WATER-RESOURCES ACTIVITIES IN ARKANSAS, 1992-94

Compiled by Bobbie L. Louthian

U.S. GEOLOGICAL SURVEY
Open-File Report 95-423

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U.S. DEPARTMENT OF THE INTERIOR

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U.S. GEOLOGICAL SURVEY

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Denver, CO 80225

CONTENTS

ILLUSTRATIONS

TABLES

U.S. GEOLOGICAL SURVEY ORIGIN

The U.S. Geological Survey was established by an act of Congress on March 3, 1879, to provide a permanent Federal agency to conduct the systematic and scientific "classification of the public lands, and examination of the geological structure, mineral resources, and products of national domain." An integral part of that original mission includes publishing and disseminating the earth-science information needed to understand, to plan the use of, and to manage the Nation's energy, land, mineral, and water resources.

Since 1879, the research and fact-finding role of the USGS has grown and been modified to meet the changing needs of the Nation it serves. As part of that evolution, the USGS has become the Federal Government's largest earth-science research agency, the Nation's largest civilian map-making agency, the primary source of data on the Nation's surface- and ground-water resources, and the employer of the largest number of professional earth scientists. Today's programs serve a diversity of needs and users. Programs include:

- Conducting detailed assessments of the energy and mineral potential of the Nation's land and offshore areas.
- Investigating and issuing warnings of earthquakes, volcanic eruptions, landslides, and other geologic and hydrologic hazards.
- Conducting research on the geologic structure of the Nation.
- Studying the geologic features, structure, processes, and history of the other planets of our solar system.
- Conducting topographic surveys of the Nation and preparing topographic and thematic maps and related cartographic products.
- Developing and producing digital cartographic data bases and products.
- Collecting data on a routine basis to determine the quantity, quality, and use of surface and ground water.
- Conducting water-resource appraisals in order to describe the consequences of alternative plans for developing land and water resources.
- Conducting research in hydraulics and hydrology, and coordinating all Federal water data acquisition.
- Using remotely sensed data to develop new cartographic, geologic, and hydrologic research techniques for natural resources planning and management.
- Providing earth-science information through an extensive publications program and a network of public access points.

Along with its continuing commitment to meet the growing and changing earth-science needs of the Nation, the USGS remains dedicated to its original mission to collect, analyze, interpret, publish, and disseminate information about the natural resources of the Nation--providing "Earth Science in the Public Service."

WATER RESOURCES DIVISION BASIC MISSION AND PROGRAM

The mission of the 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 and non-Federal agencies, by:

- Collecting on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.
- Conducting analytical and interpretive water-resources appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.
- 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 well to quantitatively predict their response to stress, either natural or manmade.
- Disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases.
- Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters.

ORGANIZATION OF THE ARKANSAS DISTRICT

The Arkansas District Office is located in Little Rock with a field office in Fort Smith and a project office at the University of Arkansas, Fayetteville (fig. 1). The Arkansas District is a member of the Lower Mississippi Programs area and the office of the Area Hydrologist is located in the Arkansas District Office. The NAWQA (National Water-Quality Assessment) program office also is located in the Arkansas District. Water-resources projects conducted by the District are assigned to one of the operating sections (fig. 2) with responsibility assigned to a project chief. The sections and their functions are listed below.

Office of the District Chief--The office of the District Chief has full responsibility for the scientific, technical, and administrative direction of water-resources investigations made by the Arkansas District. The District's Chief's office is supported by a Project Office, a NAWQA Program Office, a Water Quality Services Unit, an Information Management Section, an Administrative Service Section, and two major technical sections. Section chiefs serve as an advisory group to the District Chief if so designated. Discipline specialists in the technical sections may serve as advisors and technical consultants to the District staff as needed.

> Project Office, Fayetteville--This office conducts geohydrologic research and provides academic liaison for northwestern Arkansas. A senior staff professional is in charge of the office; he may also serve as a project chief or member.
>
> NAWQA Program Office--This office is responsible for all aspects of the National Water Quality Assessment program administered by the District. A senior staff professional is in charge of all NAWQA related activities and exercises a wide latitude of independent action in supervision, training, and technical guidance; he may also serve as a project chief or member.

Information Management Section--This section is responsible for developing, implementing, and maintaining information management systems, including quality assurance procedures and dissemination of hydrologic data and related information for the District. A senior staff professional is in charge and exercises a wide latitude of independent action in supervision, training, and technical guidance; he may also serve as a project chief or member.

> NWIS Software Design and Support Group--This group functions as a unit in the Information Management Section and is a remote arm of the National Water Information Systems Office in Reston, Virginia. The group works as an integral part of the National NWIS staff and has responsibilities in the areas of software design, coding, implementation, and support.

Administrative Service Section--This section provides administrative and clerical support to the activities of the District concerning fiscal and budgetary affairs, serves as staff counselor concerning the Privacy Act, and ensures that the District's filing system conforms to the requirements of this Act.

Hydrologic Investigations Section--This section is responsible for the District's water-resources investigations and applied research. Essentially all project work of the District is conducted by this section. A senior staff professional is in charge of all project chiefs and auxiliary staff and exercises a wide latitude of independent action in supervision, training, and technical guidance; he may also serve as a project chief or member.

Hydrologic Surveillance Section--This section is responsible for all hydrologic data collection and publication for the District's data program. The major aspects are the measurement, compilation, publication, and quality control of all streamflow, water-quality, and ground-water data; the monitoring and documentation of hydrologic events; and the preparation and publication of the annual data report. A senior staff professional is in charge and exercises a wide latitude of independent action in supervision, training, and technical guidance; he may also serve as a project chief or member.

Water Quality Service Unit--This unit provides water-quality data-collection, analysis, quality assurance, and laboratory support for all District water-quality activities.

Field Operations Unit--This unit provides technical support for surface-water data-collection activities throughout the District.

Field Office, Fort Smith--This office provides hydrologic data-collection support for west-central Arkansas.

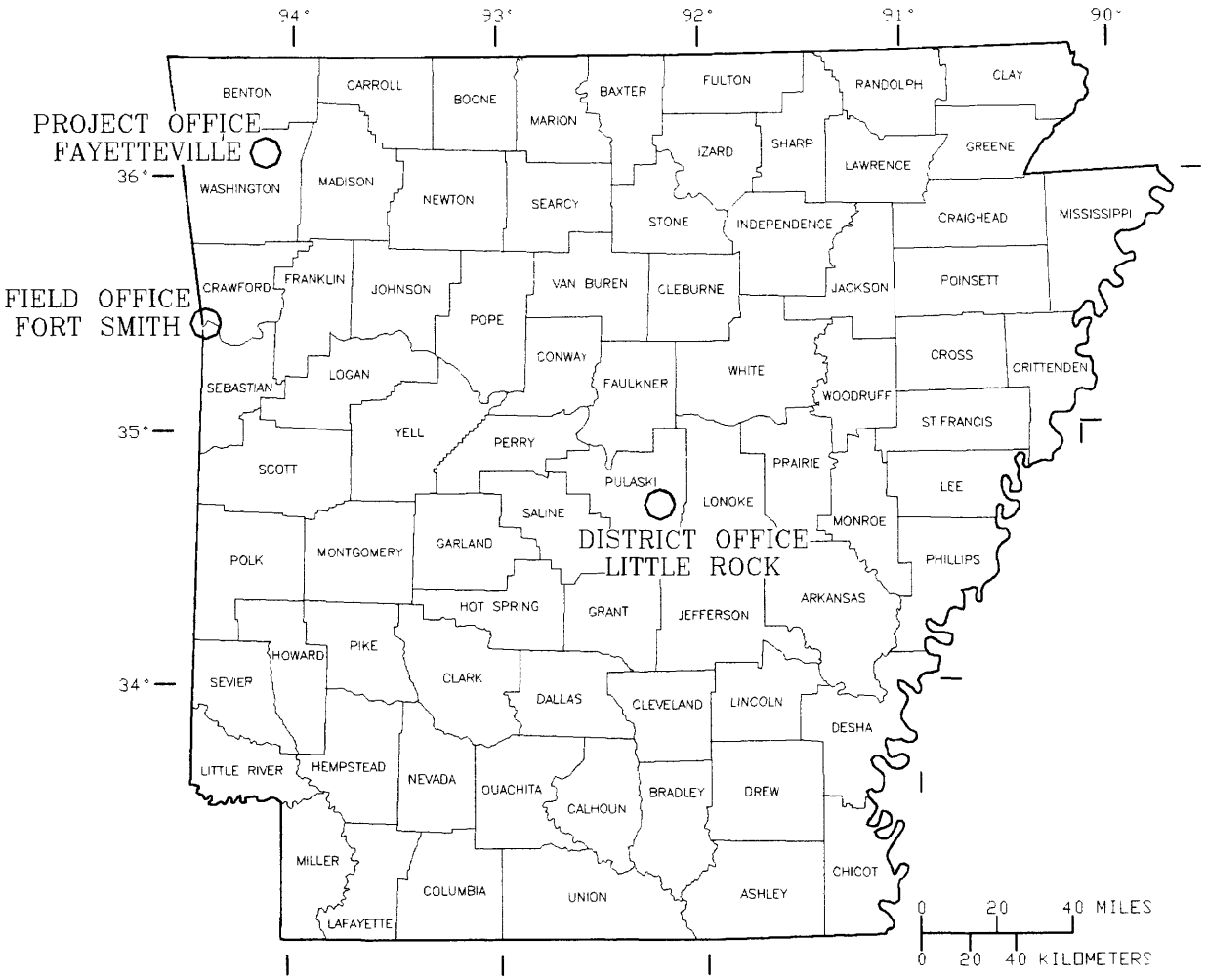
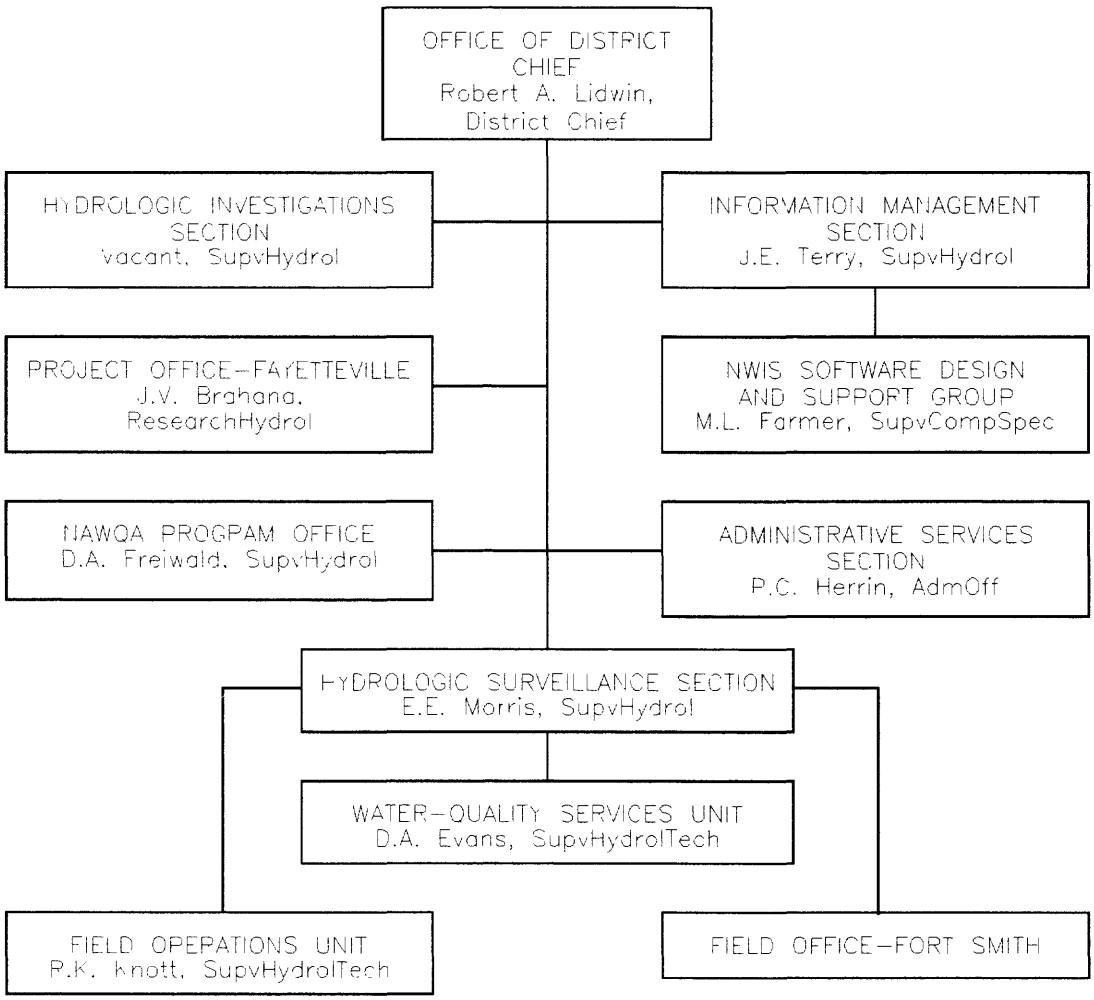


Figure 1. U.S. Geological Survey offices in Arkansas.



District Office
U.S. Geological Survey
401 Hardin Road
Little Rock, AR 72211
(501) 228-3600

Field Headquaters
U.S. Geological Survey
P.O. Box 1503
Room B115
P.O. & Courthouse Building
Fort Smith, AR 72902
(501) 783-6490

Project Office
U.S. Geological Survey
University of Arkansas
118 Ozark Hall
Fayetteville, AR 72701
(501) 575-2570

Figure 2. Arkansas District organization.

FUNDING AND COOPERATION

Funding for program operation of the U.S. Geological Survey in Arkansas comes from direct Federal allotments to the USGS, transfer of funds from other Federal agencies, and joint-funding agreements with State and local agencies. Financial support for these programs in Arkansas for fiscal year 1994 was about $4 million. Agencies cooperating with the USGS in Arkansas are listed in table 1.

Table 1. Agencies supporting water-resources investigations during 1992-94 in the Arkansas District

Federal Agencies
U.S. Department of Agriculture
Soil Conservation Service
U.S. Department of the Army
Corps of Engineers
Little Rock District
Memphis District
Tulsa District
Vicksburg District
Waterways Experiment Station
U.S. Department of Commerce
National Weather Service
U.S. Department of Energy
U.S. Department of Interior
National Park Service
U.S. Environmental Protection Agency
State Agencies
Arkansas Department of Health
Arkansas Department of Parks and Tourism
Arkansas Department of Pollution Control and Ecology
Arkansas Game and Fish Commission
Arkansas Geological Commission
Arkansas-Oklahoma Arkansas River Compact Commission
Arkansas Soil and Water Conservation Commission
Arkansas State Highway and Transportation Department
University of Arkansas - Fayetteville
University of Arkansas - Little Rock
Local Agencies
Arkansas Power and Light Company
City of Fort Smith
City of Little Rock
City of Rogers
Independence County
Little Rock Municipal Water Works
Saline County Rural Development Authority

COLLECTION OF SURFACE-WATER DATA (AR-001)

DATE PROJECT BEGAN: October 1927

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: E.E. Morris

LOCATION: Statewide

COOPERATING AGENCIES: Arkansas Geological Commission, Arkansas Soil and Water Conservation Commission, Arkansas Department of Pollution Control and Ecology, U.S. Army Corps of Engineers, Arkansas Power and Light Co., Arkansas State Highway and Transportation Department, Arkansas Game and Fish Commission, Independence County, City of Rogers, City of Fort Smith, National Park Service, Arkansas Department of Parks and Tourism, University of Arkansas at Little Rock, and Arkansas - Oklahoma Arkansas River Compact Commission

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: Collect surface-water data to satisfy needs for current-purpose uses, such as (1) assessment of water resources, (2) operation of reservoirs or industries, (3) forecasting, (4) disposal of wastes and pollution controls, (5) discharge data to accompany water-quality measurements, (6) compact and legal requirements, and (7) research or special studies. 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 bodies of water for use in planning and design.

APPROACH: Standard methods of data collection will be used as described in the publication series, "Techniques of Water-Resources Investigations of the U.S. Geological Survey." Partial-record gaging will be used instead of complete-record gaging where it serves the required purpose. Non-standard methods will be used where standard methods are not feasible.

PROGRESS: The statewide network of streamflow stations was continued and records were published. Statewide network of crest-stage gages and partial-record stations for water-quality sampling was continued. Operated 72 satellite data collection platforms (DCPs) and 44 rain gages. Statewide networks of crest-stage gages and partial-record stations for water-quality sampling were continued. Annual Arkansas River Compact report and Water Resources Data report were published.

PLANS: Continuation of present network. Publish all records. Operate 72 data collection platforms and a local readout ground station (LRGS). Install two new gaging stations.

REPORTS:

Evans, D.A., Porter, J.E., and Westerfield, P.W., 1995, Water resources data, Arkansas, water year 1994: U.S. Geological Survey Water-Data Report AR-94-1, 466 p.

Morris, E.E., Porter, J.E., and Westerfield, P.W., 1992, Water resources data, Arkansas, water year 1991: U.S. Geological Survey Water-Data Report AR-91-1, 588 p.

Porter, J.E., Westerfield, P.W., and Morris, E.E., 1993, Water resources data, Arkansas, water year 1992: U.S. Geological Survey Water-Data Report AR-92-1, 610 p.

Westerfield, P.W., Evans, D.A., and Porter, J.E., 1994, Water resources data, Arkansas, water year 1993: U.S. Geological Survey Water-Data Report AR-93-1, 528 p.

COLLECTION OF GROUND-WATER DATA (AR-002)

DATE PROJECT BEGAN: July 1945

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: Paul W. Westerfield

LOCATION: Statewide

COOPERATING AGENCIES: Arkansas Geological Commission and Arkansas Soil and Water Conservation Commission

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

OBJECTIVE: Collect water-level data 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 allow proper planning and management. Provide a data base against which the short-term records acquired in areal studies can be analyzed. This analysis must provide an assessment of the ground-water resource, allow prediction of future conditions, detect and define contamination and supply problems, and provide the data base necessary for management of the resource.

APPROACH: Evaluation of regional geology allows broad, general definition of aquifer systems and their boundary conditions. Within this framework and with some knowledge of the stress on the system in time and space and the hydrologic properties of the aquifers, a subjective decision can be made on the most advantageous locations for observation of long-term system behavior. This subjective network will be refined as records become available and detailed areal studies of the ground-water system more closely define the aquifers, their properties, and the stresses to which they are subjected.

PROGRESS: Water-level measurements were made in wells throughout the State as part of the continuing Federal-State ground-water data collection program. An aquifer test was conducted at Danville, Arkansas. Water samples were collected and analyzed for five master wells. Several reports were published.

PLANS: Continue the water-level monitoring and water-quality sampling program. Complete map reports. Log wells where needed, revise the continuous well data collection network, and make changes in site selection and instrumentation where needed.

REPORTS:

Evans, D.A., Porter, J.E., and Westerfield, P.W., 1995, Water resources data, Arkansas, water year 1994: U.S. Geological Survey Water-Data Report AR-94-1, 466 p.

Morris, E.E., Porter, J.E., and Westerfield, P.W., 1992, Water resources data, Arkansas, water year 1991: U.S. Geological Survey Water-Data Report AR-91-1, 588 p.

Porter, J.E., Westerfield, P.W., and Morris, E.E., 1993, Water resources data, Arkansas, water year 1992: U.S. Geological Survey Water-Data Report AR-92-1, 610 p.

Westerfield, P.W., 1994, Potentiometric-surface maps of the Cockfield and lower Wilcox aquifers in Arkansas, 1991: U.S. Geological Survey Water-Resources Investigations Report 93-4134, 2 sheets.

_____ 1995, Potentiometric surface of the Sparta and Memphis aquifers in eastern Arkansas, April through July 1993: U.S. Geological Survey Water-Resources Investigations Report 95-4000, 1 sheet.

Westerfield, P.W., Evans, D.A., and Porter, J.E., 1994, Water resources data, Arkansas, water year 1993: U.S. Geological Survey Water-Data Report AR-93-1, 528 p.

Westerfield, P.W., and Gonthier, G.J., 1993, Water-level maps of the Mississippi River Valley alluvial aquifer in eastern Arkansas: 1989: U.S. Geological Survey Water-Resources Investigations Report 92-4120, 1 sheet.

Westerfield, P.W., and Poynter, D.T., 1994, Water-level maps of the Mississippi River Valley alluvial aquifer in eastern Arkansas, spring 1992: U.S. Geological Survey Open-File Report 93-374, 1 sheet.

Westerfield, P.W., and Touschner, S.T., 1991, Ground-water levels in the alluvial aquifer in eastern Arkansas, 1990: U.S. Geological Survey Open-File Report 91-248, 24 p.

_____ 1992, Ground-water levels in the alluvial aquifer in eastern Arkansas, 1991: U.S. Geological Survey Open-File Report 92-46, 24 p.

_____ 1993, Ground-water levels in the alluvial aquifer in eastern Arkansas, 1992: U.S. Geological Survey Open-File Report 93-96, 25 p.

COLLECTION OF WATER-QUALITY DATA (AR-003)

DATE PROJECT BEGAN: July 1945

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: E.E. Morris

LOCATION: Statewide

COOPERARATING AGENCIES: Arkansas Geological Commission, Arkansas Department of Pollution Control and Ecology, U.S. Army Corps of Engineers, U.S. Department of Energy, and Saline County Rural Development Authority

PROBLEM: Water-resource planning and water-quality assessment requires a nationwide base of relatively standardized information. For intelligent planning and realistic assessment of the water resources, the chemical and physical quality of rivers and streams must be defined and monitored.

OBJECTIVE: Provide a National and State bank of water-quality data for broad planning and action programs, and provide data for management of Arkansas' waters.

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

PROGRESS: Water-quality samples were collected and analyzed on schedule. These samples were collected at 8 National Stream Accounting Network (NASQAN) stations, 2 Benchmark stations, 5 Coop stations, 85 sites on 14 lakes, 30 wastewater effluent sites, and 8 continuous monitor sites. Samples were analyzed for common constituents, trace materials, and other selected constituents.

PLANS: Continue to operate water-quality stations, and update stations to meet current and long-term needs.

REPORTS:

Evans, D.A., Porter, J.E., and Westerfield, P.W., 1995, Water resources data, Arkansas, water year 1994: U.S. Geological Survey Water-Data Report AR-94-1, 466 p.

Joseph, R.L., and Green, W.R., 1994, Water-quality reconnaissance and streamflow gain and loss of Yocum Creek Basin, Carroll County, Arkansas: U.S. Geological Survey Open-File Report 94-537, 14 p.

_____ 1995, Water-quality conditions and streamflow gain and loss of the South Prong of Spavinaw Creek Basin, Benton County, Arkansas: U.S. Geological Survey Open-File Report 94-706, 16 p.

Joseph, R.L., and Morris, E.E., 1993, Bacterial survey of Nimrod Lake, Arkansas, spring and summer 1992: U.S. Geological Survey Open-File Report 93-70, 1 sheet.

Lasker, A.D., 1995, Bacteria and turbidity survey for Blue Mountain Lake, Arkansas, spring and summer 1994: U.S. Geological Survey Water-Resources Investigatins Report 95-301, 1 sheet.

Morris, E.E., Porter, J.E., and Westerfield, P.W., 1992, Water resources data, Arkansas, water year 1991: U.S. Geological Survey Water-Data Report AR-91-1, 588 p.

Porter, J.E., Westerfield, P.W., and Morris, E.E., 1993, Water resources data, Arkansas, water year 1992: U.S. Geological Survey Water-Data Report AR-92-1, 610 p.

Westerfield, P.W., Evans, D.A., and Porter, J.E., 1994, Water resources data, Arkansas, water year 1993: U.S. Geological Survey Water-Data Report AR-93-1, 528 p.

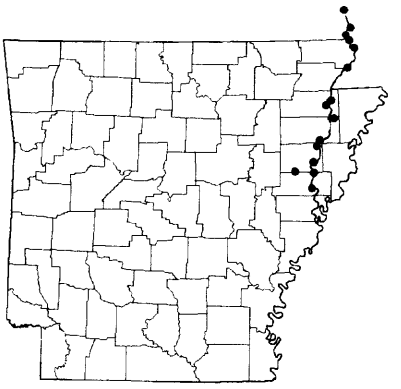
COLLECTION OF SEDIMENT DATA (AR-004)

DATE PROJECT BEGAN: July 1976

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: Dennis A. Evans

COOPERATING AGENCY: U.S. Army Corps of Engineers



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

OBJECTIVE: Provide a national bank of sediment data for use in Federal and State planning and action programs and to provide data for Federal management of 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 samples were collected on a regular basis at 15 sites in the St. Francis River Basin and analyzed for concentration, and for particle size on sand fractions of particles greater than 62 micrometers in diameter. Automatic samplers were installed at 3 of the 15 sites to collect continuous record. One continuous site was collected by an observer.

PLANS: Collect and analyze samples monthly at 15 stations in the St. Francis River Basin. Collect and analyze samples daily at four of the 15 stations.

REPORTS:

Evans, D.A., Porter, J.E., and Westerfield, P.W., 1995, Water resources data, Arkansas, water year 1994: U.S. Geological Survey Water-Data Report AR-94-1, 466 p.

Morris, E.E., Porter, J.E., and Westerfield, P.W., 1992, Water resources data, Arkansas, water year 1991: U.S. Geological Survey Water-Data Report AR-91-1, 588 p.

Porter, J.E., Westerfield, P.W., and Morris, E.E., 1993, Water resources data, Arkansas, water year 1992: U.S. Geological Survey Water-Data Report AR-92-1, 610 p.

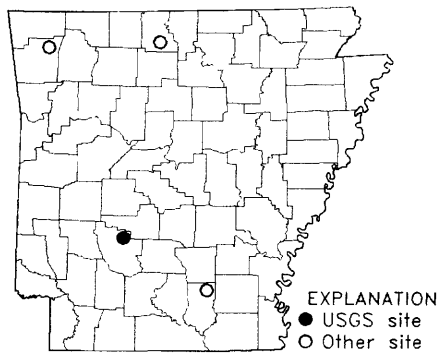
Westerfield, P.W., Evans, D.A., and Porter, J.E., 1994, Water resources data, Arkansas, water year 1993: U.S. Geological Survey Water-Data Report AR-93-1, 528 p.

NATIONAL TRENDS NETWORK (NTN) FOR MONITORING ATMOSPHERIC DEPOSITION (MAD) (AR-005)

DATE PROJECT BEGAN: July 1983

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: James C. Petersen



PROBLEM: Acidic precipitation has potential detrimental effects on aquatic and terrestrial systems. Data concerning the extent and severity of acidic precipitation in the United States are limited.

OBJECTIVE: Determine variations in acid precipitation that occurs on a week-to-week basis. Augment the precipitation network maintained by the U.S. Weather Service and other agencies. Collect wet deposition products for analysis of elements and compounds that can contribute to the acidity of surface waters.

APPROACH: Set up monitoring stations as part of the National Trends Network (NTN). Maintain stations, collect onsite measurements, and process samples to an analytical laboratory. Verify data retrievals and report on results.

PROGRESS: Median pH (December 1983-September 1993) is approximately 4.6 Data approved by National Atmospheric Deposition Program National Trends Network (NADP/NTN), placed in National Data Storage and Retrieval System (WATSTORE) and published in the annual Arkansas Data Report.

PLANS: Weekly composites of precipitation will be collected. Data will be published in the annual water-data report.

REPORTS: As the data for the Caddo Valley site are approved by the NADP Coordinator, they are published in the annual Arkansas Data Report. Approved data for all sites in the NADP/NTN are published quarterly by the National Atmospheric Deposition Program.

Evans, D.A., Porter, J.E., and Westerfield, P.W., 1995, Water resources data, Arkansas, water year 1994: U.S. Geological Survey Water-Data Report AR-94-1, 466 p.

Morris, E.E., Porter, J.E., and Westerfield, P.W., 1992, Water resources data, Arkansas, water year 1991: U.S. Geological Survey Water-Data Report AR-91-1, 588 p.

Porter, J.E., Westerfield, P.W., and Morris, E.E., 1993, Water resources data, Arkansas, water year 1992: U.S. Geological Survey Water-Data Report AR-92-1, 610 p.

Westerfield, P.W., Evans, D.A., and Porter, J.E., 1994, Water resources data, Arkansas, water year 1993: U.S. Geological Survey Water-Data Report AR-93-1, 528 p.

WATER USE (AR-007)

DATE PROJECT BEGAN: April 1979

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: Terrance W. Holland

LOCATION: Statewide

COOPERATING AGENCIES: Arkansas Soil and Water Conservation Commission

PROBLEM: Because of the large increase (more than 500 percent since 1960) in the use of water in Arkansas, there is a need for real-time water-use data as a management tool. Increasing numbers of requests from State and municipal planners for water-use data indicate that these data are increasingly significant. As competition increases among users, the need for water-use information will become more essential in determining how much water remains available for increased use.

OBJECTIVE: The objectives of the water-use data program are to establish a statewide water-use data collection system on a continuing basis to document the amount of water used, and to develop a data-storage and retrieval system that will permit recall and publication of the information as desired.

APPROACH: Water-use data will be collected statewide for storing and disseminating. The Site-Specific Water Use Data System (SSWUDS) and the Aggregated Water Use Data System (AWUDS) will be maintained on the Arkansas District computer for storing water-use data. Site-specific water use reported to cooperators will be entered and stored in SSWUDS. Data will be reviewed and supplemented by USGS and permanently stored on the Arkansas District computer. Periodic data and map reports will be published to summarize water use in Arkansas. Detailed investigations of water use for selected categories and areas will be made to refine the water-use data base for the State.

PROGRESS: Completed and distributed water-use reports. Water-use data reports were completed and distributed for counties in Arkansas. Begin writing remote entry software for water-use data.

PLANS: Install remote entry software in County Conservation District offices in Arkansas.

REPORTS:

Baker, N.T., Manning, C.A., and Beavers, E.A., 1991, Inventory of public water supplies in Arkansas: U.S. Geological Survey Open-File Report 91-247, 157 p.

Holland, T.W., 1992, Water-use data collection techniques in the southeastern United States, Puerto Rico, and the U.S. Virgin Islands: U.S. Geological Survey Water-Resources Investigations Report 92-4028, 76 p.

_____ 1993, Use of water in Arkansas, 1990: U.S. Geological Survey Open-File Report 93-48, pamphlet.

Holland, T.W., and Baker, N.T., 1993, Evaluation of pumpage data furnished by selected public water suppliers in Arkansas, May 1990 through March 1991: U.S. Geological Survey Water-Resources Investigations Report 93-4104, 80 p.

Holland, T.W., and Manning, C.A., 1992, Summary of reported water use for Arkansas counties, 1990: U.S. Geological Survey Open-File Report 92-496, 21 p.

Holland, T.W., and Manning, C.A., 1993, Summary of reported agriculture and irrigation water use in Arkansas County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-136, pamphlet.

REPORTS (continued):

_____ 1993, Summary of reported agriculture and irrigation water use in Ashley County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-166, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Chicot County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-167, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Clay County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-424, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Craighead County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-425, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Crittenden County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-426, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Cross County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-427, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Desha County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-428, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Drew County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-429, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Greene County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-430, pamphlet.

Holland, T.W., Manning, C.A., and Stafford, K.L., 1993, Summary of reported agriculture and irrigation water use in Independence County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-431, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Jackson County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-432, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Jefferson County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-460, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Lafayette County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-468, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Lawrence County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-461, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Lee County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-469, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Lincoln County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-470, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Lonoke County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-471, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Miller County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-472, pamphlet.

REPORTS (continued):

_____ 1993, Summary of reported agriculture and irrigation water use in Mississippi County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-473, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Monroe County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-474, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in northwestern Arkansas counties, 1991: U.S. Geological Survey Open-File Report 93-635, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Phillips County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-475, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Poinsett County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-487, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Prairie County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-488, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Pulaski County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-633, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Randolph County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-489, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in southwestern Arkansas counties, 1991: U.S. Geological Survey Open-File Report 93-636, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in St. Francis County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-490, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in west-central Arkansas counties, 1991: U.S. Geological Survey Open-File Report 93-637, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in White County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-491, pamphlet.

_____ 1993, Summary of reported agriculture and irrigation water use in Woodruff County, Arkansas, 1991: U.S. Geological Survey Open-File Report 93-634, pamphlet.

ARKANSAS RIVER COMPACT (ARKANSAS-OKLAHOMA) (AR032)

DATE PROJECT BEGAN: May 1977

DATE PROJECT ENDS: Continuing

PROJECT CHIEF: E.E. Morris

PROBLEM: Equitable divide and apportion the waters and utilization of the Arkansas River between the States of Arkansas and Oklahoma.

OJECTIVE: Provide administrative support and staff assistance to the Federal Representative on the Arkansas River Compact.

APPROACH: Administrative support will be provided as needed to the Federal Representative on the Arkansas River Compact, Arkansas-Oklahoma.

PROGRESS: Provided liaison between Federal Representative and Reston Headquarters, as needed. Provided administrative support for budgeting of operating funds and processing of documents for payment. Participated in annual compact meeting. A Natural Resources Committee was formed by the Compact to solve water-quality issues between the two States under the oversight of the Compact. A flow and water-quality monitoring proposal prepared by the Arkansas and Oklahoma Districts, USGS, was presented to the Compact. The USGS monitoring proposal was referred to the Natural Resources Committee for consideration.

PLANS: Continue liaison as needed. Publish annual Compact report.

REPORTS:

Barks, C.S., Blazs, R.L., and Lamb, T.E., 1992, Annual yield and selected hydrologic data for the Arkansas River Basin Compact, Arkansas-Oklahoma, 1991 water year: U.S. Geological Survey Open-File Report 92-29, 31 p.

Barks, C.S., Blazs, R.L., and Touschner, S.T., 1993, Annual yield and selected hydrologic data for the Arkansas River Basin Compact, Arkansas-Oklahoma, 1992 water year: U.S. Geological Survey Open-File Report 93-171, 42 p.

Porter, J.E., and Barks, C.S., 1994, Annual yield and selected hydrologic data for the Arkansas River Basin Compact, Arkansas-Oklahoma, 1993 water year: U.S. Geological Survey Open-File Report 94-364, 61 p.

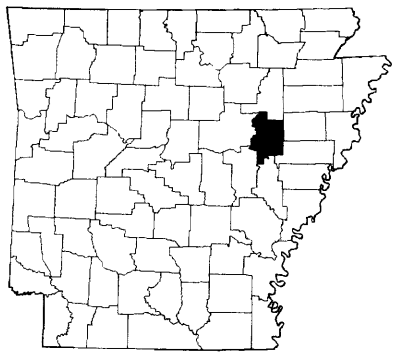
WETLAND RESEARCH PROJECT, BLACK SWAMP, CACHE RIVER, WOODRUFF COUNTY, ARKANSAS (AR058)

DATE PROJECT BEGAN: October 1986

DATE PROJECT ENDS: September 1994

PROJECT CHIEF: Gerard J. Gonthier

COOPERATING AGENCY: U.S. Army Corps of Engineers Waterways Experiment Station



PROBLEM: The U.S. Army Corps of Engineers has the responsibility to regulate activities in wetlands of the United States under Section 404 of the Clean Water Act. Existing guidance requires the Corps, along with the U.S. Environmental Protection Agency and State pollution agencies, to consider the water quality and hydrologic impacts of dredge and fill projects. Wetland hydrologic and sedimentologic budgets have been poorly documented and are a prerequisite for a detailed water-quality study. Wetlands are presumed to affect water quality through element cycling, sediment deposition, ion adsorption or transformation and temperature modification, however, their actions generally are poorly understood and may be most poorly understood in bottomland hardwood systems found in the lower Mississippi Valley.

OBJECTIVE: Define the surface-water budget and the sediment budget of the Black Swamp wetland. Describe the ground-water flow system of the wetland. Assist in collection of water-quality data and interpretation of the total functions of the wetland.

APPROACH: Establish one continuous discharge station and compute daily discharges for an existing gage on the Cache River and establish four stage stations with periodic discharge measurements. Establish two daily sediment stations on the Cache River. Collect periodic sediment samples at four tributary stations; collect water-quality samples for analysis by the Corps of Engineer's contractor. Establish a network of monitoring wells using existing irrigation and domestic wells and USGS placed wells. Evaluate results of data collected by all parties.

PROGRESS: Collected water samples from wells and surface sites for deuterium analyses. Samples were collected four times from approximately 17 wells and 9 surface-water sites. Ground- and surface-water data were analyzed and draft of report was completed. Reinstalled two continuous recorders. Completed journal article.

PLANS: Approval and publication of report as a Water-Resources Investigations Report.

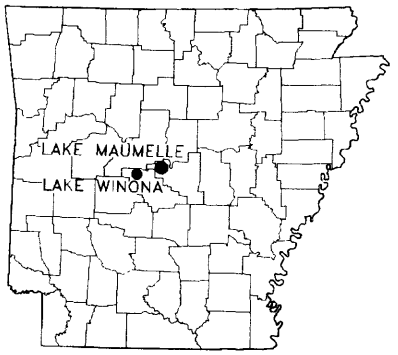
HYDROLOGIC SURVEILLANCE OF LAKES MAUMELLE AND WINONA IN CENTRAL ARKANSAS (AR064)

DATE PROJECT BEGAN: May 1989

DATE PROJECT ENDS: September 1993

PROJECT CHIEF: W. Reed Green

COOPERATING AGENCY: Little Rock Municipal Water Works



PROBLEM: Lakes Maumelle and Winona are municipal water supplies for the city of Little Rock and surrounding areas. Maintaining the quality of water in the lakes to meet drinking water regulations and to prevent increased water treatment costs is important. Changes in land use such as timber clearcutting and sod farming in the watersheds have caused concern about the effects of these changes on the quality of water and the rate of sedimentation in the lakes. Sufficient data currently are not available, however, to assess the impacts of these land-use practices on Lakes Maumelle and Winona.

OBJECTIVE: The objectives of this study are: (1) to assess the present water quality of Lakes Maumelle and Winona, and (2) to establish a comprehensive hydrologic data base that can be used by the Little Rock Municipal Water Works and others to evaluate the impact of future land-use practices in the watersheds.

APPROACH: Sampling network consists of six sites in Lake Maumelle and of four sites in Lake Winona watersheds. Stage data at two sites in each watershed are transmitted by telemetry. Water samples collected quarterly and during three high streamflow events each year at two Maumelle and one Winona sites. Triannual vertical profiles determined at four Maumelle and three Winona sites. Lake-bottom profiles determined at four Maumelle and three Winona sites. Water-budget analysis based on data at daily discharge stations. Summary report will be written in third year of study.

PROGRESS: Reports and project completed.

REPORTS:

Green, W.R., 1994, Water quality assessment of Maumelle and Winona reservoir systems, central Arkansas, May 1989 - October 1992: U.S. Geological Survey Water-Resources Investigations Report 93-4218, 42 p.

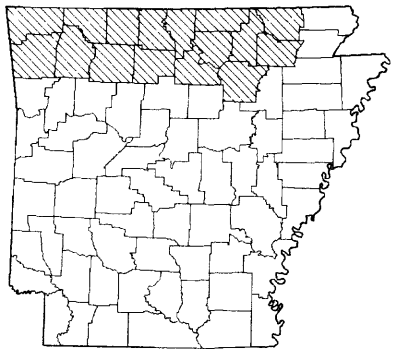
Green, W.R., and Louthian, B.L., 1993, Hydrologic data collected in Maumelle and Winona reservoir systems, central Arkansas, May 1989 through October 1992: U.S. Geological Survey Open-File Report 93-122, 253 p.

GEOHYDROLOGIC STUDIES--NORTHWEST ARKANSAS (AR065)

DATE PROJECT BEGAN: October 1989

DATE PROJECT ENDS: September 1995

PROJECT CHIEF: J. Van Brahana



COOPERATING AGENCY: University of Arkansas, Arkansas Soil and Water Conservation Commission

PROBLEM: Approximately 20 percent of North America has carbonate rocks at or near land surface. A wide range of hydrogeologic behavior is attributed to a complex interaction of numerous geologic and hydrologic variables that are not fully quantified for any specific carbonate aquifer. Permeability distributions and flow systems are poorly defined for most carbonate aquifers at scales less than 10 kilometers. Solute transport in carbonate aquifers also is not well understood. Wide ranges of velocities and sediment loads and generally poor definition of specific flow paths have produced few quantitative tools that are appropriate for resource management outside the specific area for which they were developed.

OBJECTIVE: The objectives of this study are (1) to develop a more complete understanding of the processes and controls that affect the flow distribution and permeability evolution in carbonate aquifers, (2) to refine existing conceptual models of flow for carbonate aquifers, (3) to develop appropriate tools to quantitatively assess ground-water resources in carbonate-rock terranes, (4) to apply these tools to assess contaminant-transport potential at scales ranging from regional to site specific.

APPROACH: Quantify and verify the flow system of the shallow aquifers, supplementing existing areal data base with new, synoptic data. Monitor hydrologic and water-quality parameters to define range of temporal variations at key wells and springs. Initiate local-scale, site-specific studies after definition of regional and intermediate flow boundaries. Address transport problems involving point source and non-point source contaminants using multidisciplinary approach. Develop potentially helpful tools ranging from field techniques (tracers) to numerical simulation methods. Use computer data bases and Geographic Information System resources to store, process, and analyze data in support of planned publications. Coordinate with Ozark Plateaus National Water-Quality Assessment (NAWQA) study.

PROGRESS: Three data reports have been approved and published. Several abstracts have been approved and published. Conceptual model of flow and transport (comparative with other mid-continent regions) has been presented at national, regional, and university professional meetings. Marion County report is awaiting water-quality sampling. Synoptic water-level map for Boone-St. Joe aquifer is in review.

PLANS: Continue locating and identifying wells, springs, and surface point-source karst features throughout northwestern Arkansas if study research project is funded. Complete data-collection program in Marion County. Complete preliminary conceptual model of flow in the study area. Reintegrate investigation into natural radionuclide distribution in deep aquifers. Initiate continuous and recurring sampling of key hydrologic features to show naturally occurring ranges. Initiate host-specific virus study to fingerprint land use. Develop field training course for professional personnel, students, and volunteers working in the general area. Initiate flow modeling in selected part of study area (northwest).

REPORTS:

Brahana, J.V., Gonthier, G.J., and Remsing, L.M., 1991, Hydrogeologic data for Boone County, Arkansas: U.S. Geological Survey Open-File Report 91-518, 36 p.

Brahana, J.V., Leidy, V.A., Lindt, John, and Hodge, S.A., 1993, Hydrogeologic data for Carroll County, Arkansas: U.S. Geological Survey Open-File Report 93-150, 32 p.

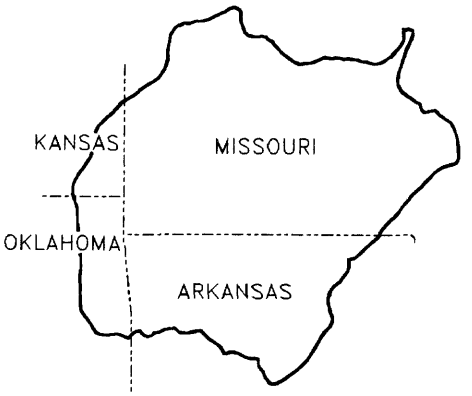
Ford, G.L., and Brahana, J.V., 1992, Soil-gas data for the underground hydrocarbon contamination site in the Highland Avenue area, Fayetteville, Arkansas: U.S. Geological Survey Open-File Report 92-77, 11 p.

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM--OZARK PLATEAUS STUDY UNIT (AR067)

DATE PROJECT BEGAN: October 1991

DATE PROJECT ENDS: September 1999

PROJECT CHIEF: David A. Freiwald



PROBLEM: The extensive karst features of the Ozark Plateaus create a complex hydrologic system that results in rapid interactions between ground and surface water. Poultry, cattle, and swine production along with septic tanks and sewage-treatment plants have impacted the water quality with nitrate, ammonia, and bacteria. Serious degradation has occurred in the surface and ground waters because of abandoned lead and zinc mines in the tri-state area of Kansas, Missouri, and Oklahoma, and recent lead mining in southeastern Missouri. Elevated levels of radionuclides are evident in numerous wells throughout the area, and highly saline ground water along the western boundary have caused some wells to be abandoned.

OBJECTIVE: Describe the status and trends in the quality of the ground- and surface-water resources of the Ozark Plateaus study unit. Provide a sound understanding of the natural and human factors that affect the quality of these resources. Integrate study unit results with regional and national synthesis activities that will provide a foundation to assess specific water-quality issues of the Nation.

APPROACH: Compile and review available water-quality information for both surface- and ground-water resources in the first 2 years. Intensively sample and analyze the water resources of the study unit for a wide array of physical, chemical, and biological properties for a period of about 3 years. Create computer data bases of water-quality and ancillary information to effectively interpret and report the results. Intermittently monitor the water quality of the study unit for a period of about 5 years to establish trends using statistical and deterministic techniques.

PROGRESS: Began intensive field data collection phase in spring 1993. Sampled 100 wells and springs for a full suite of chemical constituents. Sampled 14 surface-water sites monthly for inorganics and nutrients. Sampled 14 sites for bed-sediment and tissue analysis. Performed ecological surveys at selected sites including habitat assessments, fish community surveys, and collections of benthic invertebrates and periphyton.

PLANS: Continue ground water, surface water, and biological intensive field data collection. Sample 100 wells and springs. Sample 13 surface-water sites monthly, 2 sites weekly for pesticides, and low and high flow synoptic studies. Perform more fish community, invertebrate, and periphyton sampling at 13 sites, and synoptic sampling at 29 additional sites for invertebrate and periphyton. Collect 13 bed sediment and tissue samples. Complete and publish reports.

REPORTS:

Adamski, J.C., Petersen, J.C., Freiwald, D.A., and Davis, J.V., 1995, Environmental and hydrologic setting of the Ozark Plateaus study unit, Arkansas, Kansas, Missouri, and Oklahoma: U.S. Geological Survey Water-Resources Investigations Report 94-4022.

Davis, J.V., Petersen, J.C., Adamski, J.C., and Freiwald, D.A., 1995, Water-quality assessment of the Ozark Plateaus study unit, Arkansas, Kansas, Missouri, and Oklahoma--Analysis of information on nutrients, suspended sediment, and suspended solids, 1970-92: U.S. Geological Survey Water-Resources Investigations Report 95-4042, in press.

Femmer, S.R., 1995, National Water-Quality Assessment Program--Ozark Plateaus biological study: U.S. Geological Survey Fact Sheet 116-95, 1 sheet.

Femmer, S.R., and Joseph, R.L., 1994, National Water-Quality Assessment Program--Ozark Plateaus surface-water quality study: U.S. Geological Survey Fact Sheet 94-015, 1 sheet.

Freiwald, D.A., 1991, National water-quality assessment program-Ozark Plateaus: U.S. Geological Survey Open-File Report 91-162, 1 sheet.

Pugh, A.L., and Adamski, J.C., 1993, National Water-Quality Assessment Program--Ozark Plateaus ground-water study: U.S. Geological Survey Open-File Report 93-434, 1 sheet.

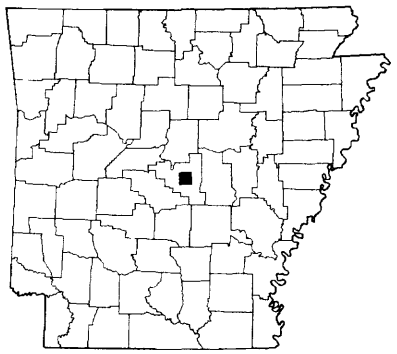
DETERMINATION OF STORMWATER RUNOFF QUALITY IN LITTLE ROCK, ARKANSAS (AR068)

DATE PROJECT BEGAN: March 1991

DATE PROJECT ENDS: September 1994

PROJECT CHIEF: C. Shane Barks

COOPERATING AGENCY: City of Little Rock



PROBLEM: The quality of stormwater runoff has become a growing concern in and around the Nation's urbanized areas. Recently, the U.S. Environmental Protection Agency focused even more attention on the problem when rules were finalized that required the characterization of the quality of urban stormwater runoff in cities with populations of 100,000 or greater and selected urban unincorporated areas. As a result of these concerns and new rules, the city of Little Rock realized a need to characterize the quality of stormwater runoff in the city.

OBJECTIVE: (1) Characterize the quantity and quality of discharge from selected storm-sewer outfalls during periods of dry weather. (2) Characterize the quantity and the physical, chemical, and bacteriological quality of stormwater at 5 to 10 storm-sewer outfalls, which drain areas of representative land uses. An estimation of annual constituent loading also will be made. (3) An attempt will be made to estimate annual constituent loading based on the information collected and on regression equations that have been developed for this purpose.

APPROACH: Automatic samplers or field personnel will be used to collect representative stormwater samples at 5 to 10 sites. The validity of existing regional regression equations for estimation of constituent loads will be examined based on the data collected for the city of Little Rock. Once validated or adjusted, these equations will be used to estimate mean annual constituent loads for unsampled sites in the city of Little Rock.

PROGRESS: Completed dry-weather screening of storm-sewer outfalls. Developed and delivered characterization plan to the city of Little Rock. Installed monitoring and sampling equipment at five wet-weather sampling sites. Report and project completed.

REPORT:

Barks, C. S., 1995, Verification and adjustment of regional regression models for urban storm-runoff quality using data collected in Little Rock, Arkansas: U.S. Geological Survey Water-Resources Investigations Report 94-4216, 12 p.

COMPUTER SOFTWARE DEVELOPMENT IN SUPPORT OF WATER-RESOURCE DATA-BASE MANAGEMENT AND HYDROLOGIC APPLICATIONS (AR069)

DATE PROJECT BEGAN: June 1991

DATE PROJECT ENDS: September 1998

PROJECT CHIEF: John E. Terry

PROBLEM: Often projects at both the national and local levels require computer programming support that cannot feasibly be provided by project staff. At the District level, if projects do not have a resource group available from which needed applications software may be requested, the project and the products generated by those projects may suffer. Also, a sufficient number of computer programming centers must be available to support national data-base design and software development efforts for the Water Resources Division.

OBJECTIVE: The objectives of this project are to provide quality software support to projects at the national and district level. The Arkansas District will continue to have the primary responsibility for the NWIS-I Site-Specific Water-Use Data System (SSWUDS) and will continue to play a very active role in the support of the NWIS-I Automated Processing System (ADAPS). In addition, the District will be establishing a coding shop for NWIS-II and will be doing a substantial amount of software development for that project. Other software development objectives may be added to the project as the need develops at both the national and local level.

APPROACH: The project chief will work closely with Headquarters and District management to assess software needs and to address those needs in a timely and efficient manner. Software development and support provided by this project will result in quality products that will benefit the entire Division.

PROGRESS: NWIS-II effort now includes a significant amount of design and testing as well as coding of software. Project also is coordinating the integration of the master application for NWIS-II and creating the executable image.

PLANS: Complete the first release of NWIS-II and help with testing. Help coordinate the release to the Division. Continue work on future releases and bug fixes. Support NWIS-II as released. Continue to support NWIS-I ADAPS and SSWUDS as needed for remainder of their use.

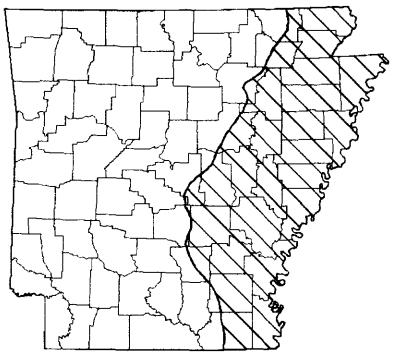
OPTIMIZING GROUND- AND SURFACE-WATER WITHDRAWALS IN EASTERN ARKANSAS: A CONJUNCTIVE-USE, SUSTAINED-YIELD ANALYSIS USING COMPUTER MODELS (AR071)

DATE PROJECT BEGAN: October 1992

DATE PROJECT ENDS: December 1994

PROJECT CHIEF: Gary L. Mahon

COOPERATING AGENCY: Arkansas Soil and Water Conservation Commission



PROBLEM: Observed data and previous ground-water flow models have shown that ground-water level declines have occurred to some extent in the alluvial aquifer in most of eastern Arkansas. Farmers in some areas have had to drill into aquifers beneath the alluvium because pumping for irrigation from the alluvial aquifer could not be sustained and because large quantities of surface water that remain unused in the alluvial aquifer are not in an appropriate location for irrigation practices. Water-management strategies need to be developed and implemented.

OBJECTIVE: The current condition of water resources in the area will be evaluated in order to propose planning scenarios in which a maximum portion of water demands can be met without causing further permanent degradation of the resource. Those areas where the demand for water cannot be met from available sources will be delineated so that plans can be formulated for the delivery of water from alternate sources, where possible. Digital optimization models of the area, using 1-square-mile cells, will be developed to assist water planners in making decisions for supplying irrigation water to meet future demands.

APPROACH: The models will optimize the conjunctive use of available ground- and surface-water resources until equilibrium conditions are met in the aquifer, giving a sustained-yield analysis, while maintaining a specified minimum aquifer saturation at all times. Additional data will be collected including projected water demand for agricultural, municipal, and industrial use, off-stream surface-water use, inflow rates to rivers and streams, and minimum streamflows. Optimization strategies will be based on estimates for 10-year time periods between 1990 and 2040. Estimates are with and without conservation measures imposed on water use.

PROGRESS: GAMS/MINOS software installed and tested on Data General workstation. Software tested using models sent with software and with model/data from previous eastern Arkansas model. Municipal/industrial and deep aquifer pumpage data transformed from latitude/longitude coordinates to model cell locations and data sets constructed. Assisted U.S. Soil Conservation Service in their development of agricultural demand data sets. Obtained and entered into computer data base the "lower limits of streamflow" data from cooperator and prepared model data sets. Met with cooperator and U.S. Soil Conservation Service to discuss and agree upon scenarios for model simulations.

PLANS: Model simulations of water demand scenarios will be made for the area west of Crowleys Ridge and north of the Arkansas River. Report summarizing these simulations will be completed. Project has been suspended because of lack of cooperator funding. Plans are to complete the optimization model and report for the area west of Crowleys Ridge.

FLOOD FREQUENCY (AR072)

DATE PROJECT BEGAN: January 1993

DATE PROJECT ENDS: September 1996

PROJECT CHIEF: Scott A. Hodge

LOCATION: Statewide

COOPERATING AGENCY: Arkansas State Highway and Transportation Department

PROBLEM: The Arkansas State Highway and Transportation Department (AHTD) needs current data and updated flood-frequency relations in the design of new highway structures and in the analysis of existing structures. Based on 1984 data, Neely's 1986 report is used by AHTD to estimate T-year discharges. Additional peak flow data have been obtained with extreme annual peak discharge occurring in 1987 and 1990. Updated flood-frequency relations can be computed using the more rigorous statistical Generalized Least Squares procedure. Updated study will include the 500-year flood frequency relation, which is needed for Level 2 scour analysis at bridges by AHTD.

OBJECTIVE: The objectives of this project are to investigate the use of geographic information system (GIS) coverage for identifying possible statistically significant basin characteristics, analyze data using the latest statistical methods to provide a revised set of 2-year to 100-year flood frequency equations and the 500-year flood frequency equation, and produce results in a computer format for use by cooperators and the public.

APPROACH: Peak-flow and basin characteristics files will be updated. GIS coverages will be constructed where not available. Station discharge-frequency relation will be obtained and statistical data will be determined and entered into the basin characteristics file for regional analysis. Investigations will be made into defining new regions in the State by close examination of the residuals from the regression analysis. Stations with drainage areas in multiple regions of the State will be examined to determine the most accurate method of computing the T-year discharges. Floppy disk included with the report will allow computation of T-year discharges and confidence intervals.

PROGRESS: Report has been completed and is in review. The Region of Influence method has been added as an alternative to regional regression equations for estimating flood magnitudes and frequencies.

PLANS: Approval and publication of report as a Water-Resources Investigations Report.

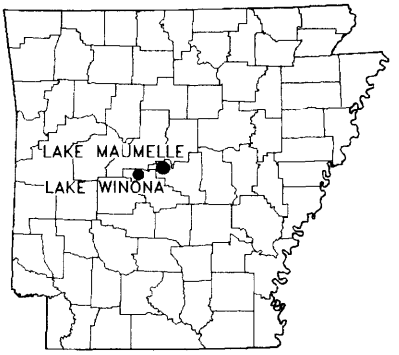
WATER-QUALITY MONITORING AND ASSESSMENT IN LAKES MAUMELLE AND WINONA, CENTRAL ARKANSAS (AR074)

DATE PROJECT BEGAN: October 1993

DATE PROJECT ENDS: December 1996

PROJECT CHIEF: W. Reed Green

COOPERATING AGENCY: Little Rock Municipal Water Works



PROBLEM: Water-quality monitoring in Lake Maumelle has been conducted since 1989. A water-quality data base and assessment, and calibration of a numerical, water-quality and hydrodynamics model in Lake Maumelle have been prepared. A fish-hatchery reservoir exists next to Lake Maumelle. Documentation of the water-quality impact from the annual release of this reservoir on Lake Maumelle is needed. Concentrations of total and dissolved organic carbon suggests a potential for formation of disinfectant by products in Lakes Maumelle and Winona. Understanding the origin and seasonal variability of the carbon source and potential formation of disinfectant by products are necessary to properly manage the municipal water supply.

OBJECTIVE: Project objectives are (1) continue the flow and water-quality monitoring program for the Maumelle and Winona reservoir systems; (2) assess the water-quality impact of the Twin Creek fish-hatchery release into the Maumelle reservoir, and simulate this release using the calibrated numeric model of hydrodynamics and water developed for the Maumelle reservoir; and (3) assess the disinfectant by product formation potential in the Maumelle and Winona reservoir systems.

APPROACH: Routine monitoring will include the operation and maintenance of the existing streamflow and reservoir elevation data collection platforms. Additional sampling will be conducted to assess the load contributed by the fish-hatchery reservoir release into Maumelle reservoir. Constituent loads from the releases will be determined from pending and previous releases. Data will be used in a numeric, water-quality and hydrodynamics model to simulate the impact. Water-quality sampling and analysis in the Maumelle and Winona reservoir systems will determine temporal and spatial distribution of dissolved and total organic carbon, and disinfectant by product formation potential.

PLANS: Continue routine flow and water-quality monitoring. Analyze the 1995 fish-hatchery release. Prepare a report assessing the water-quality impact of the fish-hatchery release into Maumelle reservoir. Prepare a report for the numeric model of water quality and hydrodynamics including the fish-hatchery release. Prepare a report for the characterization and source determinations of the natural organic material in both Lakes Maumelle and Winona.

PROGRESS: Routine monitoring continues to be conducted and the fish-hatchery release is being monitored. The numerical water-quality model for Lake Maumelle has been calibrated for thermodynamics and is being calibrated for dissolved oxygen and chemical constituents. Characterization and source determination of the natural organic material in both Lakes Maumelle and Winona has been resolved.

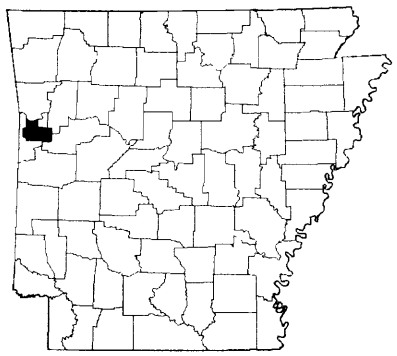
RCRA FACILITY INVESTIGATION AND CORRECTIVE MEASURES WORK PLAN DEVELOPMENT FOR SOLID WASTE MANAGEMENT UNITS LOCATED AT THE U.S. ARMY FORT CHAFFEE FACILITY, SEBASTIAN, CRAWFORD, AND FRANKLIN COUNTIES, ARKANSAS (AR075)

DATE PROJECT BEGAN: March 1994

DATE PROJECT ENDS: December 1994

PROJECT CHIEF: Phillip D. Hays

COOPERATING AGENCY: U.S. Army Fort Chaffee Environmental Branch



PROBLEM: The U.S. Army at Fort Chaffee has received an Order of Consent from the U.S. Environmental Protection Agency (EPA) concerning environmental at Solid Waste Management Units (SWMUs) located at Fort Chaffee facility. The Order of Consent exercises EPA regulatory authority with the purpose of ensuring that investigative and corrective activities are designed and implemented. The EPA arranged for a RCRA Facility Assessment that described 34 SWMU's. Facility investigations were recommended for 17 SWMU's. This pending regulatory requirement has prompted a request from the Fort Chaffee Environmental Branch for the USGS to submit a proposal to develop planning documents for future RFI work at the Fort Chaffee facility.

OBJECTIVE: The USGS proposes to provide technical assistance to the Fort Chaffee Environmental Branch initially in the form of addressing the immediate concerns of EPA as set forth and prioritized in the Consent Order for the U.S. Army Fort Chaffee facility. The most immediate need dictated by EPA is development of an RFI Work Plan for SWMU's requiring study. The USGS will develop the required RFI Work Plan--based on the EPA RFI-Task format--that will orchestrate hydrogeologic study at Fort Chaffee to characterize the nature and extent of hazardous materials of the SWMU's, provide all data necessary to support the subsequent Corrective Measures Study, and address relevant EPA and Army regulatory concerns. In addition, the USGS will execute hydrogeologic studies at SWMU's prioritized and designated for action by the Fort Chaffee Environmental Branch.

APPROACH: The USGS will develop an RFI Work Plan as described in the EPA Consent Order for the Fort Chaffee facility and attachments. The RFI Work Plan will address those sites specified at the conclusion of consent order negotiations and will delineate the technical approach, methodology, schedules, personnel requirements, and budget of the six RFI tasks. Development of the RFI Work Plan will be completed through thorough review of relevant regulatory and technical documents and extensive interaction with the Fort Chaffee Environmental Branch.

PROGRESS: Drafts of preliminary project reports have been completed. A field lab/office has been established on the facility. Sampling of all existing monitor wells and surface waters at Defense Environmental Restoration Account (DERA) funded SWMUs has been completed. Site investigations have been initiated and are in various stages of completion for the contaminated oil trench site, the DDT contaminated site, and the sewage lagoon site.

PLANS: Complete review and approval of project reports. Initiate investigations at three additional sites and complete investigations and reports at DDT site and contaminated oil trench site. Present DDT investigation results at national GSA meeting.

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