysis of aquifer-test results for nine regional aquifers in Louisiana." Obtain Director's approval for publication of the RASA interim report, "Regional view of ground-water flow of Coastal Lowlands aquifer system," and a map report describing the potentiometric surfaces of the upper and lower Jasper and equivalent aquifers.

PROJECT TITLE: Transport of suspended-sediments and associated chemical constituents in the lower Mississippi River (research merit project)

PROJECT NUMBER: LA83-077

STUDY LOCATION: Lower Mississippi River from Tarbert Landing, Mississippi, to Venice, Louisiana

COOPERATING AGENCY: Department of Transportation and Development, Office of Public Works

PROJECT CHIEF: Charles R. Demas, District Office, Baton Rouge

PROJECT DURATION: October 1982 through September 1986



PROBLEM: Sedimentation and channel bed movement in the lower Mississippi River are significant factors in navigation and maintenance of coastal wetlands. The effects of a proposed deepening of the shipping channel is dependent upon the manner in which sediment is transported throughout the system. Also, levees and other flood control structures on the river have distorted the natural progression of sediment deposition in the wetlands, contributing to an accelerated coastal recession and land loss. The use of diverted river water may be a partial deterrent to coastal land loss. The sediment and other water-quality characteristics of the river system need to be determined to evaluate diversions as a wetland management alternative.

OBJECTIVE: (1) To define areas where suspended sediment and its associated chemical load are deposited or resuspended; to quantitatively relate this to streamflow and suspended-sediment loads of lower Mississippi River. (2) To determine selected chemical constituent loads in relation to suspended-sediment concentrations, particle size, and water discharge in the lower Mississippi River and to relate this to the bed sediment. (3) Attempt to develop and test a sediment transport model for the lower Mississippi River, and use it to predict both sediment and chemical loads.

APPROACH: Suspended sediment, bed material, and attached chemical constituents will be sampled during several rises at discharges above and below 600,000 cubic feet per second in the Mississippi River at Tarbert Landing. Instantaneous discharge measurements will be made at several sites along this study reach. Sediment and discharge information will be used in an attempt to model sediment movement in the Mississippi River using models such as the Numerical Model for Routing Graded Sediments in Alluvial Channels developed by Alonso and others (1981) and the one-dimensional unsteady streamflow model J879 (Land, 1978). Additional samples will be collected dependent upon fixed site results.

PROGRESS: Completed all field work in February 1985. Field work included three additional intensive suspended-sediment sampling trips at flows of 532,000; 678,000; and 899,000 cubic feet per second. Two additional sets of wet-sieved suspended-sediment size classes were collected and analyzed for minor elements. Analyses of the three suspended-sediment particle-size classes showed increasing concentrations of total recoverable aluminum, chromium, copper, iron, cadmium, manganese, nickel, and zinc with decreasing particle-size class. Highest concentrations of minor elements occurred in the less than 30 micron particle-size class and lowest concentrations in the greater than 63 micron particle-size class. Results indicate that the smaller suspended-sediment particle-size classes play an important role in the transport of most minor elements by the lower Mississippi River. Therefore, impact of minor elements on wetlands receiving diversions of Mississippi River water can be minimized by restricting diversions of Mississippi River water during rising stages when suspended-sediment concentrations are highest and permitting diversions of river water during falling stages of rises when suspended sediment concentrations are relatively lower.

PLANS FOR 1986: Complete writing of planned project reports, submit for Director's approval, and publish in appropriate outlets.

PROJECT TITLE: Development of methods for determining water-use in rice irrigation

PROJECT NUMBER: LA83-078

STUDY LOCATION: Southwestern Louisiana

COOPERATING AGENCY: Department of Transportation and Development, Office of Public Works



PROJECT CHIEF: Kenneth J. Covay, Subdistrict Office, Alexandria

PROJECT DURATION: October 1982 through September 1987

PROBLEM: Irrigating fields for rice production is a standard practice in southwestern Louisiana because evapotranspiration is greater than rainfall in June, July, and August, and an adequate water supply must be available. There is a need for more precise methods of estimating water-use for rice irrigation to appraise present use and plan future use.

OBJECTIVE: (1) Develop methods for determining water budgets and evaluating water use in irrigated rice fields. (2) Analyze components of evapotranspiration and analyze methodology.

APPROACH: The field work will be conducted in two rice fields in Jefferson Davis Parish in southwestern Louisiana. Water-budget analysis will be attempted on monitored fields. One rice field will be equipped with seven microlysimeters to measure evaporation, seepage, and evapotranspiration and with meteorological instruments to measure wind velocity, precipitation, radiation, air and water temperature, relative humidity, and saturation vapor pressure. Inflow and outflow of water in the fields will be determined by using gage-height recorders and discharge measurements. Hydrologic (ground-water inflow and surface-water outflow) and meteorological (such as incoming, outgoing, and net radiation) data will be used to evaluate various water-budget equations. Field documentation of hydrologic data will be compared to the meteorologically generated estimate of evapotranspiration to evaluate actual water use and efficiency.

PROGRESS: Two fields were monitored during the 1985 water year. Meteorological instruments and seven microlysimeters were installed and operated during the rice-growing season. The data have been reviewed, updated, and stored on the District's Prime computer. Because of adverse weather and field conditions, only one rice crop was harvested. The meteorological equipment performed well.

PLANS FOR 1986: Evaluate meteorological data and lysimeter data. Also, develop inflow and outflow relations for the two fields. Program equations so data can be used to calculate evapotranspiration. Work closely with research advisor when interpreting data. Start compiling first draft of report. Additional soil temperature data will be collected on advice of advisor. Inflow and outflow records will be analyzed.

PROJECT TITLE: Evaluate effects of pumping on
"400- and 600-foot" aquifers
of the Baton Rouge area,
Louisiana

PROJECT NUMBER: LA84-080

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



COOPERATING AGENCIES: Department of Transportation and Development, Office of
Public Works; and Capital Area Groundwater
Conservation Commission

PROJECT CHIEF: Eve L. Kuniansky, District Office, Baton Rouge

PROJECT DURATION: August 1983 through September 1986

PROBLEM: The "400- and 600-foot" aquifers are heavily pumped aquifers in the Baton Rouge area. Recurring demands for ground water in the area may result in increased withdrawals from these aquifers. A method needs to be developed for evaluating the effects of increased pumpage on water levels within the "400- and 600-foot" aquifers. Increased withdrawal may result in the "400- and 600-foot" aquifers being recharged by water of less acceptable quality, such as the Mississippi River or nearby shallow ground water contaminated by hazardous wastes.

OBJECTIVE: (1) Show the impact of pumping from aquifers in the Baton Rouge area on the potentiometric surfaces of the "400- and 600-foot" aquifers. (2) Determine the extent of vertical movement of water above the "400- and 600-foot" aquifers into these aquifers. (3) Determine the amount of water movement between the "400- and 600-foot" aquifers and the Mississippi River, and determine the potential for movement of water into the system from overlying layers.

APPROACH: Principal approach is to prepare a three-dimensional model of the "400- and 600-foot" aquifers. Development of the model would include (1) data preparation, (2) grid preparation and preliminary model runs, and (3) model calibration. Model simulations will be used to determine the impacts of alternative pumping plans and to define the ground-water processes that affect the interchange of water between the "400- and 600-foot" aquifers and the Mississippi River, and to determine the potential for movement of water into the system from overlying layers.

PROGRESS: One-dimensional modeling of the Baton Rouge fault was completed. A mapping report is in review. A model grid was chosen and some input data have been prepared.

PLANS FOR 1986: Obtain Director's approval for the map report. Prepare a report on simulation of the "400- and 600-foot" aquifers.

PROJECT TITLE: Hydrologic characteristics of
the Chicot aquifer system in
southwestern Louisiana

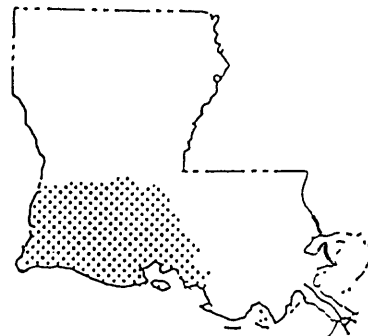
PROJECT NUMBER: LA84-083

STUDY LOCATION: Southwestern Louisiana

COOPERATING AGENCY: Department of Transportation
and Development, Office of
Public Works

PROJECT CHIEF: Dale J. Nyman, District Office, Baton Rouge

PROJECT DURATION: October 1983 through September 1986



PROBLEM: The Chicot aquifer system is the primary source of freshwater for a 13-parish area in southwestern Louisiana. Irrigation and industrial withdrawals, averaging nearly one billion gallons per day, are causing local saltwater problems. If withdrawals were steadily increased, saltwater encroachment could affect much of the freshwater storage in this coastal aquifer system. A three-dimensional aquifer model is needed to define, understand, and assist in managing the Chicot aquifer system.

OBJECTIVE: To develop an understanding of ground-water flow in the Chicot aquifer system and the effects of pumping stresses upon that system.

APPROACH: Use existing log data to define the geometry of the aquifer system. Gather the appropriate pumpage and water-level data available in the area since the 1940's. Construct a quasi three-dimensional finite-difference model that will adequately simulate the Chicot aquifer system. Land satellite (Landsat) imagery from 1978 will be used to more accurately simulate irrigation pumpage over the modeled area.

PROGRESS: Aquifer parameters and pumpage data have been input into the model. A report from the Report Sensing Laboratory at Louisiana State University (LSU) provided information on the distribution of acreage irrigated by ground water. This information was converted to pumpage data for each cell of the flow model. The pumpage data were prorated over the last 30 years using information from agricultural and climatic sources. The annotated outline and introductory sections of the model report have been reviewed and revised.

PLANS FOR 1986: Additional runs will be made to calibrate the flow model. After calibration, sensitivity analysis will be done to test the model's response to hydrologic properties. Hypothetical rates of ground-water withdrawal will be input into the model to evaluate water-level response of the aquifer.

PROJECT TITLE: Containment of organic waste in low permeability clays of the southwest Mississippi embayment, Louisiana (research merit project)

PROJECT NUMBER: LA84-084

STUDY LOCATION: Browning-Ferris Industries, Willow Springs Hazardous Waste Facility, Willow Springs, Louisiana



COOPERATING AGENCY: Department of Transportation and Development, Office of Public Works

PROJECT CHIEF: Douglas A. Trudeau, District Office, Baton Rouge

PROJECT DURATION: October 1983 through September 1986

PROBLEM: There will continue to be a need for land disposal of hazardous waste by the chemical industry in Louisiana. Therefore, an understanding of the impact of past disposal methods is urgently needed to evaluate the potential effect of future disposal activities on ground-water resources. The hydrologic and geologic parameters of the clay environment that determine the movement of ground water and organic contaminants need to be understood. Interaction of organic contaminants and clays need to be more clearly defined, so that changes in the chemical characteristics of contaminants as they move through the system can be anticipated. Also, the hydraulic characteristics of the clays need to be studied to determine any changes that might occur as a result of exposure to organic contaminants.

OBJECTIVE: To define the hydraulic processes related to the presence and movement of organic solutes in geologic materials having low hydraulic conductivities.

APPROACH: The study will be oriented toward documentation of the current and past conditions at a site located in Calcasieu Parish in southwestern Louisiana. Field data collected at the study site will be used to define the general hydrodynamic and geochemical characteristics of the waste site. Contaminant migration will be analyzed through simulation, using a ground-water flow model. The transport rates of various pollutants will be quantified for this typical coastal plain environment.

PROGRESS: Currently, water levels in approximately 150 wells are being measured monthly. Continuous digital water-level recorders were installed at three wells near the West Fork of the Calcasieu River to determine the head relation between the river and aquifers. Nineteen test holes were drilled surrounding the waste site to provide information on the subsurface geology. The test holes were completed as observation wells. Geologic mapping of individual aquifers around the site is completed, and water-level maps are in preparation. Geologic mapping indicates a complex geology

consisting of three continuous shallow aquifers within 90 feet of land surface separated by interfingering clay layers. The clay layers have secondary permeability characterized by plant-root networks, joints, as well as interspersed sand lenses, all of which are potential pathways for the movement of water and contaminants. Water-level maps of each aquifer are being prepared and seem to indicate that water movement is principally downward into the "200-foot" sand of the Chicot aquifer system. The Chicot aquifer system is the principal source of drinking water in southwest Louisiana.

PLANS FOR 1986: For samples of 24 wells in the area, determine concentrations of organic carbon using a gas chromatography-flame ionization detector (GD-FID) scan, volatile organics, acid and base-neutral extractable organic compounds, where indicated by GC-FID, dissolved organic carbon, trace metals, and inorganic constituents. Determine the organic carbon concentration and mineralogy of selected soil samples. Assess the water-quality changes occurring along a path at the site. Prepare a cross-sectional flow model of the system. Write the final report.

PROJECT TITLE: Hydrologic investigations in the lower Calcasieu River basin

PROJECT NUMBER: LA84-087

STUDY LOCATION: Calcasieu and Cameron Parishes, Louisiana

COOPERATING AGENCY: Department of Environmental Quality, Office of Water Resources



PROJECT CHIEF: George J. Arcement, District Office, Baton Rouge

PROJECT DURATION: April 1984 through September 1986

PROBLEM: The Calcasieu River is a very important factor in the development of the Lake Charles area. Because it is the major source of water for petrochemical and seafood industries and rice farming, there is a lot of interest in the hydrologic and hydraulic characteristics of the Calcasieu River, especially by those concerned with permitting and regulating the discharge of effluents.

OBJECTIVE: (1) Define the hydrologic characteristics of the lower Calcasieu River. (2) Determine the hydraulic characteristics of the lower Calcasieu River, specifically discharge data for a 15 mile reach of the Calcasieu River from the saltwater barrier above Lake Charles to Burton Landing near Moss Lake.

APPROACH: (1) Determine the hydrologic characteristics through a series of hydrologic surveys. (2) Determine hydraulic characteristics through use of a one dimensional branch-network flow model. The usual stage-discharge relations for determining flow do not apply to this study reach because of tidal and wind effects on the river and the influence of the saltwater barrier above Lake Charles.

PROGRESS: Completed field investigations of hydrology of lower Calcasieu River and prepared first draft of report. Continued calibration and verification of flow model to determine discharge for the lower Calcasieu River from saltwater barrier to Burton Landing below Moss Lake.

PLANS FOR 1986: Obtain colleague reviews and the Director's approval to publish the report of hydrology of lower Calcasieu River. Complete implementation of flow model to determine daily discharge and prepare report of model results.

PROJECT TITLE: Determination of flood characteristics for coastal streams in Louisiana (research merit project)

PROJECT NUMBER: LA85-088

STUDY LOCATION: Coastal Louisiana

COOPERATING AGENCY: Department of Transportation and Development, Office of Highways

PROJECT CHIEF: J. Josh Gilbert, District Office, Baton Rouge

PROJECT DURATION: October 1984 through September 1989



PROBLEM: A technique for determining flood characteristics of flat-sloped coastal streams is needed for design of highway bridges and culverts in Louisiana.

OBJECTIVE: (1) Collect, analyze, and interpret continuous-discharge data and basin characteristics information for approximately 12 stations on coastal streams in Louisiana. (2) Define a suitable procedure for extending flood record. (3) Develop a regionalized method for describing flood characteristics of flat-sloped or coastal streams in Louisiana.

APPROACH: Data and procedures will be analyzed to determine the best approach to defining flood characteristics in flat-sloped areas. In the sloped areas that are tidally affected, accurate discharges and flow volumes have to be determined from information gathered at sites which are instrumented with magnetic flowmeters, continuously monitored.

PROGRESS: A literature review has provided some examples of different analytical techniques of flood-frequency evaluation for flat-sloped coastal streams. Alternative methods for the determination of flood characteristics and the delineation of coastal watersheds have been studied. These methods have not been used to evaluate specific gaged or ungaged stations. A method for the collection of continuous-discharge data on coastal streams has been established. Accurate runoff and tidal volumes can be obtained at gaging stations with magnetic flowmeters. This information is needed to determine flood characteristics, calibrate rainfall-runoff models, and design highway bridges and culverts.

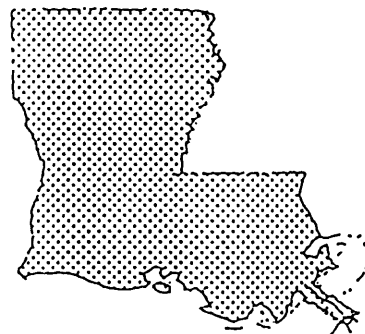
PLANS FOR 1986: Evaluate documented methods of frequency analysis using selected information from gaging stations instrumented with magnetic flowmeters. Evaluate stochastic methods for estimating occurrences of tropical depressions. Investigate areas where a tidal flood does or does not dominate the design flood criteria. Evaluate existing design procedures in an effort to give better specified limits for application, and suggest alternate methods for use outside the specified limits.

PROJECT TITLE: Minor elements in ground water of Louisiana

PROJECT NUMBER: LA85-090

STUDY LOCATION: Louisiana, statewide

COOPERATING AGENCY: Department of Transportation and Development, Office of Public Works



PROJECT CHIEF: Don C. Dial, District Office, Baton Rouge

PROJECT DURATION: October 1984 through September 1987

PROBLEM: Reports of barium, lead, and other toxic minor elements in the major aquifers of the State have caused concern. A study is needed to define the sources and extent of these minor elements in the aquifers.

OBJECTIVE: Define the minor elements present in each aquifer and identify areas where concentrations of barium, lead, or other elements are high. At selected sites with high concentrations, make further studies to determine if the anomaly is a natural occurrence or is induced by man's activities.

APPROACH: Water samples will be analyzed from each major aquifer of the State to determine natural levels of minor elements. Additional mineralogical and geochemical studies will be made in problem areas where abnormal concentrations have been found. The results of the study will be documented in a State report.

PROGRESS: Sampling from major aquifers of the State is almost completed. Results show no concentration of minor elements above the U.S. Environmental Protection Agency maximum contaminant limits.

PLANS FOR 1986: An area where high levels of minor element concentrations have been reported will be selected for further sampling and study.

PROJECT TITLE: Effects of pumping on water levels
in the Sparta aquifer, north-
central Louisiana

PROJECT NUMBER: LA85-091

STUDY LOCATION: Northern Louisiana

COOPERATING AGENCY: Department of Transportation and
Development, Office of Public
Works

PROJECT CHIEF: Harry McWreath, District Office, Baton Rouge

PROJECT DURATION: October 1984 through September 1987



PROBLEM: Extensive lowering of water levels, especially in localized areas of intensive pumping, is causing concern over increased pumping costs, long-term availability of water, and potential induced recharge that may be contaminated.

OBJECTIVE: Generally evaluate the regional effects of increased development of the Sparta aquifer. Specifically, evaluate the geohydrologic characteristics, particularly recharge, discharge, and leakage; assess effects of pumping stresses on water levels; and develop a groundwater flow model.

APPROACH: Evaluate geohydrologic characteristics by flow-net and water-budget methods, and preliminary model runs. Prepare finite-difference grid in northern Louisiana and southern Arkansas. Develop finite-difference model. Conduct model simulations under various pumping stresses.

PROGRESS: Collected water-level measurements. Developed conceptual model, designed initial grid, and defined boundary conditions. Reviewed literature. Coordinated all activity with the Arkansas District, which is working on a companion project.

PLANS FOR 1986: Develop, calibrate, and verify the digital model of the Sparta aquifer.

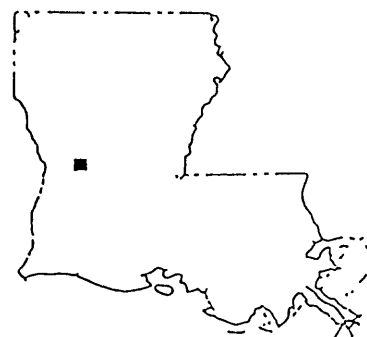
PROJECT TITLE: Evaluation of the water supply and characteristics of the aquifers at Fort Polk, Louisiana

PROJECT NUMBER: LA85-092

STUDY LOCATION: West-central Louisiana

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

PROJECT CHIEF: Harry McWreath, District Office, Baton Rouge



PROJECT DURATION: March 1985 through September 1987

PROBLEM: Ground water is the source of supply for Fort Polk and all other public-supply systems in Vernon Parish, La. A water-resources investigation of Vernon Parish in 1965 showed adequate ground-water availability, but the effects of increased development since then have not been assessed. The concern is the adequacy of the ground-water resource to meet the demands for water use at Fort Polk and the effects of increased pumpage at Fort Polk on water-levels in the aquifers.

OBJECTIVE: Define the geohydrologic framework and aquifer system at Fort Polk. Evaluate the hydraulic characteristics of the aquifer system. Define the development of ground-water at Fort Polk and evaluate the effects of pumpage on water levels.

APPROACH: Conduct aquifer tests for data to evaluate hydraulic characteristics of the aquifer system. Collect water-level data and pumpage data to evaluate effects of pumpage on water levels. Document the geohydrology of the aquifers and the development of ground water at Fort Polk.

PROGRESS: Water levels are measured quarterly. Conducted specific capacity tests on six wells. Well records are being reviewed.

PLANS FOR 1986: Perform aquifer tests to define hydraulic characteristics. Evaluate well efficiency. Plan ground-water flow model.

PROJECT TITLE: Lower Calcasieu River surface-water toxics

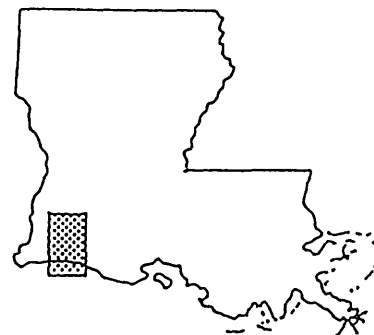
PROJECT NUMBER: LA85-093

STUDY LOCATION: Southwestern Louisiana

COOPERATING AGENCY: U.S. Geological Survey, Water Resources Division

PROJECT CHIEF: Charles Demas, District Office, Baton Rouge

PROJECT DURATION: April 1985 through September 1988



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

OBJECTIVE: (1) 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. (2) Determine the biological and chemical fates of selected organic compounds, nutrients, and metals in the industrial reach and in the transition zones between brackish and freshwater areas and the processes involved. (3) Identify the physical characteristics such as specific conductance, temperature, and dissolved-oxygen concentrations that affect the chemical and biological processes in the lower Calcasieu River.

APPROACH: (1) 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. (2) Determine the hydraulic and transport characteristics of the riverine system using flow and transport modeling results. (3) Define processes which are important in determining the movement and fate of selected toxic substances in the lower Calcasieu River by: (a) sampling water, bottom material, and biological matter over several tidal cycles, (b) determining settling and resuspension rates, (c) determining sediment-chemical size fraction relations, and (d) analyzing tissue of important aquatic organisms.

PROGRESS: Two reconnaissance sampling trips have been completed. Water, bottom material, and tissue samples have been collected. Samples have been analyzed for volatile and acid and base-neutral extractable organic compounds, minor elements, and nutrients. Compounds and minor elements found in high concentrations include bromoform, 1,3-dichlorobenzene, 1,2-dichlorobenzene,

hexachlorobenzene, phenanthrene, ammonia, iron, and chromium. Initial analytical results indicate bottom material samples with high moisture content must be freeze-dried prior to extraction for analysis of acid and base-neutral organic compounds. Freeze-drying apparently increases interaction between solvent and sediment, increasing efficiency of extraction.

PLANS FOR 1986: Select several compounds and minor elements based on reconnaissance results and study their movement within the lower Calcasieu River system. Concentrations of selected organic compounds in representative aquatic biota will be intensively studied during this year.

PROJECT TITLE: Program to convert and validate
site-index data for Master
Water Data Index (MWDI) of the
National Water Information
System (NWIS)

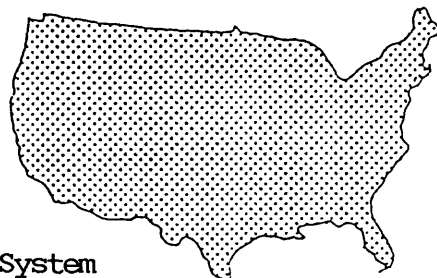
PROJECT NUMBER: LA85-094

STUDY LOCATION: U.S.A., Nationwide

COOPERATING AGENCY: U.S. Geological Survey,
National Water Information System

PROJECT CHIEF: Scott H. Beddingfield, District Office, Baton Rouge

PROJECT DURATION: June 1985 through September 1987



PROBLEM: The Master Water Data Index (MWDI) is required as a mechanism for documenting the existence and location of site specific water data stored in the National Water Information System (NWIS). The existing MWDI needs to be converted and its contents validated to meet the requirements of its redesign.

OBJECTIVE: To convert and validate unit values data which are currently stored in National Water Data Exchange (NAWDEX) and National Water Data Storage and Retrieval System (WATSTORE). To generate a transaction file documenting the existence of ground-water, quality-water, surface-water and meteorological data stored in the WATSTORE unit values file for subsequent data conversion and validation purposes.

APPROACH: (1) Review and clarify program specifications. (2) Develop code design. (3) Conduct code design walk through. (4) Write PL/1 computer code. (5) Code review and walk through. (6) Debug executable code. (7) Test code. (8) Final code review. (9) Acceptance testing. (10) Write three reports.

PROGRESS: (1) Reviewed and clarified program specifications. (2) Developed code design. (3) Conducted code design walk through. (4) Code has been written. (5) Code has been reviewed. (6) Code currently being debugged.

PLANS FOR 1986: (1) Complete code debugging. (2) Test code. (3) Conduct final code review. (4) Acceptance testing. (5) Write three reports.

PROJECT TITLE: Geohydrology and Water Quality of
the Gonzales-New Orleans aquifer
system, Jefferson Parish, Louisiana

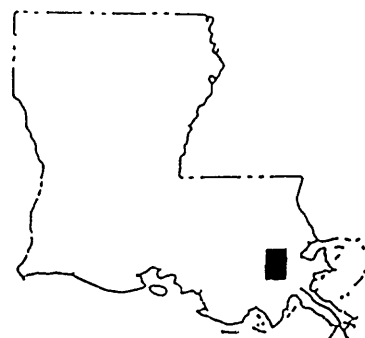
PROJECT NUMBER: LA85-095

STUDY LOCATION: Jefferson Parish, Louisiana

COOPERATING AGENCY: Department of Water, Jefferson
Parish, Louisiana

PROJECT CHIEF: Don C. Dial, District Office,
Baton Rouge

PROJECT DURATION: August 1985 through September 1987



PROBLEM: Jefferson Parish obtains its water supply from the Mississippi River. Accidental spills of hazardous chemicals into the river in the past occasionally have forced the parish to shut off their only water source. A supplemental ground-water source has to be developed that is capable of supplying 25 million gallons per day in the event the primary source is shut off.

OBJECTIVE: (1) Describe the geohydrology of the Gonzales-New Orleans aquifer system. (2) Describe areas where ground water of suitable quality is available for public water supply. (3) Investigate the effects of ground-water withdrawals on saltwater encroachment in the Gonzales-New Orleans aquifer.

APPROACH: (1) Areal reports and existing data will be used for preliminary geohydrologic mapping. (2) Test wells will be completed in areas where additional information is needed to evaluate the physical characteristics and water quality of the Gonzales-New Orleans, Norco, and Gramercy aquifers. (3) A digital flow model of the Gonzales-New Orleans aquifer will be used to determine the response of the aquifer to different rates of ground-water withdrawal.

PROGRESS: Available background literature for the area was researched. Maps showing geohydrologic properties of aquifers and the distribution of water-quality information were prepared.

PLANS FOR 1986: Existing geohydrologic data and data collected recently will be compiled and interpreted. Test wells will be drilled for additional data collection where needed. Selected water-quality characteristics such as color and salinity will be mapped. Complete implementation of a digital flow model to determine response of the aquifer to different rates of ground-water withdrawal.

PROJECT TITLE: Reaeration coefficients for inland streams in Louisiana

PROJECT NUMBER: LA86-096

STUDY LOCATION: Louisiana (Florida Parishes)

COOPERATING AGENCY: Louisiana Department of Environmental Quality, Office of Water Resources

PROJECT CHIEF: Fred N. Lee, District Office, Baton Rouge

PROJECT DURATION: April 1986 through September 1987



PROBLEM: The Louisiana Department of Environmental Quality (DEQ), the cooperator in this project, is charged with maintaining water quality standards for Louisiana streams. For each request to release waste to water bodies, each applicant must prepare a wasteload allocation based on the characteristics of the waterbody and the applicable standards for water quality. Stream characteristics and reaeration potential are important for determining wasteload allocations. To calculate reaeration potential, a field procedure must be applied. There are too many requests for permits to allow field procedures to be used for each site. A procedure to estimate the reaeration coefficients with little or no field work is needed.

OBJECTIVE: To develop procedures for estimating parameters used in empirical reaeration coefficient equations for streams in southeastern Louisiana.

APPROACH: Several empirical equations are available to estimate the reaeration coefficient (k_2). Most of these empirical equations have as common parameters, mean stream velocity (V_m) and mean cross sectional depth (D_m). A discharge equal to the 7-day, 10-year low flow is the discharge usually used by Department of Environmental Quality for wasteload calculations. This discharge can be estimated from published equations and tables (Forbes, 1980; Lee, 1985). To estimate mean stream velocity, equations published by Calandro (1978) will be used. Low-flow discharge measurements contained in the District's Prime computer files will be used to develop an equation to estimate stream width (w). Using the 7-day, 10-year discharge and estimated velocity from Calandro (1978), cross sectional areas will be computed ($A = Q/V$). With the computed area and the estimated stream channel width, a mean depth can be computed ($D_m = A/W$). A journal article will be prepared at the end of the study.

PROGRESS: Equations and graphs have been developed to estimate the parameters contained in the empirical equation,

$$k_2 = X(V_m^Y/D_m^Z).$$

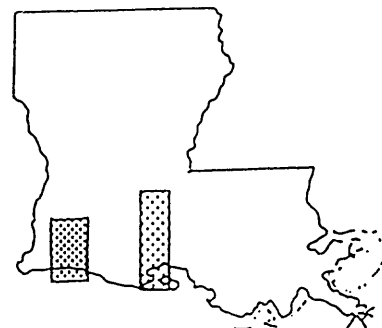
PLANS FOR 1986: Review the literature for similar studies. Develop work plan. Input data into computer files for analysis. Define ways to estimate reaeration coefficients using empirical equations from the literature.

PROJECT TITLE: Hydrologic characteristics of selected stream systems in Louisiana

PROJECT NUMBER: LA86-097

STUDY LOCATION: Louisiana (Calcasieu and Vermilion Rivers)

COOPERATING AGENCY: Louisiana Department of Environmental Quality, Office of Water Resources



PROJECT CHIEF: Nancy T. Baker, District Office, Baton Rouge

PROJECT DURATION: Began October 1985. Terminated September 1986 owing to lack of funds

PROBLEM: The Department of Environmental Quality (DEQ) is charged with maintaining water-quality standards for streams as part of their pollution control program. Many of these streams are impacted by residential, industrial, and agricultural activity adjacent to the stream; the stream is important for water supply and as a wastewater outfall conduit. Although some information on the hydrology of a stream is usually available, the information is not comprehensive enough to support a long-range program to protect stream water quality. DEQ needs information on the hydrologic characteristics of selected streams to supplement their water-quality surveys.

OBJECTIVE: (1) Describe the hydrologic characteristics of selected stream systems by defining water movement, physical characteristics of selected stream segments, and the movement of water within the system in relation to natural and man-made controls, affects of tides and winds, and water quality. (2) Provide selected training in hydrology to DEQ's personnel.

APPROACH: (1) Within the framework of a 5-year project, a segment of one stream system will be selected for study each year. An intensive survey, to collect data and define streamflow characteristics, will be planned and coordinated jointly by the DEQ and USGS. Additional data to supplement the intensive survey will be collected by the USGS. A technical report for each stream system surveyed will be prepared in the fiscal year following the intensive survey. (2) The USGS will provide manpower and equipment to carry out a training program as developed by DEQ, subject to manpower and funding limitations.

PROGRESS: Continued work on the Vermilion River project and report. Obtained additional field data to augment that taken during the intensive survey for the Vermilion River in fiscal year 1985.

PLANS FOR 1986: Prepare report "Hydrologic Investigations of the Vermilion River, Louisiana." Plan and carry out intensive survey for the next stream study site (to be selected by DEQ).

APPENDIX A

NEW PUBLICATIONS OF THE LOUISIANA DISTRICT
OF THE U.S. GEOLOGICAL SURVEY
FOR 1986-87

REPORTS IN PREPARATION

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APPENDIX B

SOURCES OF WATER-RESOURCES INFORMATION IN THE U.S. GEOLOGICAL SURVEY

SOURCES OF WATER-RESOURCES INFORMATION IN THE U.S. GEOLOGICAL SURVEY

Hydrologic Information Unit

Questions about water resources in general or about the water resources of specific areas of the United States can be directed to the Hydrologic Information Unit. This office will also answer inquiries about the availability of reports of water-resources investigations.

Hydrologic Information Unit
U.S. Geological Survey
420 National Center
Reston, Virginia 22092

Louisiana Water Resources

Questions specific to water resources in Louisiana can be directed to the Louisiana District Office. This office will answer inquiries about reports and other Louisiana water-resources activities.

District Chief
U.S. Geological Survey
Water Resources Division
P.O. Box 66492
Baton Rouge, Louisiana 70896

Office of Water Data Coordination

The OWDC (Office of Water Data Coordination) is the focal point for interagency coordination of ongoing and planned water-data acquisition activities of all Federal agencies and many non-Federal organizations. The "National Handbook of Recommended Methods for Water-Data Acquisition," indexes to the "Catalog of Information on Water Data," and other publications are available from OWDC. For additional information, write:

Office of Water Data Coordination
U.S. Geological Survey
417 National Center
Reston, Virginia 22092

National Water Data Exchange

NAWDEX (National Water Data Exchange) maintains a computerized data system that identifies sources of water data and indexes information on the water data available from the sources. The NAWDEX Program Office and local Assistance Centers assist data users in locating sources of water data, identifying sites at which data have been collected, and obtaining specific data. For additional information, write:

National Water Data Exchange
U.S. Geological Survey
421 National Center
12201 Sunrise Valley Drive
Reston, Virginia 22092

Public Inquiries Offices

USGS Public Inquiries Offices (PIO's) in the following cities provide general information about the Geological Survey's programs and its publications, and they sell, over the counter, maps of local and general interest:

USGS Public Inquiries Offices
1100 Commerce Street
Room 1-C-45 Federal Building
Dallas, Texas 75242
(214) 767-0198

⁺USGS Public Inquiries Office
12201 Sunrise Valley Drive
Room 1-C-402, 503 National Center
Reston, Virginia 22092
(703) 860-6167

USGS Public Inquiries Office
1961 Stout Street
169 Federal Building
Denver, Colorado 80294
(303) 837-6167

⁺USGS Public Inquiries Office
19th and F Streets, NW
Room 1028 General Services Building
Washington, DC 20244
(202) 343-8073

⁺ The Reston and Washington PIO's sell maps of all the States and most USGS Books.

APPENDIX C

SOURCES OF U.S. GEOLOGICAL SURVEY PUBLICATIONS

SOURCES OF U.S. GEOLOGICAL SURVEY PUBLICATIONS

Books, Maps, and Periodicals

Since 1879, the U.S. Geological Survey has served the public and Federal, State, and local governments by collecting, analyzing, and publishing detailed information about the Nation's mineral, land, and water resources. This information is in a variety of map, book, and other formats and is available from several sources within the Geological Survey.

Books, Catalogs, and Pamphlets

To order USGS book publications, catalogs¹, and pamphlets, write:

U.S. Geological Survey, Books and Open-File Reports
Federal Center, Box 25425
Denver, Colorado 80225

Maps

For maps of all areas of the United States, address mail orders to:

U.S. Geological Survey, Map Distribution
Federal Center, Box 25286
Denver, Colorado 80225

Residents of Alaska may order Alaska maps from:

Alaska Distribution Section, U.S. Geological Survey
New Federal Building-Box 12
101 Twelfth Avenue, Fairbanks, Alaska 99701

New Publications

To get on the mailing list for the free monthly catalog, "New Publications of the Geological Survey," write:

Mailing List Unit, U.S. Geological Survey,
329 National Center, Reston, Virginia 22092

¹ Two cumulative catalogs (1879-1961 and 1962-70) sell for \$2.00 each. The annual catalogs for 1971 and subsequent years are free. See "New Publications of the Geological Survey" above for information about the monthly catalogs.

Books and Open-File Reports

For information on the availability of microfiche or paper duplicate copies of selected open-file reports, write:

U.S. Geological Survey, Books and Open-File Reports
Federal Center, Box 25425
Denver, Colorado 80225

Water-Resources Data Reports

Water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.