WATER RESOURCES ACTIVITIES OF THE MISSISSIPPI DISTRICT, 1993-94

By Carol P. Moss

U.S. GEOLOGICAL SURVEY
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Introduction

This report describes the activities and programs of the U.S. Geological Survey, Water Resources Division, in Mississippi during 1993-94. The work of the Mississippi District is accomplished, in large part, through cooperation with local, State, and other Federal agencies who share in the planning and financial support of the program. The annual budget for the Mississippi District in 1994 is about $3.7 million.

The principal mission of the Mississippi District is to investigate the occurrence, quantity, quality, distribution, and movement of surface and ground water in the State. To accomplish this mission, the Mississippi District employs about 50 professional, technical, and support personnel. Hydrologic data-collection programs and interpretive studies are conducted by the Hydrologic Data Section and the Hydrologic Investigations Section. These sections are responsible for implementation and execution of District projects. The Administrative Services Section, the Computer Applications Unit, and the Reports Preparation Unit provide support services to all District personnel.

Results of most data-collection programs and interpretative studies conducted by the Mississippi District are published in U.S. Geological Survey reports or outside publications and are made available to universities, State and local agencies, other Federal agencies, and to the public. A list of reports published since 1990 is included in this report; these reports are available for inspection at the District Office in Jackson.

Local, State, and other Federal agencies that provided funding and services in support of water-resources investigations in Mississippi during 1993-94 include:

- City of Jackson
- Harrison County Board of Supervisors
- Harrison County Development Commission
- Jackson County Board of Supervisors
- Jackson County Port Authority
- Mississippi Department of Agriculture and Commerce
- Mississippi Office of Land and Water Resources
- Mississippi Office of Pollution Control
- Mississippi Department of Transportation
- Mississippi Soil and Water Conservation Commission
- National Aeronautics and Space Administration
- Pat Harrison Waterway District
- Pearl River Basin Development District
- Pearl River Valley Water Supply District
- Tombigbee River Valley Water Management District
- U.S. Army Corps of Engineers
- U.S. Army Corps of Engineers, Waterways Experiment Station
- U.S. Environmental Protection Agency
- U.S. Navy
- Yazoo Mississippi Delta Joint Water Management District

THE MISSISSIPPI EMBAYMENT STUDY UNIT OF THE NATIONAL WATER-QUALITY ASSESSMENT PROGRAM

The Nation's water resources are composed of many interrelated ground- and surface-water systems. The response of each of these systems to natural and anthropogenic factors manifests itself in a corresponding set of hydrologic, chemical, and biological characteristics that reflect the effects these factors have on water quality. Many national water-quality concerns arise from the recognition of recurring local and regional problems related to managing and protecting water quality.

To address complex water-quality concerns and related issues, the U.S. Geological proposed a National Water-Quality Assessment (NAWQA) Program in 1985 to:

- provide a nationally consistent description of current water-quality conditions for a large part of the Nation's water resources;
- define long-term trends (or identify the lack of trends) in water quality; and
- identify, describe, and explain the major natural and anthropogenic factors that affect observed water-quality conditions and trends.

In 1991, the U.S. Geological Survey began the full-scale implementation of a NAWQA Program after the successful completion of a pilot phase with field investigations in seven areas throughout the Nation. The program integrates information about water quality at several spatial scales, from local to national, and focuses on water-quality conditions that affect large areas of the Nation or occur frequently within small areas. Meeting the goals of the program will produce a wealth of water-quality information that will be useful to policy makers and managers at the National, State, and local levels.

The NAWQA Program consists of two major elements -- study unit investigations and regional and national syntheses of study unit investigation results. Study unit investigations, the basic building blocks of the NAWQA Program, are designed to address study unit and local water-quality issues and to provide the information upon which regional and national water-quality assessments can be made.

In 1994, the Mississippi Embayment study unit was among the 20 NAWQA study units selected for study under the phased implementation plan. The Mississippi Embayment water-quality study unit covers an area of approximately 48,500 square miles and includes parts of Arkansas, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee.

Results of each study unit investigation will be presented in several reports during each period of intensive assessment activity. The public will be informed about activities in each study unit through participation in public meetings. Addressing local water-quality concerns will be an important component of the study unit investigations.

Michael J. Mallory is project chief of the Mississippi Embayment NAWQA study.

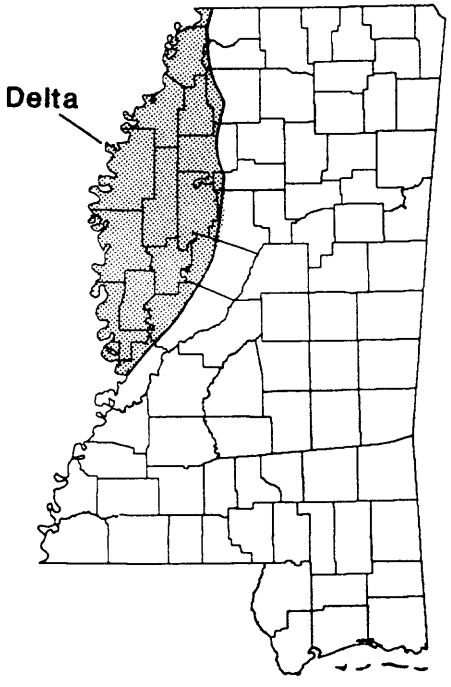
Location of the Mississippi Embayment study unit of the NAWQA Program

HYDROGEOLOGIC MAPPING OF CONFINING UNITS IN THE MISSISSIPPI RIVER ALLUVIAL AQUIFER, MISSISSIPPI DELTA

The Mississippi River alluvial aquifer is the most heavily pumped aquifer in Mississippi, supplying about 2,000 million gallons per day of water for agricultural and industrial use in the Mississippi "Delta". Recharge to the alluvial aquifer is from the Mississippi River, internal streams and lakes, precipitation, runoff and seepage from the Bluff Hills, and from underlying aquifers. To improve understanding of the vertical recharge to the alluvial aquifer, the Mississippi District, in cooperation with the Yazoo Mississippi Delta Joint Water Management District is conducting a study to determine the thickness and areal extent of the top and bottom clay beds that separate the alluvial aquifer from the surface environment and from underlying water-bearing units.

During fiscal year 1994, project work will focus on assembling, analyzing, tabulating, and creating a computer data file for the hydrogeologic information necessary to determine the vertical recharge potential for the alluvial aquifer. Results of the project are planned to be presented in a U.S. Geological Survey Water-Resources Investigations Report.

J. Kerry Arthur is the project chief for the study of confining units in the Mississippi River alluvial aquifer, Mississippi Delta.



Location of study area

MYRIAD INTERFACE: MAPS YIELDING REFERENCES, INFORMATION, ABSTRACTS, & DATA

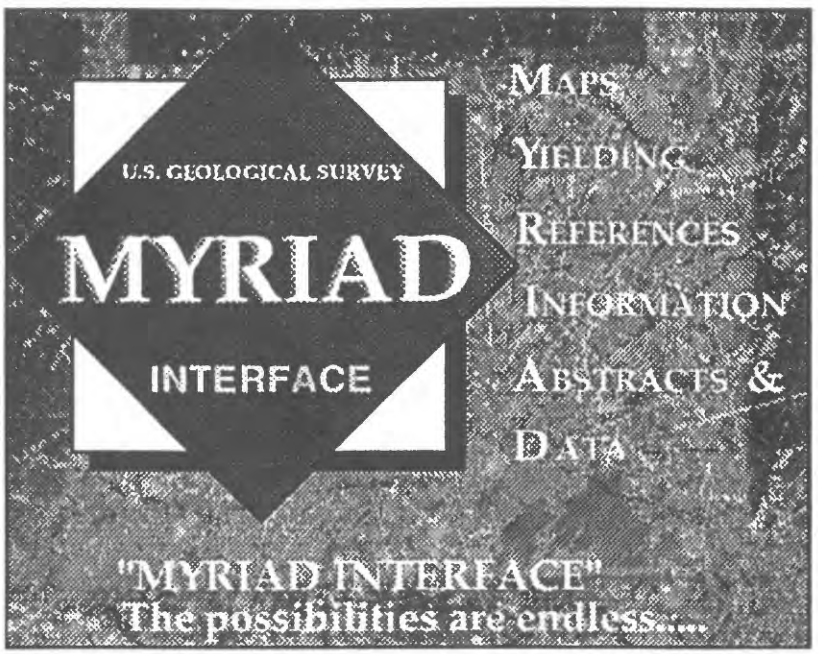
Every year, the U.S. Geological Survey produces a number of reports which describe water-resources investigations. Although recent U.S. Geological Survey reports are included in computerized data bases that can be searched with geographic and non-geographic keywords, anyone unfamiliar with the rivers, aquifers, or other geographic features within the person's area of interest would have difficulty in locating reports that contain the desired information for a designated area.

The objective of the geo-referenced bibliographic data-base project is to develop a computer data base of USGS reports covering Mississippi that is linked to an on-screen map. The data base user can display any or all of a set of themes, such as counties, cities, rivers, river basins, aquifers, physiographic provinces, and ecoregions, and use these themes to find geographic keywords that can be used to search one of the major water-resources data bases. If the data base user draws a box on the displayed map that covers the area of interest, a separate area of the screen will show a list of all reports that discuss that area. The user may also use non-geographic keywords to further limit the selection.

The initial prototype for the project was developed jointly by the Mississippi and Texas Districts and by Jackson State University's Center for Spatial Data Research. Funding is provided by the U.S. Geological Survey's Environmental Affairs Office, which maintains one of the major computer data bases of water-resources reports.

During 1993, a preliminary design for the system was developed by Randy Ulery of the Texas District. Graduate students at Jackson State University began the development of the data base by digitizing the study area for a number of reports for coastal Mississippi, and began the work on the map interface using spatial datasets provided by the Mississippi District. Reports will be added for other areas of the State and the map interface will be further refined.

Charles G. O'Hara is the chief of this project to develop a bibliographic data base.



ASSESSMENT OF NONPOINT SOURCE POLLUTION AND BEST MANAGEMENT PRACTICES ON SURFACE WATER QUALITY FROM SELECTED AGRICULTURAL FIELDS AS PART OF THE MISSISSIPPI DELTA MSEA PROGRAM IN NORTHWESTERN MISSISSIPPI

Agricultural activities are perceived as the major source of nonpoint source pollution of surface and subsurface water in the nation. Surface and subsurface water draining agricultural fields may transport large amounts of nutrients, pesticides, and suspended sediments to receiving streams and aquifers and cause them to become unsuitable for designated uses. Most of current nonpoint-source pollution policies are directed toward source control through the implementation of agricultural best management practices (BMP's) by farmers participating in voluntary programs. Increased understanding of the effect of agricultural activities on water quality, as well as the processes and factors that control the transport of agrichemicals and sediments, is needed before regulatory measures are imposed and alternative management strategies are implemented.

The Mississippi District will participate in a new research effort entitled, "Deterministic Assessment of Agricultural Nonpoint Source Pollution in Mississippi Delta Management Systems Evaluation Areas (MSEA)." The MSEA project is a 5-year, multi-agency investigation to assess the extent and nature of agricultural activities on the quality of surface and subsurface waters and to evaluate the effectiveness of BMP's. The Mississippi District currently serves as co-chairmen of a consortium of Federal, State, and local agencies that cooperatively administer the project. The watersheds to be selected for this investigation will be small oxbow lake watersheds located in northwestern Mississippi, locally known as the "Delta."

The Mississippi District will bring to the MSEA project the strategy to sample surface water runoff as developed in the Beaver Creek project in West Tennessee. Samples are collected by automatic point samplers about every 5 minutes during storm events. Each sample is then analyzed to accurately characterize pollutant concentration distribution throughout rainfall/runoff events. This sampling strategy will be evaluated and optimized as the project progresses.

The project will include an assessment of the effectiveness of BMP's using statistical techniques and an evaluation of current watershed models. The results of this investigation will be presented in a Water-Resources Investigations Report at the conclusion of the project.

Richard A. Rebich is the project chief for this study of the Mississippi Delta.

Location of study area

DETERMINATION OF METHODS FOR CHARACTERIZATION OF UNDERGROUND INJECTION SITES IN MISSISSIPPI

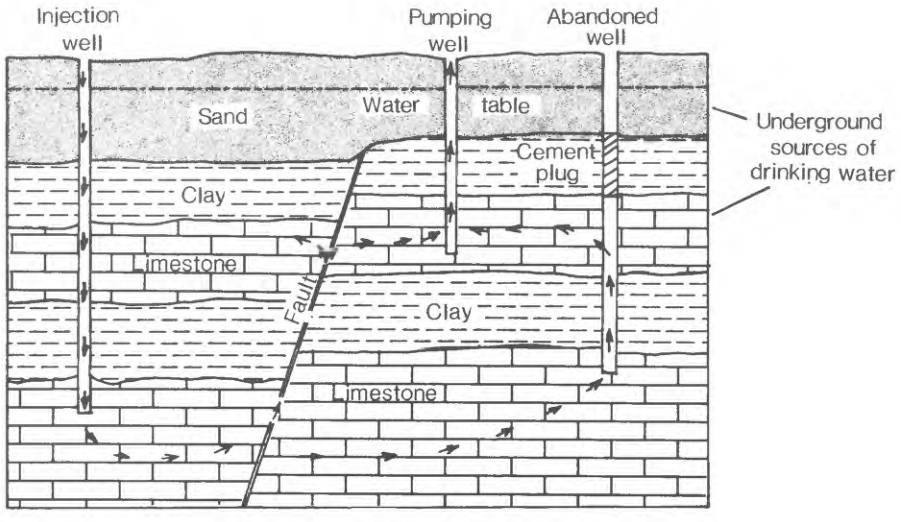
Underground injection of industrial waste is a disposal process in which liquid waste is injected and stored beneath the surface of the earth. Industries use this disposal process primarily to dispose of wastewater that is impractical to treat for surface-water discharge. Underground injection requires a location where the geology provides an acceptable injection (receiving) zone and adequate confinement for the wastewater. The need exists for more information on which to base management decisions concerning underground injection.

The Mississippi District is working in cooperation with the Mississippi Office of Pollution Control to provide information that will be useful in making sound decisions concerning underground injection wells in Mississippi, specifically the use of Class I injection wells, which are defined as wells used to inject hazardous or non-hazardous liquid waste below a formation that contains the lowermost underground source of drinking water. Mississippi currently (1993) has three Class I injection sites containing a total of six wells.

During the first phase of the project, a report was written that presented a literature overview of methods that can be used to evaluate and monitor Class I underground injection sites in Mississippi (U.S. Geological Survey Water-Resources Investigations Report 93-4058). The report, "A literature overview of methods to evaluate and monitor Class I underground injection sites in Mississippi," by Richard A. Rebich, included a discussion of site-data requirements, a discussion of potential hydrogeological problems associated with an injection site, a presentation and comparison of four numerical models that can be used to simulate injection, and a discussion of monitoring programs.

During the second phase of the project, a second report was written to present available data for two injection zones in southeastern Mississippi that can be used in two numerical models that simulate injection. Literature, reference material, and data bases from a number of sources were used to locate any available data. This second report, "Data requirements for simulation of hydrogeologic effects of liquid waste injection, Harrison and Jackson Counties, Mississippi," by Richard A. Rebich, has been released as U.S. Geological Survey Water-Resources Investigations Report 94-4021.

Richard A. Rebich is the project chief for this study of underground injection in Mississippi.



Examples of liquid waste movement from deep subsurface injection site to shallow aquifer used for public supply

SUSCEPTIBILITY OF MAJOR AQUIFERS IN MISSISSIPPI TO SURFACE AND SHALLOW-SOURCE CONTAMINATION

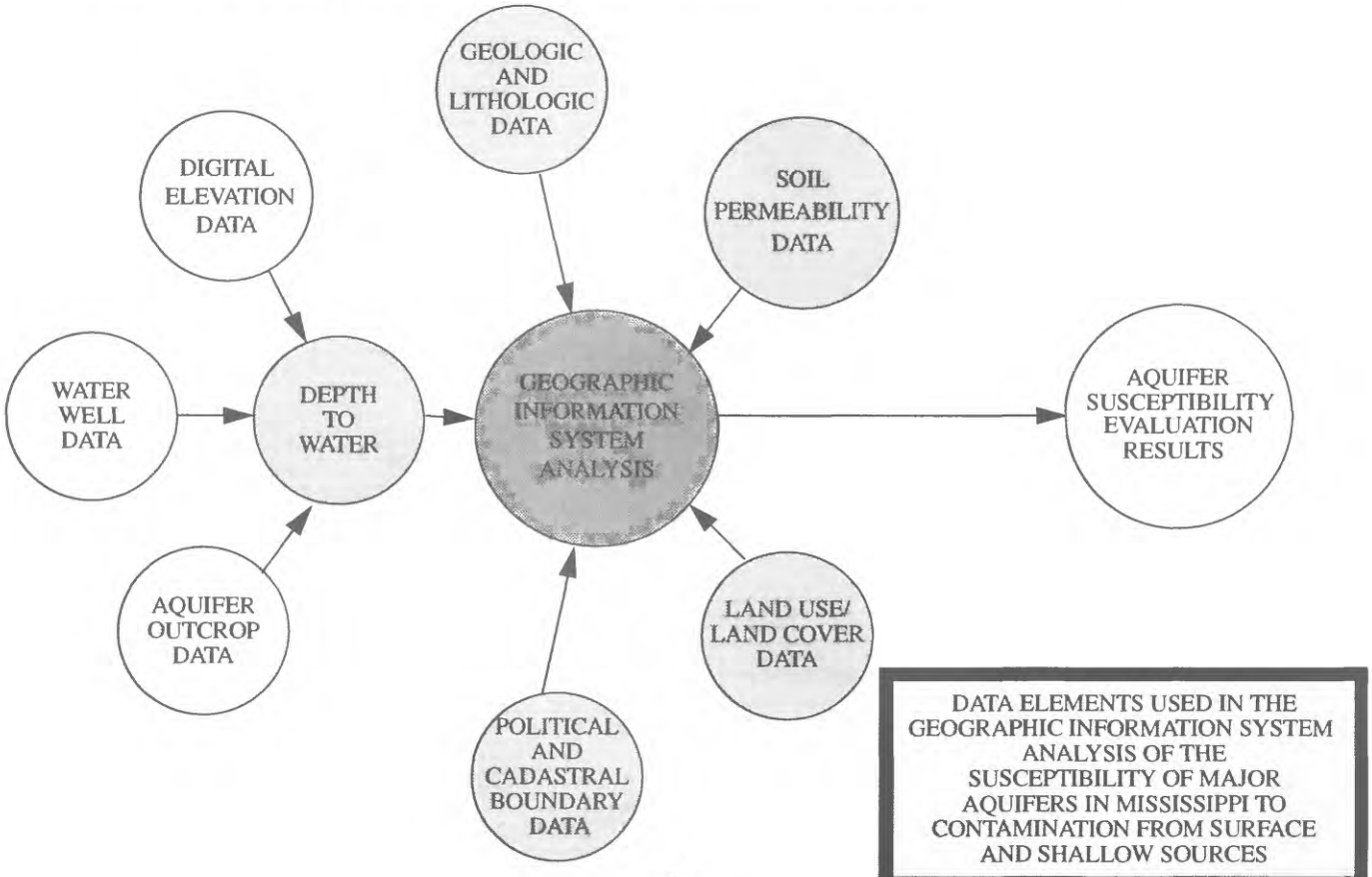
The U.S. Geological Survey, Mississippi District, in cooperation with the Mississippi Office of Pollution Control and the Mississippi Department of Agriculture and Commerce, is conducting an investigation to describe the relative susceptibility of major aquifers in Mississippi to surface and shallow-source contamination. A geographic information system will be used to integrate and analyze data describing the various geologic, hydrologic, and physiographic features that influence aquifer susceptibility to these types of contamination.

The objectives of the project are to:

- define and delineate geologic, hydrologic, and physiographic features that influence aquifer susceptibility to surface and shallow-source contamination, and
- evaluate the relative susceptibility of the major aquifers in Mississippi to surface and shallow-source contamination.

The project is statewide in scope. The analysis of susceptibility to contamination for a multi-county study area has been completed and the results released in U.S. Geological Survey Water-Resources Investigations Report 93-4129. Statewide maps of individual data elements to the susceptibility analysis are being prepared. The statewide susceptibility evaluation results are being prepared from these data elements.

Charles G. O'Hara is the project chief for this study of the susceptibility of major aquifers in Mississippi to surface and shallow-source contamination.



DATA ELEMENTS USED IN THE GEOGRAPHIC INFORMATION SYSTEM ANALYSIS OF THE SUSCEPTIBILITY OF MAJOR AQUIFERS IN MISSISSIPPI TO CONTAMINATION FROM SURFACE AND SHALLOW SOURCES

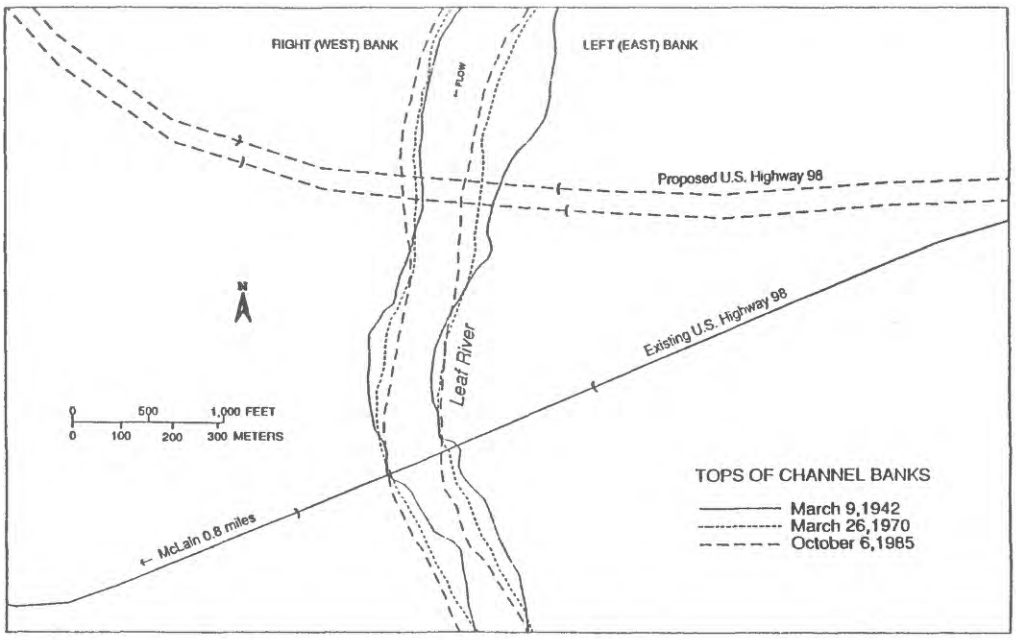
DEVELOPMENT OF A METHODOLOGY TO BETTER ESTIMATE CHANNEL MEANDERING

Rivers are one of the most dynamic of all geomorphic forms. Lateral erosion problems caused by river meandering result in loss of arable land, bridge failure, and endangerment of human life. An estimation of the course of channel meandering is important in the hydraulic and structural design of bridges. In 1990, the Mississippi District initiated a study in cooperation with the Mississippi Department of Transportation to develop a better methodology for defining channel meandering using streamflow data, channel-bank soil strength data, historical aerial photography, and a geographic information system. Specific objectives of the project were to:

- map and define past rates and direction of meandering,
- measure planform change in channel dimensions and patterns,
- digitally simulate the defined past channel meandering, and
- relate patterns of change to available hydraulic and hydrologic data and shear-strength properties of channel-bank material.

Two reports, by D. Phil Turnipseed, which present the results of the study have been written and published. The first report, "Lateral movement and stability of channel banks near two highway crossing in the Pascagoula River Basin in Mississippi," was released as U.S. Geological Survey Water-Resources Investigations Report 93-4131. The second report, "Lateral movement and stability of channel banks near four highway crossings in southwestern Mississippi, has been released as U.S. Geological Water-Resources Investigations Report 94-4035.

D. Phil Turnipseed served as chief of this project to develop a methodology to better estimate channel meandering.



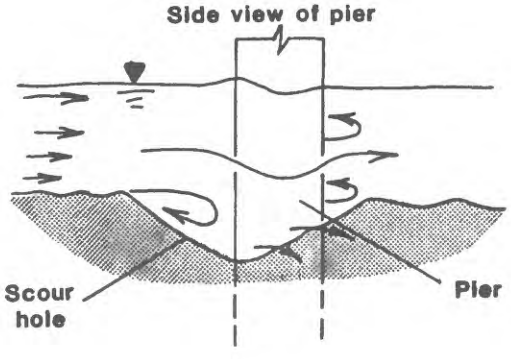
Tops of channel banks from 1942 to 1985 in the vicinity of the existing and proposed U.S. Highway 98 crossing of the Leaf River near McLain, Mississippi

EVALUATION OF SCOUR AT SELECTED BRIDGES CROSSING MISSISSIPPI STREAMS

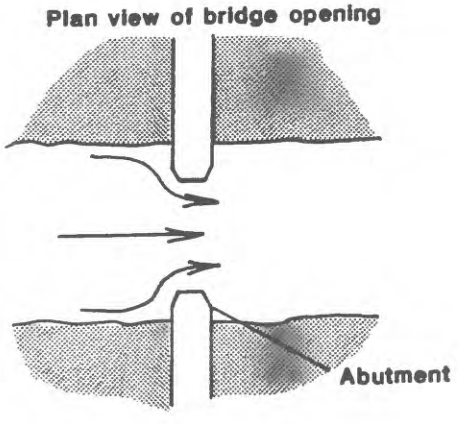
Scour of the ground in the vicinity of bridge piers and abutments during floods has resulted in more bridge failures than all other causes in recent history. The design and maintenance of bridge foundations require consideration of the maximum depth of scour that could likely occur during an extreme flood. The Mississippi Department of Transportation (MDOT) is mandated by the Federal Highway Administration (FHWA) to evaluate by 1997 the potential for scour at about 1,200 bridges crossing Mississippi streams.

In 1993, the Mississippi District, in cooperation with the MDOT, began a 5-year study with the principal objective of evaluating the observed and potential scour conditions at selected bridges to help the MDOT meet the FHWA's requirements. WSPRO (a model for computing water-surface profiles) is being used to determine the hydraulic parameters of floods with a 100-year recurrence interval. These hydraulic parameters are then used to compute scour. During 1993, 16 stream sites were evaluated for scour which comprised a total of about 30 bridges. The Mississippi District is also evaluating equations used for predicting bridge scour. This evaluation is based on bridge-scour data collected since 1990 at selected sites in Mississippi.

Trent Baldwin is the project chief for this study to evaluate scour at selected bridges crossing Mississippi streams.



Local scour at a pier



Scour at a projecting abutment

Scour associated with bridge piers and abutments in path of flow

GEOHYDROLOGY AND SIMULATED EFFECTS OF GROUND-WATER WITHDRAWALS IN THE MIOCENE AQUIFER IN SELECTED AREAS OF SOUTHERN MISSISSIPPI

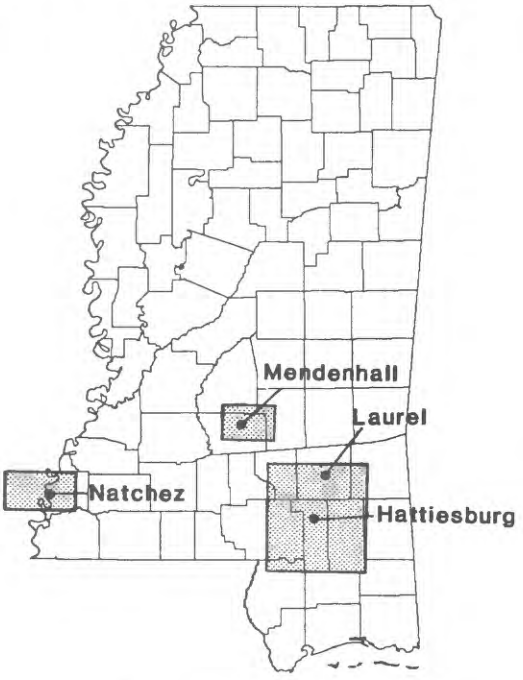
Local overpumping of ground water from the Miocene aquifer has led to ground-water-level declines and water-supply problems in several areas in southern Mississippi. Although the aquifer is capable of supplying the current demand, significant increases in ground-water withdrawals will require careful management of the ground-water resources. The areas of concern include the Laurel-Hattiesburg area in Jones and Forrest Counties, the Natchez area in Adams County, and the Mendenhall area in Simpson County. The Mississippi District is conducting an investigation of the ground-water resources in these areas in cooperation with the Mississippi Office of Land and Water Resources, the Pearl River Basin Development District, and the Pat Harrison Waterway District. The objectives of this investigation are to:

- develop a three-dimensional ground-water model of the Miocene aquifer in the Laurel-Hattiesburg area and use the model to study the probable response of the aquifer to future pumpage, and

- investigate the ground-water resources of the Natchez and Mendenhall areas and use two-dimensional analytical solutions to study the probable response of the aquifer to future pumping.

During 1993, the ground-water model for the Laurel-Hattiesburg area was developed and used to predict the probable water levels under three scenarios of growth in water use for Laurel and Hattiesburg. Field data and background information on the ground water in the Mendenhall and Natchez areas were collected and analyzed, in preparation for using an analytical solution to study the ground-water flow in these areas.

Nancy L. Barber is the project chief for the Miocene aquifer ground-water modeling project.



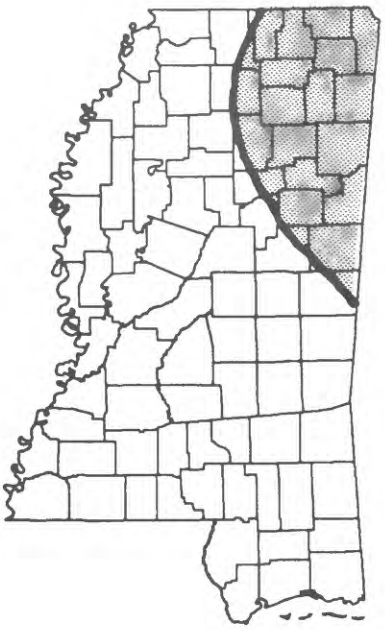
Location of study areas

GROUND-WATER RESOURCES OF NORTHEASTERN MISSISSIPPI

The Tuscaloosa aquifer system contains freshwater in an area of about 9,000 square miles in northeastern Mississippi. This aquifer system is the primary source of ground-water for public and industrial water supplies in about three-fourths of this area. Increased pumping for public, industrial, and military uses during and since World War II has greatly intensified the demand on the aquifer system. Local overdevelopment of the aquifer has resulted in large declines in ground-water levels and attendant supply problems. Less intense but more extensive water-level declines of about 2 feet per year have occurred throughout large parts of the area. The need for additional water supplies to support continuing industrial growth in the area is expected to exacerbate these problems in the future.

The principal objective of this study, which is being conducted in cooperation with the Tombigbee River Valley Water Management District and the Mississippi Office of Land and Water Resources, is to describe and quantify the Tuscaloosa aquifer system in the area using a three-dimensional model of the system. In particular, the model will be used to investigate the probable response of the system to present and anticipated pumping and to investigate the consequences of various management programs. During 1993, definition of the three-dimensional model was completed and calibration of the model began.

Michael J. Mallory and Eric Strom are the principal investigators for this project to describe and quantify ground-water resources of northeastern Mississippi.



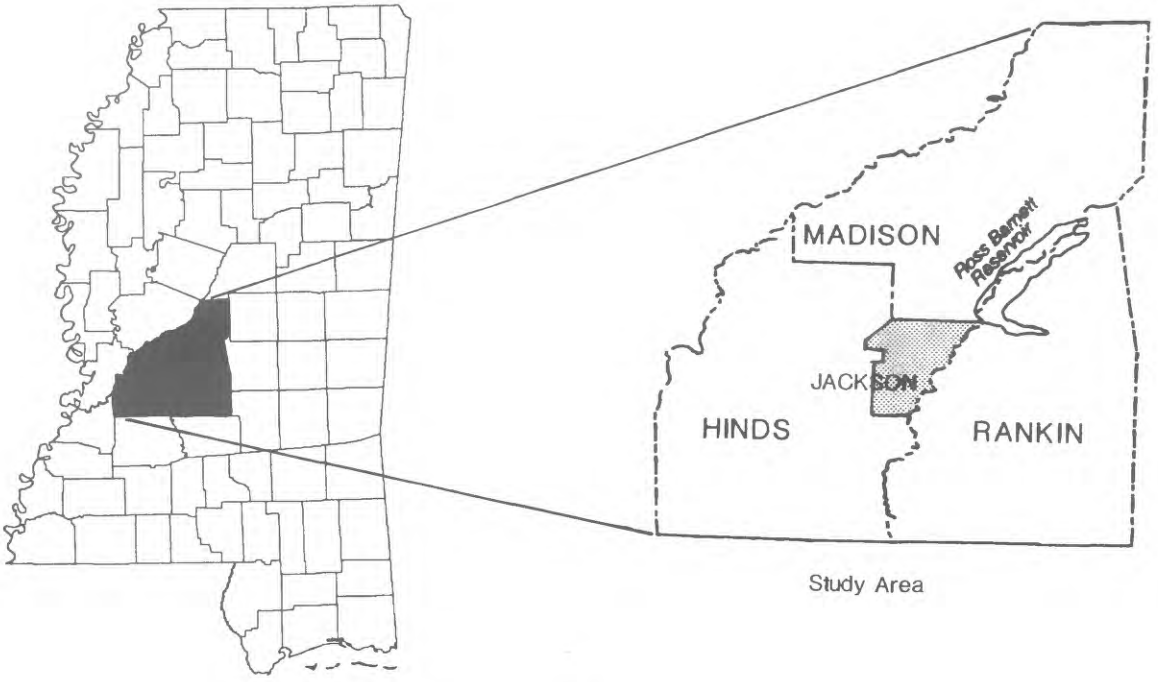
GROUND-WATER FLOW ANALYSIS OF THE COCKFIELD AND SPARTA AQUIFERS IN THE THREE-COUNTY JACKSON METROPOLITAN AREA

In 1990, about 25 million gallons per day of fresh water was pumped from the Cockfield and Sparta aquifers in the Hinds, Madison, and Rankin County, Jackson metropolitan area. As a result of long-term pumping, significant cones of depression have developed in the potentiometric surfaces of the Cockfield and Sparta aquifers in this area. To improve understanding of the ground-water flow system in the three-county area, the Mississippi District, in cooperation with the Mississippi Office of Land and Water Resources, conducted a study of the Cockfield and Sparta aquifers. The study had the following objectives:

- assemble data to define the hydrogeologic framework of the ground-water flow system underlying the three-county area.
- develop a three-dimensional digital model representing the flow system underlying the area,
- analyze the ground-water flow system using model results to estimate the response of the flow system to present and future pumping, and
- investigate the effects of various water-resource management decisions and ground-water pumping scenarios on the ground-water flow system underlying the three-county area.

During 1993, the results of the ground-water flow analysis of the Cockfield and Sparta aquifers in the Jackson metropolitan area were published. The report, "Generalized description and analysis of ground-water flow in the Cockfield and Sparta aquifers in Hinds, Madison, and Rankin Counties, Mississippi," by J.K. Arthur, was released as U.S. Geological Survey Water-Resources Investigations Report 93-4143.

J. Kerry Arthur was the project chief for the study of ground-water flow of the Cockfield and Sparta aquifers in the three-county Jackson metropolitan area.



COLLECTION AND ANALYSIS OF FLOOD DATA

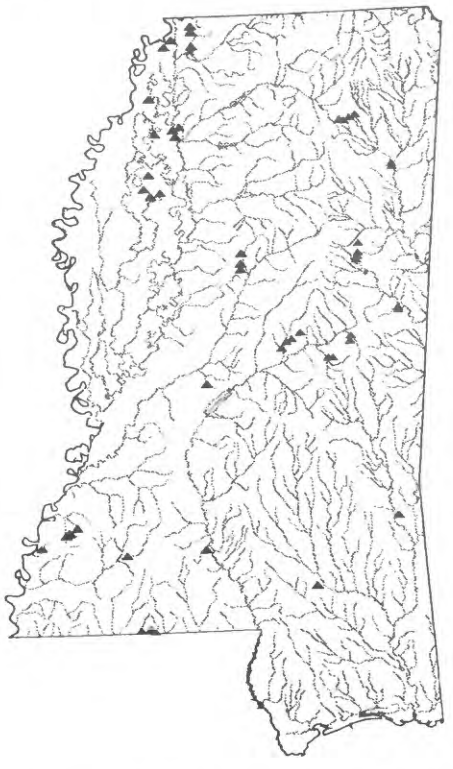
The Mississippi Department of Transportation (MDOT) annually spends millions of dollars for highway construction. Site studies using streamflow records, hydrologic analyses of basins, and hydraulic analyses of the flooding potential at proposed crossings provide information necessary for economical and optimum design of highway-drainage structures. The flood-data program has the following objectives:

- evaluate and analyze the flooding potential at highway crossings of streams throughout Mississippi using existing hydrologic and hydraulic data, and
- systematically analyze flood data and prepare reports presenting the flood data.

Flood-frequency and hydraulic characteristics at a highway crossing are determined from historical flood elevations recovered by the U.S. Geological Survey, cross-section data, and correlations with nearby gaged stations. The flood information collected in these studies not only provides the basis for the design of highways and drainage structures, but also is used by local agencies and the general public as a guide in flood-plain management.

In 1993, hydrologic and hydraulic analyses of streams at highway crossings at about 50 sites in Mississippi were prepared, and about 40 requests by the MDOT for flood information were answered. Many data requests by the public were also answered in 1993. U.S. Geological Survey Water-Resources Investigations Report 93-4086, "Simulation of floodflows in the Magby Creek flood plain near Old Mill Road at Columbus, Mississippi," by Paul C. Floyd, was published in 1993. Operation of the flood crest-stage gage network continued. Peak stage and discharge are published in the annual data report and may be used in future flood-frequency studies and hydrologic and hydraulic analyses.

K. Van Wilson, Jr., is chief of the project to evaluate and analyze flooding potential at highway crossings of Mississippi streams.



Locations of bridge-site studies for 1993

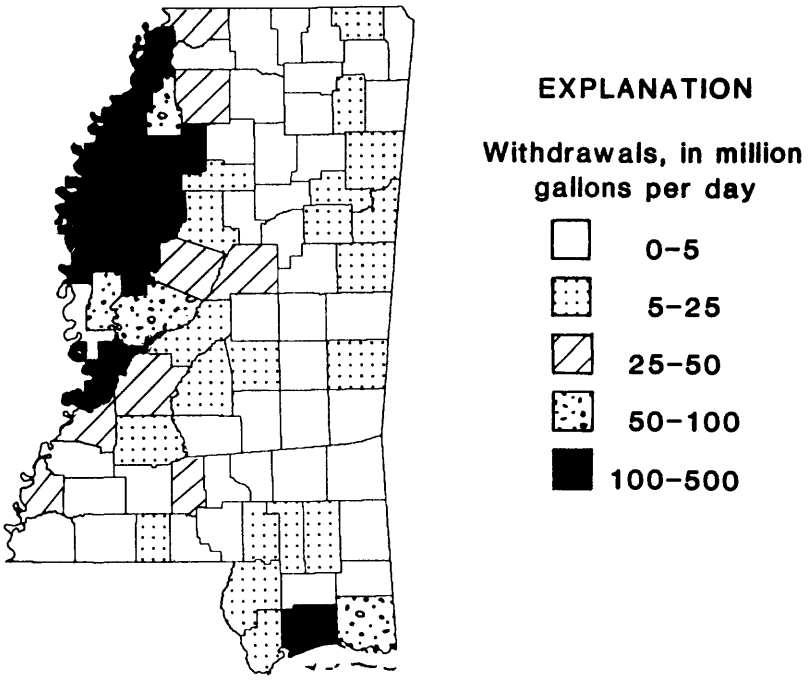
WATER-USE INFORMATION

The demand for water in Mississippi continues to increase because of increasing water requirements of public suppliers, industries, irrigators, and catfish farmers. Water managers need a consistent and accurate record of water use to predict future needs and ensure that those needs can be met. The Mississippi District water-use program is conducted in cooperation with the Mississippi Office of Land and Water Resources and the Yazoo Mississippi Delta Joint Water Management District with the following objectives:

- collect information on the amount of surface and ground water withdrawn by major users,
- store this information in a computerized data base, and
- disseminate water-use data and information to the public by means of reports and presentations and to the District as needed for other projects.

During 1993, work focused on compiling 1987-92 withdrawal data from about 100 users that voluntarily report withdrawals or sales and inputting these data into the water-use data base. A paper, "Freshwater withdrawals in Mississippi, 1990," was written and presented at the Mississippi Water Resources Conference in April 1993. A data report, "Total water withdrawals in Mississippi, 1990," was written and published as U.S. Geological Survey Open-File Report 93-375.

Project chief of the Mississippi water-use program is Penny M. Johnson.



Total water withdrawals in Mississippi, by county, 1990

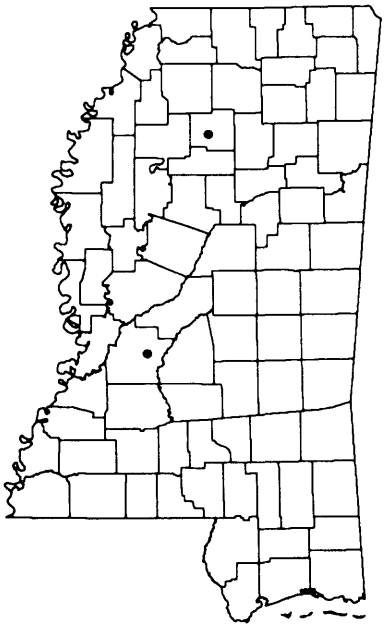
ACID-PRECIPITATION DATA COLLECTION

Since 1982 the U.S. Geological Survey has conducted a program to monitor the quality of precipitation in Mississippi. Currently, the USGS collects long-term data required to assess the effect that selected inorganic chemical constituents and physical properties of atmospheric precipitation may have on the environment. Data are collected at two sites as a part of the National Trends Network.

The purposes of the program are:

- monitor atmospheric precipitation at selected stations,
- store the data that are collected in a computerized data base, and
- evaluate water-quality trends in streams and lakes in the State (as related to atmospheric precipitation).

Darrell T. Wilson is project chief of the acid-precipitation data-collection program in Mississippi.



Location of precipitation-quality stations in Mississippi in 1993

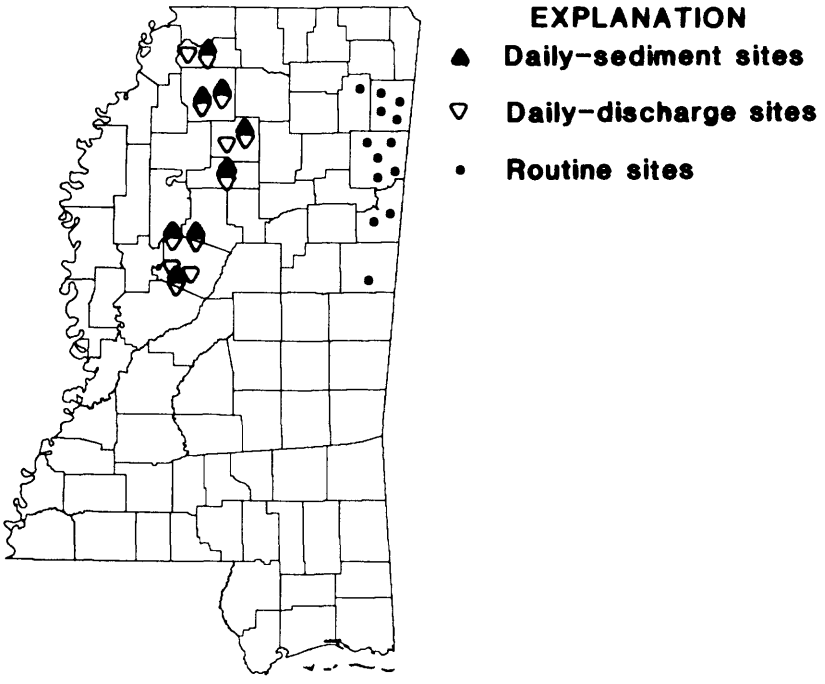
SEDIMENT DATA COLLECTION

Sediment concentrations in rivers and streams should be defined and monitored to provide information for water-resource planning and water-quality assessment. The Mississippi District sediment program is conducted in cooperation with other Federal agencies with the following objectives:

- provide sediment data for use in Federal and State planning and action programs, and
- provide sediment data for Federal management of interstate and international waters.

During 1993, water-discharge data were collected at 12 daily discharge sites as part of the sediment data-collection program. Bed-material samples and daily suspended-sediment data were collected at eight of these sites. Periodic suspended sediment samples were collected at 4 of these sites and at 15 partial-record sites. Discharge and suspended-sediment data were collected at 13 routine stations on regularly scheduled visits at 6-week intervals. Data collected at all sites were published in the annual data report.

Fred George is project chief of the sediment data-collection program in Mississippi.



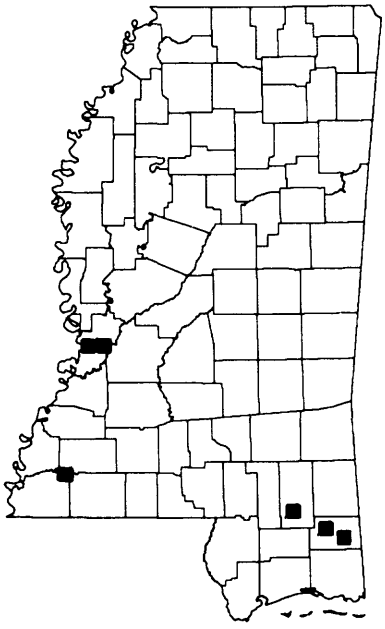
Location of sediment-data collection sites in Mississippi in 1993

QUALITY-OF-WATER DATA COLLECTION

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 and physical quality of surface and ground water needs to be defined and monitored.

To obtain and document an unbiased inventory of water-quality data for use in the planning and development of the water resources of Mississippi, one or more water-quality samples were collected at 53 surface-water sites and at 384 ground-water sites in 1993. Water-quality data were collected at five National Stream Quality Accounting Network (NASQAN) stations and at one Hydrologic Benchmark (HBM) station.

Michael A. Manning, District NASQAN Specialist, is the principal investigator for the quality-of-water data-collection program.



Location of NASQAN and HBM stations in Mississippi in 1993

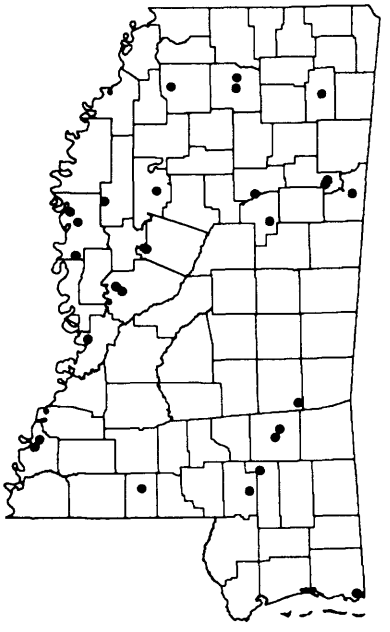
GROUND-WATER DATA COLLECTION

Long-term water-level records are needed to evaluate the effects of climatic variations on the recharge to and discharge from the major aquifers in the State, to provide a data base from which to measure the effects of development on future supplies, and to provide data for management of the water resources. The Mississippi District ground-water data-collection program is conducted in cooperation with State and local agencies with the following objectives:

- collect sufficient water-level data to provide a long-term data base so that the general response of the ground-water system to natural climatic variations and induced stresses is known;
- aid in the early identification of potential problems that might threaten the ground-water resource;
- aid in the proper management of the ground-water resource; and
- provide a data base against which the short-term record acquired in areal studies can be analyzed. This analysis should provide an assessment of the ground-water resource, allow estimates of future conditions, identify and define contamination and supply problems, and provide the data necessary for water managers to formulate water-supply decisions about ground-water resources.

During 1993, water-level measurements were made at 235 observation wells in the statewide network, and continuous recorders were operated on 31 wells. Water-quality samples were collected from 384 wells, and data from 35 geophysical logs were compiled. Data on about 100 new water wells were added to the Ground-Water Site Inventory (GWSI) file, increasing the total sites in the file to 65,983.

William T. Oakley is project chief of the ground-water data-collection project.



Locations of continuous water-level recorders in Mississippi in 1993
(Some locations represent multiple well sites.)

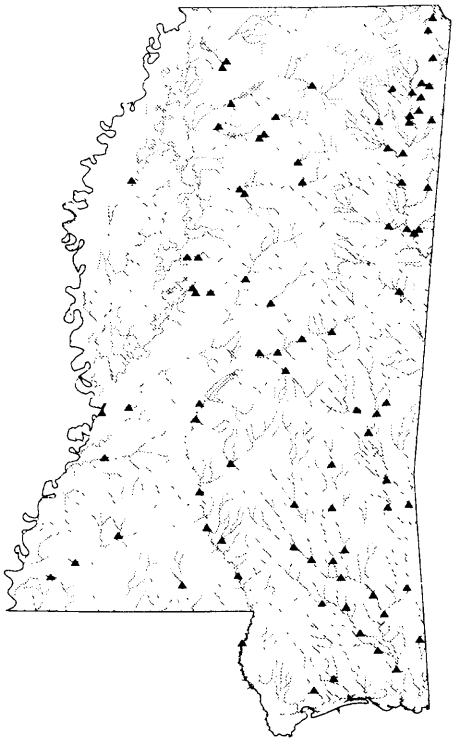
SURFACE-WATER DATA COLLECTION

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. To provide this information, an appropriate data base is necessary. The Mississippi District surface-water data-collection program is conducted in cooperation with many local, State, and other Federal agencies with the following objectives:

- collect information on the surface-water resources of Mississippi;
- store this information in computerized local and national water-resources data bases; and
- disseminate surface-water information to local, State, and other Federal agencies, as well as to educational institutions, private organizations, and the public by means of an annual report and direct responses to individual requests.

During 1993, data were collected at more than 80 continuous-record streamflow sites and at more than 100 partial-record sites.

D. Phil Turnipseed is project chief of the surface-water data-collection program in Mississippi.



Locations of continuous-record streamflow sites in Mississippi in 1993

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