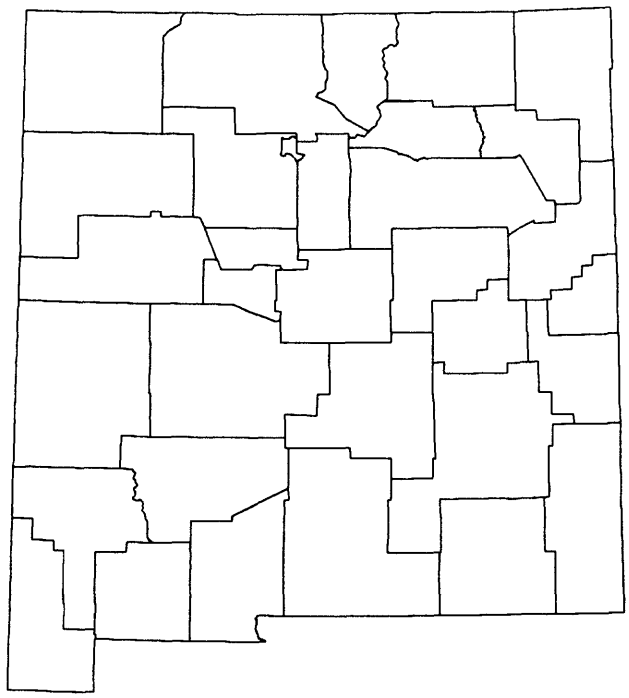
WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY IN NEW MEXICO, FISCAL YEAR 1992

Compiled by Harriet R. Allen



U.S. GEOLOGICAL SURVEY

Open-File Report 93-661

Albuquerque, New Mexico
1994

U.S. DEPARTMENT OF THE INTERIOR

BRUCE BABBITT, *Secretary*

U.S. GEOLOGICAL SURVEY

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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
inch	25.4	millimeter
foot	0.3048	meter
mile	1.609	kilometer
acre	0.004047	square kilometer
square mile	2.590	square kilometer
gallon	0.06309	liter

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

MESSAGE FROM THE DISTRICT CHIEF

Awareness of our environment in general, and water resources in particular, has brought increased interest in and support of hydrologic data collection and research. The quantity, quality, and distribution of water are extremely important to the future well-being of New Mexico. The State's surface-water resources are minimal and highly variable due to climate and to regulation and diversion; ground-water resources are subject to development that exceeds natural recharge and to potential contamination by land use. Issues related to global climate change, disposal of hazardous wastes, toxic substances in water, water rights, and ground-water contamination are evolving areas of greater public concern. At the same time there is a continuing need for a better understanding of various hydrologic systems and processes in order to manage these limited water resources for maximum benefit to present and future generations.

The U.S. Geological Survey has collected and disseminated information on the water resources of New Mexico for more than a century. The Survey began to collect records of streamflow in New Mexico in December 1888 when the first discharge measurements were made on the Rio Grande near the present gaging station at Embudo. This site, called the "birthplace of systematic stream gaging," was chosen to be the training center for the first hydrographers of the Irrigation Survey, a bureau within the original Geological Survey. Since that time, in cooperation with Federal, State, local, and tribal agencies, we have monitored streams at hundreds of sites throughout the State and have a current network of more than 200 streamflow-gaging stations. Through the Cooperative Program, we also have established sites where ground-water levels are monitored to document changes in ground-water storage or where surface-water and ground-water samples are collected to determine water chemistry, and we have undertaken investigative studies to define the availability, quality, and distribution of water resources. Information from the data program and results of investigative studies are made available to water-resources managers, regulators, and the public to be used for the effective management of the State's water resources.

This report provides a brief summary of the activities of the New Mexico District for FY (fiscal year) 1992, including our mission, organization, sources of funding, and descriptions of current projects. This report serves to document not only the content of the program, but also the diversity and complexity of that program. Cooperation among water-resources agencies will be essential in effectively dealing with water-related issues facing New Mexico. We look forward to the challenge of addressing these issues by continuing to provide factual hydrologic data and technically sound areal appraisals and interpretive studies.

Russell K. Livingston
District Chief, New Mexico District

WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY

IN NEW MEXICO, FISCAL YEAR 1992

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MISSION AND PROGRAM OF THE U.S. GEOLOGICAL SURVEY

The U.S. Geological Survey was established by an act of Congress on March 3, 1879, as a permanent Federal agency in the U.S. Department of the Interior. Its mission is to conduct the systematic and scientific classification of the public lands and to examine the geological structure, mineral resources, and products of the 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 Geological Survey has become the Federal Government's largest earth-science research agency, the Nation's largest civilian mapmaking 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, programs of the Geological Survey serve a diversity of needs:

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

MISSION AND PROGRAM OF THE WATER RESOURCES DIVISION

The Water Resources Division is one of five operational divisions of the U.S. Geological Survey. The overall mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the best use and management of the Nation's water resources for the benefit of the people of the United States. For more than 100 years, the U.S. Geological Survey has studied the occurrence, quantity, quality, distribution, and movement of the surface and ground water that composes the Nation's water resources. As the principal Federal water-data agency, the Geological Survey collects and disseminates about 70 percent of the water data currently being used by numerous other Federal, State, local, tribal, and private agencies to develop and manage our water resources. This nationwide program, which is carried out through the Water Resources Division's 48 District offices and 4 Regional offices, includes the collection, analysis, and dissemination of hydrologic data and water-use information; areal resource appraisals and other interpretive studies; and research projects. Much of this work is a cooperative effort in which planning and financial support are shared by local, tribal, and State governments and other Federal agencies. Typical programs include:

- 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 that describe the occurrence; availability; and physical, chemical, and biological characteristics of surface and ground water and their interrelation.
- Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science and engineering to improve the scientific basis for field investigations and measurement techniques and to predict quantitatively the response of hydrologic systems to natural or human-induced stress.
- Disseminating water data and the results of 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 certain water information.
- Providing scientific and technical assistance in hydrologic fields to other Federal, State, local, and tribal agencies; to licensees of the Federal Energy Regulatory Commission; and to international agencies on behalf of the U.S. Department of State.
- Administering the provisions of the Water Resources Research Act of 1984, which include the State Water Resources Research Institutes and the Research Grants Programs.
- Acquiring, developing, and disseminating information on water-related natural hazards such as droughts, floods, volcanoes, mudflows, landslides, and land subsidence.
- Supporting the provisions of the National Environmental Policy Act of 1969 and managing Geological Survey conduct of natural resources surveys in response to the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund Act) of 1980.

The Geological Survey, through its Office of Water Data Coordination, also coordinates the water-data acquisition activities of other Federal agencies. Information on these Federal activities is consolidated into a "Catalog of Information on Water Data." Many State and local agencies and private organizations that have water-data-acquisition activities also contribute information to this catalog. This information is available to all users of water data by means of a national network of assistance centers managed by the Geological Survey's National Water Data Exchange (NAWDEX). In New Mexico, access to NAWDEX services can be obtained through the District Chief, U.S. Geological Survey, Water Resources Division, Albuquerque, New Mexico. A leaflet explaining NAWDEX services is available from the NAWDEX Program Office, U.S. Geological Survey, 421 National Center, Reston, Virginia 22092.

HISTORY AND PROGRAM OF THE NEW MEXICO DISTRICT

The history of the U.S. Geological Survey's New Mexico District begins with the camp at Embudo, a tent compound on the banks of the Rio Grande near the tiny Mexican village of Embudo. It was there, along the tracks of the Denver and Rio Grande Railroad, that the first Survey hydrographers gathered for training in February 1895. The site was chosen because of the diverse climate, which provided a variety of stream-gaging conditions; the proximity to the railroad for transportation and supplies; and general interest in the Rio Grande, a major resource for future irrigation of the arid West.

The first Survey office in New Mexico was established in Carlsbad in 1903. Responsibilities included operating stream-gaging stations in parts of New Mexico and Oklahoma and conducting irrigation investigations of the Pecos Valley. This office was headquarters for the Oklahoma-Eastern New Mexico District that existed until 1907. In 1907 the first cooperative water-resources program in New Mexico, between the U.S. Geological Survey and the New Mexico Territory, was established. Establishment in 1912 of the Santa Fe Subdistrict Office was a result of this continuing cooperative program and of the change of status from Territory to State in 1912. The Santa Fe Subdistrict Office was one of several field offices of the Rocky Mountain District headquartered in Denver, Colorado.

The increasing importance of the cooperative program in New Mexico, which boosted the number of recorder-equipped stations in the Nation at the time, resulted in a reorganization in 1913 that established the New Mexico-Arizona District headquartered in Santa Fe. With the unexpected withdrawal in 1915 of New Mexico from the cooperative program, the Santa Fe office returned to subdistrict status, again under the Rocky Mountain District. In 1920 the New Mexico State Engineer resumed a cooperative program with the Ground Water Branch of the Survey. Over the next 10 years, the program grew to include a number of interpretive investigations, such as a study of water-level declines in the Roswell artesian basin and irrigation water-supply studies in Socorro, Torrance, and Baca Counties.

The New Mexico District office was established in Santa Fe on July 1, 1931, after the New Mexico State Engineer reestablished a cooperative program with the Surface Water Branch of the Survey. At this time the program consisted of about 60 streamflow studies, which increased dramatically to more than 300 by 1940. To maintain such an extensive network, field offices over the next 20 years were operated for at least 1 year at the following locations: Bernalillo, Albuquerque, Belen, Farmington, Socorro, Roswell, Lordsburg, Carlsbad, Santa Rosa, Tyrone, and Las Vegas. In 1967, three branches of the U.S. Geological Survey--Surface Water, Ground Water, and Water Quality--were formally combined to form the Water Resources Division.

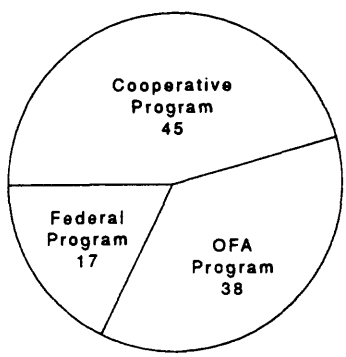
Organization

The New Mexico District's program consists of two broad categories of activities: (1) hydrologic-data collection, and (2) areal appraisals and interpretive studies. Approximately 40 percent of the program is for hydrologic-data collection and 60 percent for interpretive studies. Approximately 106 employees work in the New Mexico District, which consists of the district office in Albuquerque; subdistrict offices in Santa Fe and Las Cruces; and field headquarters in Albuquerque and Carlsbad (fig. 1). The Carlsbad office reports to the Las Cruces Subdistrict.

The operating sections are the National Water-Quality Assessment (NAWQA) Program; the Hydrologic Investigations Section, which consists of three Investigations Units; the Hydrologic Data Collection and Management Section, which consists of the Albuquerque Field Headquarters, the Quality Assurance Unit, and the Technical Support Unit; the Santa Fe Subdistrict; and the Las Cruces Subdistrict, which oversees the Carlsbad Field Headquarters (fig. 2). The District support sections are the Administrative Services Section and the Computer Services and Scientific Publications Section, which includes a Computer Unit, GIS (Geographical Information System) Unit, Manuscript/Editorial Unit, and Drafting Unit.

Sources of Funding

To support its water-resources program in New Mexico, the U.S. Geological Survey receives funding from three sources: Federal appropriations (Federal Program), reimbursements from other Federal agencies (OFA Program), and Federal/State/local cooperative programs (Cooperative Program). The distribution of funds, in percent, among these sources for FY 1992 (October 1991 through September 1992) is shown below:



Federal appropriations are provided to collect hydrologic data at selected sites that serve national water-resources interests and to execute hydrologic investigations of national interest. Other Federal agencies provide funds to the Geological Survey to collect and interpret data necessary for water management and water-development planning and design. The Cooperative Program, based on the concept that Federal, State, local, and tribal governments have mutual interests in evaluating, planning, developing, conserving, and managing the Nation's water resources, provides for Congressional appropriations to fund as much as 50 percent of the cost of water-resources activities. The following is a list of Federal, State, local, and tribal cooperators that supported in part the water-resources activities of the U.S. Geological Survey, New Mexico District, during FY 1992:

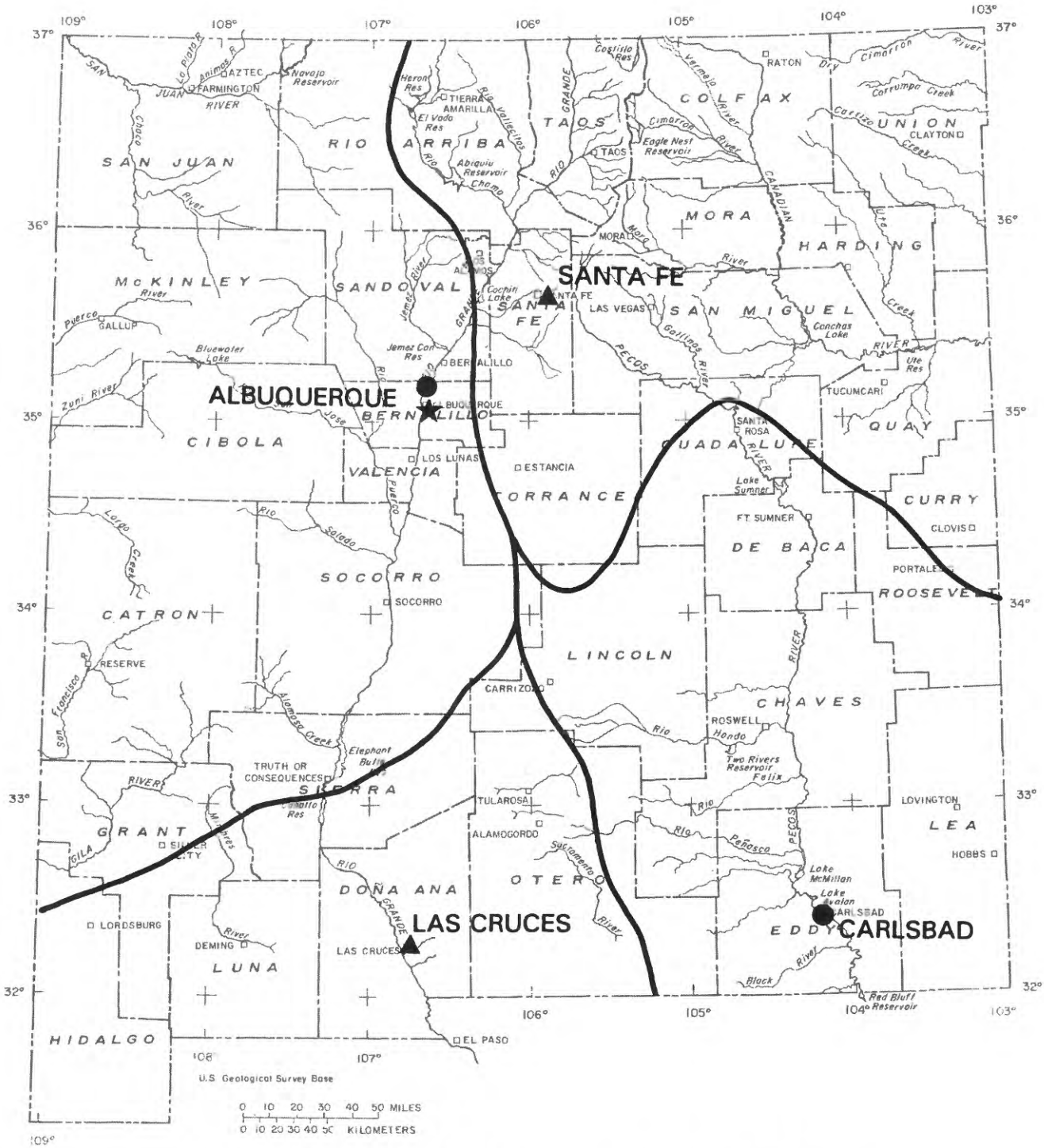


Figure 1.--Location of U.S. Geological Survey offices in New Mexico and general areas of responsibility.

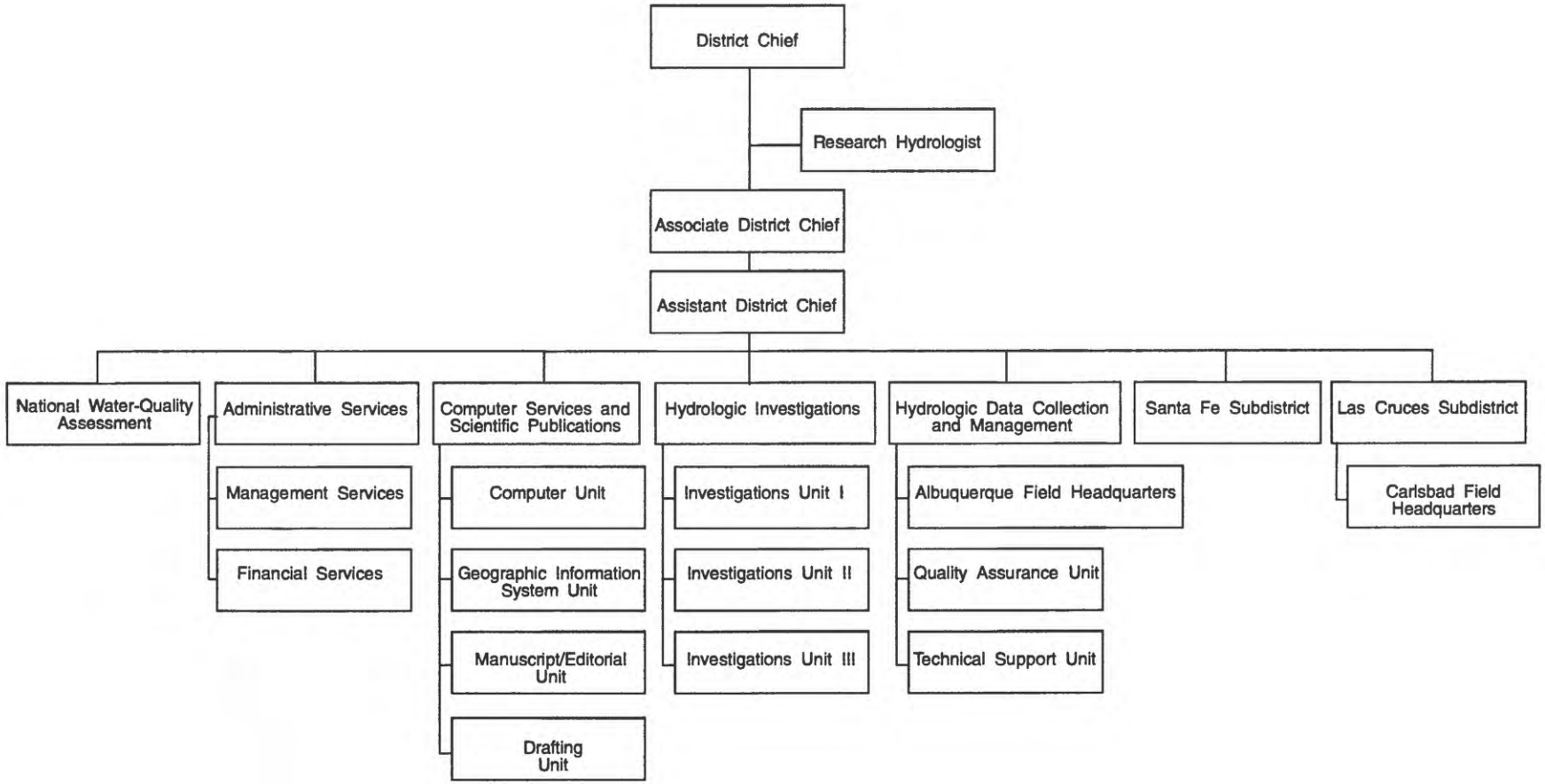


Figure 2.--Organization chart of the New Mexico District.

Other Federal Agencies

International Boundary and Water Commission--U.S. Section
Santa Fe National Forest
U.S. Air Force
  Brooks Air Force Base
  Kirtland Air Force Base
U.S. Department of Agriculture
  Forest Service
U.S. Department of the Army
  Corps of Engineers
  Fort Bliss
  White Sands Missile Range
U.S. Department of Defense
U.S. Department of Energy
  Los Alamos National Laboratory
  Sandia National Laboratories
U.S. Department of the Interior
  Bureau of Indian Affairs
  Bureau of Land Management
  Bureau of Reclamation
  Fish and Wildlife Service
  National Park Service
  Office of the Secretary
U.S. Department of the Treasury
  Internal Revenue Service

State Agencies

Arizona Department of Environmental Quality
Arizona Department of Water Resources
Costilla Creek Compact Commission
New Mexico Environment Department
New Mexico Highlands University
New Mexico State Engineer Office/Interstate Stream Commission
New Mexico State Highway and Transportation Department
New Mexico State University
Pecos River Commission
Rio Grande Compact Commission

Local and Tribal Agencies

Albuquerque Metropolitan Arroyo Flood Control Authority
Bernalillo County Commission
Canadian River Municipal Water Authority
City of Albuquerque
City of Las Cruces
City of Las Vegas
City of Raton
City of Santa Rosa
El Paso Water Utilities
Elephant Butte Irrigation District
La Cienega Acequia Association
Navajo-Hopi Indian Relocation Committee
Navajo Nation
Pueblo of Zuni
Rio San Jose Flood Control District
Santa Fe Metropolitan Water Board
Village of Ruidoso

WATER ISSUES IN NEW MEXICO

The primary water issues facing New Mexico are problems typical of most southwestern States. Major areas of concern are:

- Water supply, particularly ground-water depletion: Although the largest cities in New Mexico use ground water for public supply, the largest user of ground water statewide is irrigated agriculture. Economic growth and rapid increases in population require additional reliable sources of ground water.
- Surface-water and ground-water rights, particularly the interstate transfer of water: All surface water is fully appropriated, and all New Mexico streams are subject to one or more of eight interstate water compacts. Water-rights litigation has resulted in additional needs for hydrologic data and ground-water assessment.
- Ground-water quality: Although New Mexico, with its generally sparse population, does not have the water-quality problems that many of the more densely populated regions of the Nation have, approximately 75 percent of New Mexico's ground water is too saline for most uses (Ong, 1988, p. 377). Land-use practices such as landfills, agriculture, military-related hazardous-waste disposal, and leaking underground storage tanks have altered the water quality of some aquifers.

- The impacts of drought: New Mexico's semiarid climate and its diverse geology result in a wide range in the quantity and availability of surface water and ground water. Recharge to the ground-water system is derived from infiltration of precipitation, surface water, and irrigation-return flow. "More than 90 percent of New Mexico's precipitation and surface-water inflow from adjacent States returns to the atmosphere through evapotranspiration" (Garrabrant and others, 1990, p. 375).

The current activities of the New Mexico District address many of the State's current and potential water issues and water-information needs. These activities, as described in this report, are designed to provide the hydrologic data and appraisals necessary for the intelligent use and management of the water resources of New Mexico and the Nation.

NEW MEXICO DATA-COLLECTION PROGRAMS

The New Mexico District maintains data-collection stations throughout the State to obtain records of stream discharge and stage, reservoir and lake stage and contents, ground-water levels, and quality of surface water and ground water. Stations in this data network are added or discontinued as information needs change. In addition, crest-stage data are obtained at partial-record stations for floodflow analyses, and discharge measurements are made at miscellaneous sites, generally during periods of flood or drought. Most current and historical data are stored in computer data files and are published annually in the U.S. Geological Survey Water-Data Report series entitled, "Water resources data, New Mexico, water year 19__." A water year is October 1 through September 30, thereby coinciding with a Federal fiscal year.

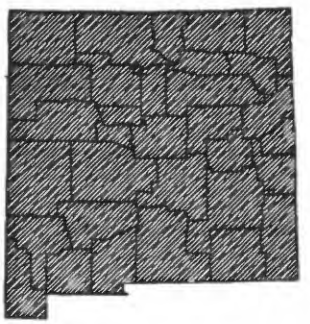
SURFACE-WATER STATIONS (NM001)

Period of Project: Continuous since 1930

Study Location: Statewide

Principal Investigator: John P. Borland

Cooperating Agencies: Most of the agencies shown in the list of cooperators



Problem: Surface-water information is used 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. A historically complete data base is necessary to provide this information.

Objective: Obtain and document surface-water discharge (streamflow) and stage (water level) for general hydrologic purposes such as (1) assessment of water resources, (2) forecasting, (3) areal analysis, (4) determination of long-term trends, (5) research and special studies, (6) compact and legal requirements, (7) operation of reservoirs or industries, or (8) pollution controls and disposal of wastes.

Approach: Standard methods of data collection are used as described in the report series, "Techniques of Water-Resources Investigations of the U.S. Geological Survey." Daily and partial (annual peak discharge) records are collected, computed, and prepared for publication each year in the annual report, "Water resources data, New Mexico." The following table summarizes the types of stations in operation during water year 1992:

Station classification	Number of stations
Streamflow stations	
Continuous stage and discharge record:	
Water year (October - September)	[1]147
Seasonal	56
Annual peak discharge	110
Cumulative discharge records	
Irrigation season total only	14
Reservoir and lake stations	
Continuous stage and contents	[2]22
Intermittent stage and contents	[3]4
Total stations	353

[1]Records are provided by a cooperating agency for 6 stations.
[2]Records are provided by a cooperating agency for 15 stations.
[3]All records are provided by a cooperating agency.

All streamflow stations (except annual peak discharge stations and cumulative irrigation-season stations) are described in table 1, and reservoir and lake stations are described in table 2. The locations of these stations are shown in figure 3, except for those operated during only the irrigation season. As part of interpretive hydrologic investigations, streamflow sometimes is measured at temporary gaging stations and at locations other than gaging stations.

Progress and Significant Results: Discharge and stage data were collected at network sites, computed, and published.

Plans for FY 93: Continue network operated in FY 1992. Minor revisions will be made in response to changes in information needs. The following stations were discontinued in the cooperative program for water year 1992:

08329865 Grant Line Arroyo above San Pedro Boulevard at Albuquerque
08330505 Tijeras Arroyo above Four Hills Bridge at Albuquerque
08382760 Los Esteros Creek Tributary above Santa Rosa Lake
09395350 Puerco River near Church Rock

Table 1.--Streamflow-gaging stations in operation during water year 1992

[(S), seasonal; (P), provided record; --, no data. Stations are in New Mexico unless otherwise indicated. *, some records have been collected previously]

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
07202400	Vermejo River at Vermejo Park (S)	Colfax	36.7	1985-
07202500	Eagle Tail Ditch near Maxwell	do.	--	*1975-
07203000	Vermejo River near Dawson	do.	301	*1927-
07203505	Vermejo Ditch near Colfax	do.	--	1980-
07203525	Vermejo River near Maxwell	do.	486	1983-
07204000	Moreno Creek at Eagle Nest (S)	do.	73.8	*1964-
07204500	Cieneguilla Creek near Eagle Nest (S)	do.	56	*1964-
07205000	Sixmile Creek near Eagle Nest (S)	do.	10.5	*1958-
07206000	Cimarron River below Eagle Nest Dam	do.	167	1950-
07207000	Cimarron River near Cimarron	do.	294	1950-
07207500	Ponil Creek near Cimarron	do.	171	1950-
07208500	Rayado Creek at Sauble Ranch near Cimarron	do.	65	*1927-
07211000	Cimarron River at Springer	do.	1,032	*1926-
07211500	Canadian River near Taylor Springs	do.	2,850	*1964-
07215020	La Cueva Wasteway at La Cueva	Mora	--	1956-
07215100	La Cueva Canal below La Cueva	do.	--	*1956-
07215500	Mora River at La Cueva	do.	173	*1931-
07216500	Mora River near Golondrinas	do.	267	*1988-
07218000	Coyote Creek near Golondrinas	do.	215	*1930-
07221000	Mora River near Shoemaker	do.	1,104	*1927-
07221500	Canadian River near Sanchez	San Miguel	6,015	*1935-
07222500	Conchas River at Variadero	San Miguel	523	1936-
07226500	Ute Creek near Logan	Harding	2,060	*1942-
07227000	Canadian River at Logan	Quay	11,141	1959-
07227100	Revuelto Creek near Logan	Quay	786	1959-
08252500	Costilla Creek above Costilla Dam (S)	Taos	25.1	1937-
08253000	Casias Creek near Costilla (S)	do.	16.6	1937-
08253500	Santistevan Creek near Costilla (S)	do.	2.15	1937-
08254000	Costilla Creek below Costilla Dam (S)	do.	54.6	1937-
08255500	Costilla Creek near Costilla	do.	195	1936-
08261000	Costilla Creek at Garcia, Colo. (S)	do.	200	1944-
08263500	Rio Grande near Cerro	do.	8,440	1948-
08265000	Red River near Questa	do.	113	*1926-
08265500	Llano Ditch near Questa (S)	do.	--	1961-
08266000	Cabresto Creek near Questa	do.	36.7	1943-

Table 1.--Streamflow-gaging stations in operation during water year 1992--Continued

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
08266820	Red River below Fish Hatchery near Questa	Taos	185	*1978-
08267500	Rio Hondo near Valdez	do.	36.2	1934-
08268700	Rio Grande near Arroyo Hondo	do.	8,760	1963-
08269000	Rio Pueblo de Taos near Taos	do.	66.6	*1962-
08271000	Rio Lucero near Arroyo Seco	do.	16.6	*1962-
08275500	Rio Grande del Rancho near Talpa	do.	83	*1985-
08276300	Rio Pueblo de Taos below Los Cordovas	do.	380	1957-
08276500	Rio Grande below Taos Junction Bridge near Taos	do.	9,730	1925-
08277470	Rio Pueblo near Peñasco	do.	--	1992-
08278500	Rio Santa Barbara near Peñasco	do.	38	*1992-
08279000	Embudo Creek at Dixon	Rio Arriba	305	*1962-
08279500	Rio Grande at Embudo	Taos	10,400	1889-
08284100	Rio Chama near La Puente	do.	480	1955-
08284160	Azotea Tunnel at Outlet near Chama (P)	do.	--	1970-
08284200	Willow Creek above Heron Reservoir near Los Ojos (P)	do.	112	1962-
08284300	Horse Lake Creek above Heron Reservoir near Los Ojos (S) (P)	do.	45	1962-
08284520	Willow Creek below Heron Dam (P)	do.	193	1971-
08285500	Rio Chama below El Vado Dam	do.	877	*1935-
08286500	Rio Chama above Abiquiu Reservoir	do.	1,600	1961-
08287000	Rio Chama below Abiquiu Dam	do.	2,147	1961-
08289000	Rio Ojo Caliente at La Madera	do.	419	1932-
08290000	Rio Chama near Chamita	do.	3,144	1912-
08291000	Santa Cruz River at Cundiyo	Santa Fe	86	1930-
08292000	Santa Clara Creek near Española	Rio Arriba	34.5	*1985-
08294210	Rio Nambe below Nambe Falls Dam near Nambe (P)	Santa Fe	34.1	1979-
08313000	Rio Grande at Otowi Bridge near San Ildefonso	Santa Fe	14,300	1895-
08313042	Los Alamos Canyon near Los Alamos	Los Alamos	--	1992-
08313060	Pueblo Canyon near Los Alamos	Los Alamos	--	1992-
08313230	Cañada del Buey at White Rock	Los Alamos	--	1992-
08313500	Cochiti East Side Main Canal at Cochiti (S)	Sandoval	--	*1970-
08314000	Sili Main Canal (at head) at Cochiti (S)	Sandoval	--	*1970-
08316000	Santa Fe River near Santa Fe	Santa Fe	18.2	1913-
08317200	Santa Fe River above Cochiti Lake	Santa Fe	231	1970-
08317400	Rio Grande below Cochiti Dam	Sandoval	14,900	1970-
08317950	Galisteo Creek below Galisteo Dam	Santa Fe	597	1970-
08319000	Rio Grande at San Felipe	Sandoval	16,100	1925-
08323000	Rio Guadalupe at Box Canyon near Jemez	Sandoval	235	*1981-
08324000	Jemez River near Jemez	Sandoval	470	*1953-
08329000	Jemez River below Jemez Canyon Dam	Sandoval	1,038	*1943-
08329700	Campus Wash at Albuquerque (S)	Bernalillo	--	1982-

Table 1.--Streamflow-gaging stations in operation during water year 1992--Continued

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
08329831	Pino Arroyo at Ventura at Albuquerque (S)	Bernalillo	--	1990-
083298314	Hoffmantown Church Outlet No. 1 at Albuquerque (S)	do.	--	1990-
083298315	Hoffmantown Church Outlet No. 2 at Albuquerque (S)	do.	--	1990-
08329832	Cherry Hills Arroyo No. 1 at Albuquerque (S)	do.	--	1990-
08329833	Cherry Hills Arroyo No. 2 at Albuquerque (S)	do.	--	1990-
08329834	Pino Arroyo at Wyoming at Albuquerque (S)	do.	--	1990-
08329835	North Floodway Channel at Albuquerque (S)	do.	--	1982-
08329838	South Fork Hahn Arroyo in Albuquerque (S)	do.	2.00	*1992-
08329839	North Fork Hahn Arroyo in Albuquerque (S)	do.	1.50	*1992-
08329840	Hahn Arroyo at Albuquerque (S)	do.	4.23	1978-
08329860	Grant Line Arroyo at Villa del Oso Drain at Albuquerque (S)	do.	0.052	1976-
08329880	Academy Acres Drain at Albuquerque (S)	do.	0.124	1976-
08329890	La Cueva Arroyo Tributary near Albuquerque (S)	do.	0.09	1977-
08329900	North Floodway Channel near Alameda	do.	--	1968-
08329914	North Camino Arroyo Tributary at Albuquerque (S)	do.	0.06	1979-
08329928	Rio Grande near Alameda	do.	17,263	1989-
08329935	Arroyo 19A at Albuquerque (S)	do.	1.50	1977-
08329936	Taylor Ranch Drain at Albuquerque (S)	do.	0.132	1978-
08329938	Ladera Arroyo at Albuquerque (S)	do.	0.34	1981-
08330000	Rio Grande at Albuquerque	do.	17,440	1941-
08330540	Tramway Floodway Channel at Albuquerque (S)	do.	1.60	1987-
08330565	Arroyo del Coyote near Albuquerque (S)	do.	--	1989-
08330567	Arroyo del Coyote at mouth near Albuquerque (S)	do.	--	1989-
08330569	Tijeras Arroyo below Arroyo del Coyote near Albuquerque (S)	do.	--	1987-
08330580	Tijeras Arroyo at Montessa Park near Albuquerque (S)	do.	122	1987-
08330600	Tijeras Arroyo near Albuquerque (S)	do.	128	*1974-
08330775	South Diversion Channel above Tijeras Arroyo near Albuquerque (S)	do.	--	1988-
08331990	Rio Grande Conveyance Channel near Bernardo	Socorro	--	*1952-
08332010	Rio Grande Floodway near Bernardo	Socorro	19,230	*1941-
08332050	Bernardo Interior Drain near Bernardo	Socorro	--	*1943-
08334000	Rio Puerco above Arroyo Chico near Guadalupe	Sandoval	420	1951-
08341300	Bluewater Creek above Bluewater Dam near Bluewater	Cibola	75	1989-
08341365	Cottonwood Creek near Thoreau	McKinley	--	1989-
08341500	Bluewater Creek below Bluewater Dam	Cibola	201	*1989-
08343000	Rio San Jose at Grants	Cibola	1,020	*1968-

Table 1.--Streamflow-gaging stations in operation during water year 1992--Continued

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
08343100	Grants Canyon at Grants	Cibola	13	1961-
08343500	Rio San Jose near Grants	Cibola	2,300	1936-
08349800	Rio Paguate below Jackpile Mine near Laguna	Cibola	107	1976-
08351500	Rio San Jose at Correo	Cibola	3,660	1943-
08353000	Rio Puerco near Bernardo	Socorro	7,350	1939-
08354500	Socorro Main Canal North at San Acacia	do.	--	1936-
08354800	Rio Grande Conveyance Channel at San Acacia	do.	--	1960-
08354900	Rio Grande Floodway at San Acacia	do.	26,770	1936-
08358300	Rio Grande Conveyance Channel at San Marcial	do.	--	1969-
08358400	Rio Grande Floodway at San Marcial	do.	27,700	1964-
08361000	Rio Grande below Elephant Butte Dam	Sierra	29,450	1915-
08362500	Rio Grande below Caballo Dam (P)	Sierra	30,700	1938-
08377900	Rio Mora near Terrero	San Miguel	53.2	1963-
08378500	Pecos River near Pecos	San Miguel	189	1919-
08379187	Tecolote Creek below Wright Canyon near El Porvenir (S)	San Miguel	5.42	1987-
08379500	Pecos River near Anton Chico	Guadalupe	1,050	*1927-
08380500	Gallinas Creek near Montezuma	San Miguel	84	1916-
08382500	Gallinas River near Colonias	Guadalupe	610	1951-
08382600	Pecos River above Cañon del Uta near Colonias	do.	2,330	1976-
08382650	Pecos River above Santa Rosa Lake	do.	2,340	1976-
08382730	Los Esteros Creek above Santa Rosa Lake	do.	65.6	1973-
08382830	Pecos River below Santa Rosa Dam	do.	2,430	1980-
08383000	Pecos River at Santa Rosa	do.	2,650	*1928-
08383500	Pecos River near Puerto de Luna	do.	3,970	1938-
08384500	Pecos River below Sumner Dam	De Baca	4,390	*1938-
08385000	Fort Sumner Main Canal near Fort Sumner	De Baca	--	*1954-
08385522	Pecos River below Taiban Creek near Fort Sumner	De Baca	--	1992-
08385648	Pecos River above Acme near Roswell	Chaves	--	1992-
08386000	Pecos River near Acme	Chaves	11,380	*1937-
08387000	Rio Ruidoso at Hollywood	Lincoln	120	1953-
08387600	Eagle Creek below South Fork near Alto	Lincoln	8.14	*1988-
08390500	Rio Hondo at Diamond A Ranch near Roswell	Chaves	947	*1939-
08390800	Rio Hondo below Diamond A Dam near Roswell	Chaves	963	1963-
08393500	Rio Hondo at Roswell	Chaves	1,070	1981-
08395500	Pecos River near Lake Arthur	Chaves	14,760	1938-

Table 1.--Streamflow-gaging stations in operation during water year 1992--Continued

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
08396025	Eagle Draw at Artesia	Eddy	--	1989-
08396500	Pecos River near Artesia	do.	15,300	*1909-
08398500	Rio Peñasco at Dayton	do.	1,060	1951-
08399500	Pecos River (Kaiser Channel) near Lakewood	do.	--	1950-
08400000	Fourmile Draw near Lakewood	do.	265	1951-
08401150	North Seven Rivers near Lakewood	do.	--	1989-
08401200	South Seven Rivers near Lakewood	do.	220	1963-
08401500	Pecos River below Brantley Dam near Carlsbad	do.	17,650	*1971-
08401900	Rocky Arroyo at Highway Bridge near Carlsbad	do.	285	1963-
08402000	Pecos River at Damsite 3 near Carlsbad	do.	17,980	*1944-
08403500	Carlsbad Main Canal (at head) near Carlsbad	do.	--	1939-
08404000	Pecos River below Avalon Dam	do.	18,080	*1951-
08405150	Dark Canyon Draw at Carlsbad	do.	450	1973-
08405200	Pecos River below Dark Canyon Draw at Carlsbad	do.	18,550	1970-
08405500	Black River above Malaga	do.	343	*1946-
08406500	Pecos River near Malaga	do.	19,190	1920-
08407000	Pecos River at Pierce Canyon Crossing near Malaga	do.	19,260	*1951-
08407500	Pecos River at Red Bluff	do.	19,540	1937-
08408500	Delaware River near Red Bluff	do.	689	*1937-
08412500	Pecos River near Orla, Tex.	Reeves (Tex.)	21,210	1937-
08477110	Mimbres River at Mimbres	Grant	184	1978-
08481500	Tularosa Creek near Bent	Otero	120	1947-
09355500	San Juan River near Archuleta	San Juan	3,260	1954-
09363500	Animas River near Cedar Hill	La Plata (Colo.)	1,090	1933-
09364500	Animas River at Farmington	San Juan	1,360	*1912-
09365000	San Juan River at Farmington	San Juan	7,240	*1912-
09367500	La Plata River near Farmington	San Juan	583	1938-
09367950	Chaco River near Waterflow	San Juan	4,350	*1975-
09368000	San Juan River at Shiprock	San Juan	12,900	*1927-
09371010	San Juan River at Four Corners, Colo.	Montezuma (Colo.)	14,600	1977-
09386900	Rio Nutria near Ramah	McKinley	71.4	1969-
09386950	Zuni River above Black Rock Reservoir	McKinley	848	1969-
09387300	Zuni River at New Mexico-Arizona State line	McKinley	1,314	1987-
09395630	Puerco River near Manuelito	McKinley	990	1989-
09430500	Gila River near Gila	Grant	1,864	*1927-
09430600	Mogollon Creek near Cliff	Grant	69	1967-
09431500	Gila River near Redrock	Grant	2,829	*1962-
09442680	San Francisco River near Reserve	Catron	350	1959-
09442692	Tularosa River above Aragon	Catron	94	1966-
09444000	San Francisco River near Glenwood	Catron	1,653	1927-

Table 1.--Streamflow-gaging stations in operation during water year 1992--Concluded

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
09800100	North Side Luna Ditch near Luna (S)	Catron	–	1970-
09819950	Lewis Ditch near Reserve (S)	do.	–	1990-
09820500	Kiehne Ditch near Reserve (S)	do.	–	1970-
09820600	Middle Frisco Ditch at Reserve	do.	–	1970-
09820610	Parsons Ditch near Reserve (S)	do.	–	1970-
09821200	San Francisco Ditch near Reserve (S)	do.	–	1970-
09830100	Spurgeon No. 2 Ditch near Glenwood (S)	do.	–	1970-
09830200	Thomason Flat Ditch near Glenwood (S)	do.	–	1970-
09830300	W.S. Ditch near Glenwood (S)	do.	–	1970-
09830400	Lower W.S. Ditch near Glenwood (S)	do.	–	1970-
09831700	Fish Pond Ditch near Glenwood (S)	do.	–	1970-
09832200	East Pleasanton Ditch near Glenwood (S)	do.	–	1970-
09832500	Deep Creek No. 1 Ditch near Glenwood (S)	do.	–	1970-
09840400	Upper Gila Ditch near Gila (S)	Grant	–	1969-
09840600	Fort West Ditch near Gila (S)	Grant	–	1969-
09841200	Gila Farms Ditch near Gila (S)	Grant	–	1969-
09841500	Riverside Ditch near Gila (S)	Grant	–	1969-
09860000	Grandpa Harper Ditch near Redrock (S)	Grant	–	1969-

Table 2.--Reservoir- and lake-gaging stations in operation during water year 1992

[(I), intermittent; (P), provided record. Stations are in New Mexico unless otherwise indicated. *, some records have been collected previously]

Station number	Station name	County	Drainage area (square miles)	Period of record (water years)
07199450	Lake Maloya near Raton	Colfax	20.8	1975-
07199550	Lake Alice near Raton (I) (P)	Colfax	29.4	1975-
07205500	Eagle Nest Lake near Eagle Nest	Colfax	167	*1950-
07223500	Conchas Lake at Conchas Dam (P)	San Miguel	7,409	1938-
07226800	Ute Reservoir near Logan	Quay	11,140	1963-
08284510	Heron Reservoir near Los Ojos (P)	Rio Arriba	193	1970-
08285000	El Vado Reservoir near Tierra Amarilla (P)	Rio Arriba	873	1935-
08286900	Abiquiu Reservoir near Abiquiu (P)	Rio Arriba	2,146	1963-
08294200	Nambe Falls Reservoir near Nambe (P)	Santa Fe	34.1	1976-
08315500	McClure Reservoir near Santa Fe	Santa Fe	17.4	*1947-
08316500	Nichols Reservoir near Santa Fe	Santa Fe	22.8	1943-
08317300	Cochiti Lake near Cochiti Pueblo (P)	Sandoval	14,900	1973-
08317900	Galisteo Reservoir near Cerrillos (P)	Santa Fe	596	1970-
08328500	Jemez Canyon Reservoir near Bernalillo (P)	Sandoval	1,034	1953-
08341400	Bluewater Lake near Bluewater	Cibola	201	*1958-
08360500	Elephant Butte Reservoir at Elephant Butte (P)	Sierra	29,445	1915-
08362000	Caballo Reservoir near Arrey (P)	Sierra	30,700	1938-
08382810	Santa Rosa Lake near Santa Rosa (P)	Guadalupe	2,430	1980-
08384000	Lake Sumner near Fort Sumner (P)	De Baca	4,390	1938-
08390600	Two Rivers Reservoir near Roswell (I) (P)	Chaves	1,027	1963-
08390610	Rio Hondo Reservoir near Roswell (I) (P)	Chaves	963	1963-
08390620	Rocky Arroyo Reservoir near Roswell (I) (P)	Chaves	64	1963-
08401450	Brantley Lake near Carlsbad (P)	Eddy	17,650	1988-
08403800	Lake Avalon near Carlsbad (P)	Eddy	18,070	1939-
08410000	Red Bluff Reservoir near Orla, Tex. (P)	Reeves (Tex.)	20,720	1937-
09355100	Navajo Reservoir near Archuleta (P)	San Juan	3,230	1962-

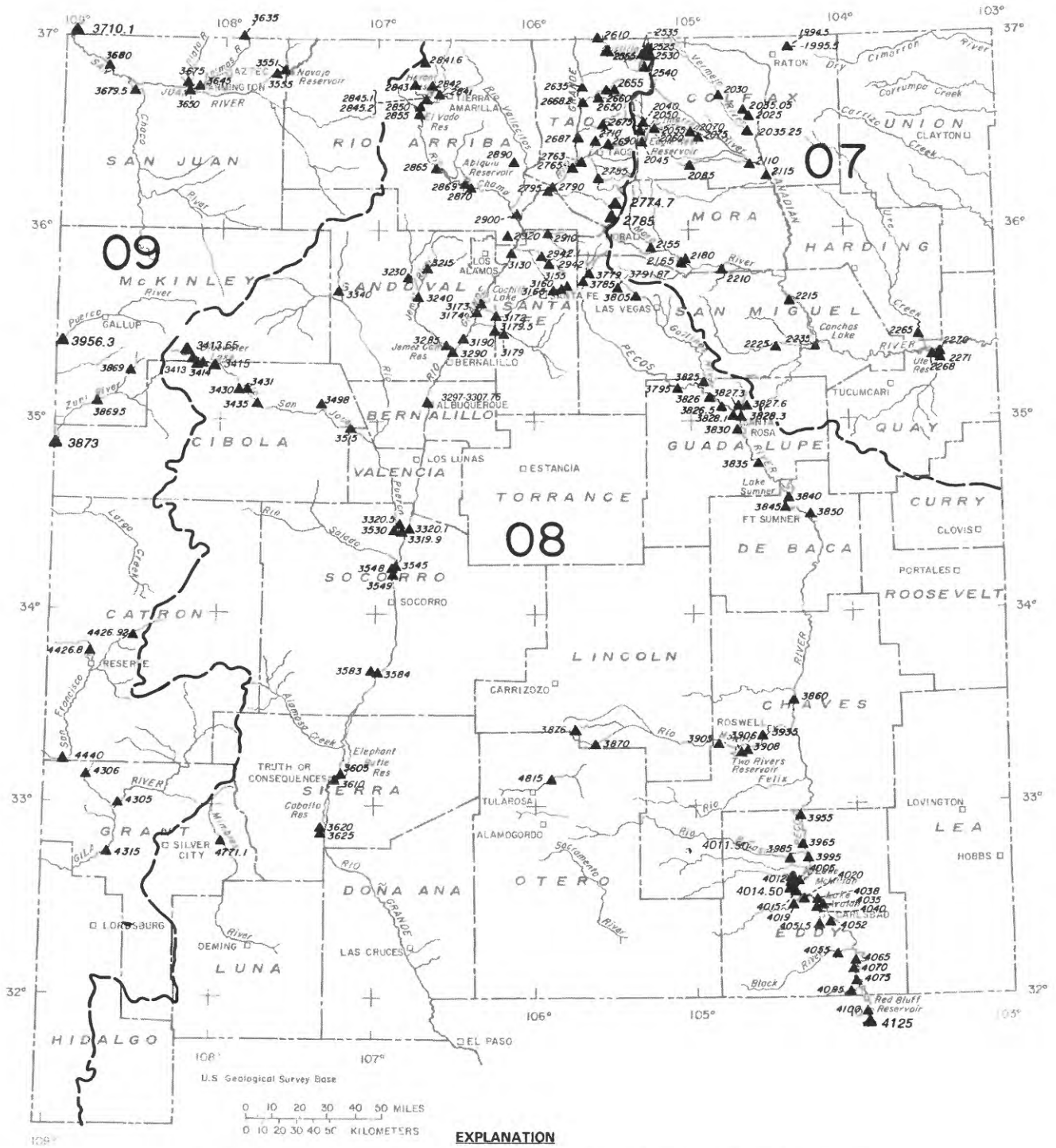


Figure 3.--Location of surface-water gaging stations.

The following stations were added to the program for water year 1992:

08277470	Rio Pueblo near Peñasco
08278500	Rio Santa Barbara near Peñasco
08313042	Los Alamos Canyon near Los Alamos
08313060	Pueblo Canyon near Los Alamos
08313230	Cañada del Buey at White Rock
08329838	South Fork Hahn Arroyo in Albuquerque
08329839	North Fork Hahn Arroyo in Albuquerque
08385522	Pecos River below Taiban Creek near Fort Sumner
08385648	Pecos River above Acme near Roswell
08412500	Pecos River near Orla, Tex.

Reports in Progress:

Water resources data, New Mexico, water year 1993: U.S. Geological Survey Water-Data Report.

Reports Released:

Borland, J.P., Cruz, R.R., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1991, Water resources data, New Mexico, water year 1990: U.S. Geological Survey Water-Data Report NM-90-1, 466 p.

Borland, J.P., DeWees, R.K., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1992, Water resources data, New Mexico, water year 1991: U.S. Geological Survey Water-Data Report NM-91-1, 557 p.

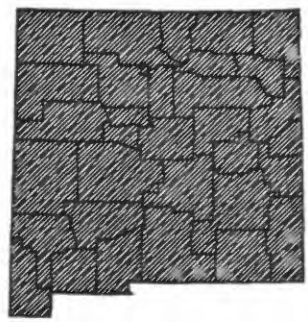
Cruz, R.R., DeWees, R.K., Funderburg, D.E., Lepp, R.L., Ortiz, D., and Shaull, D., 1993, Water resources data, New Mexico, water year 1992: U.S. Geological Survey Water-Data Report NM-92-1, 526 p.

Reports on water-resources data for New Mexico are published annually.

GROUND-WATER STATIONS (NM002)

Period of Project: Continuous since 1925

Study Location: Statewide



Principal Investigator: Roy R. Cruz

Cooperating Agencies: New Mexico State Engineer Office and Federal Program

Problem: Evaluating the effects of development and of climatic variations, assisting in the prediction of future supplies, and providing data for water-resources management require long-term water-level records.

Objective: Maintain a network of ground-water observation wells to provide a long-term data base encompassing areas of ground-water development or potential development. This data base allows evaluation of the general response of the hydrologic system to natural and induced stresses and provides information against which short-term records can be analyzed.

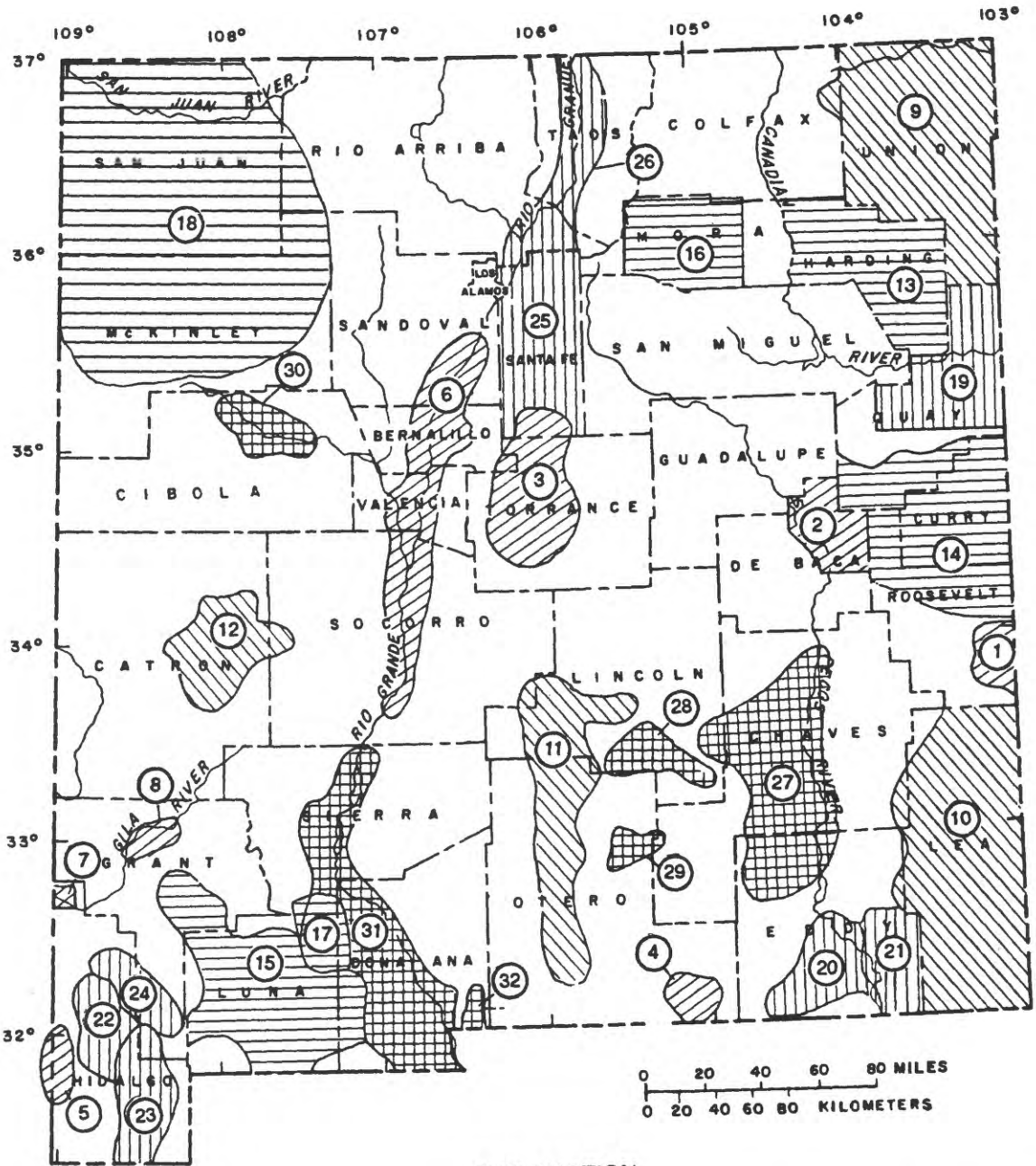
Approach: Most areas of ground-water development in the State are scheduled for intensive water-level measurements at 5-year intervals (fig. 4). Work in an area selected for 5th-year water-level measurements includes inventory of wells; collection of data, such as depths to water, well-drilling and completion records, and well yields; and water-quality analyses that are readily available. Observation wells are selected using the inventory data. Evaluation of water levels for these selected wells assures that the levels are representative of the primary aquifer. A number of wells in each major ground-water basin are selected for annual water-level measurements. A special effort is made to determine well-construction and aquifer characteristics for these wells.

Progress and Significant Results: Intensive water-level measurement efforts in 10 areas of the State resulted in about 4,600 water levels for inclusion in the ground-water data base. Fifth-year measurement areas in 1991 and 1992 included the Northern High Plains; Lea County-High Plains-Capitan Basin; Tularosa Basin; San Agustin Plains; Harding County; Curry County-House area-Portales Valley; Mimbres Basin; Mora area; Nutt-Hockett; and San Juan Basin (fig. 4).

The ground-water data base was updated and checked for errors. The additional water-level information in the 10 mass-measurement areas included data from approximately 200 wells and 120 Federal observation wells and daily values from continuous water-level recorders.

Approximately 300 wells in the Eastern High Plains are measured annually for inclusion in the Internal Revenue Service accounting system. Eight maps indicating ground-water depletion in the Ogallala Formation were published that were drawn using water-level data from wells. The Internal Revenue Service uses these maps for tax purposes to determine allowable ground-water depletion.

The annual Water-Data Report, "Water resources data, New Mexico," includes data for about 110 Federal net wells. Water levels in these wells are measured in summer and winter and the data are included in the ground-water data base. Continuous water-level recorders are maintained on 15 wells, mostly in eastern New Mexico (fig. 5). The data base includes daily highest and lowest water levels recorded for these wells.



EXPLANATION

1990/1995

1. CAUSEY-LINGO
2. FT. SUMNER
3. ESTANCIA
4. SALT BASIN
5. SAN SIMON
6. MIDDLE RIO GRANDE
7. VIRDEN
8. GILA RIVER

1991/1996

9. N. HIGH PLAINS
10. LEA COUNTY-HIGH PLAINS, CAPITAN BASIN
11. TULAROSA BASIN
12. SAN AGUSTIN PLAINS

1992/1997

13. HARDING COUNTY
14. CURRY COUNTY-HOUSE-PORTALES
15. MIMBRES BASIN
16. MORA AREA
17. NUTT-HOCKETT
18. SAN JUAN BASIN

1988/1993

19. LOWER CANADIAN
20. CARLSBAD
21. CAPITAN REEF
22. ANIMAS
23. PLAYAS
24. LORDSBURG
25. SANTA FE COUNTY
26. UPPER RIO GRANDE

1989/1994

27. ROSWELL BASIN
28. RIO HONDO
29. RIO PEÑASCO
30. GRANTS-BLUEWATER
31. LOWER RIO GRANDE
32. HUECO

Figure 4.--Areas of 5-year ground-water-level monitoring and years measured or scheduled for measurement.

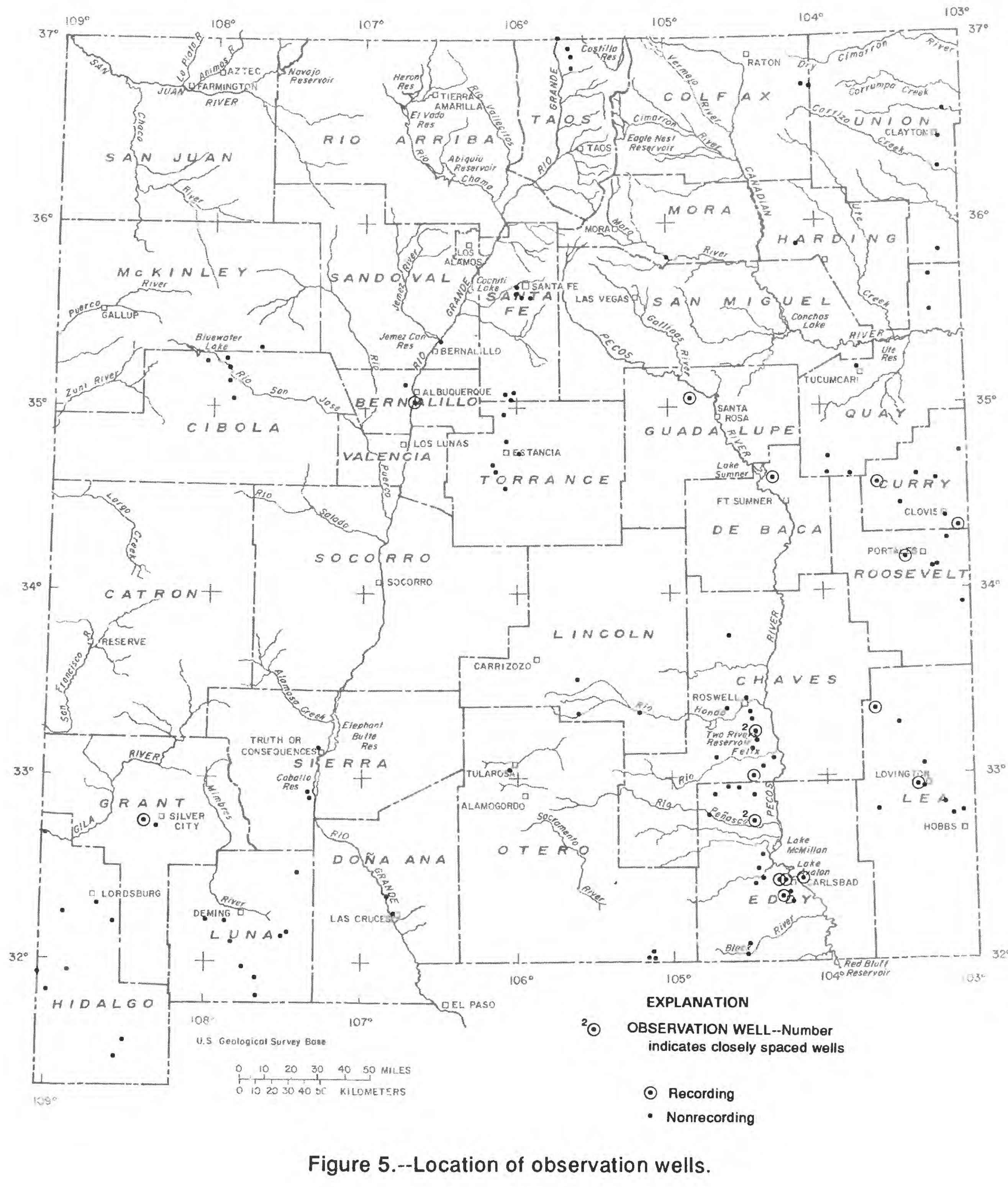


Figure 5.--Location of observation wells.

Plans for FY 93: The schedule of 5th-year mass measurements beginning in January 1993 and scheduled to be completed by the end of March 1993 includes eight areas. These areas are the lower Canadian, Carlsbad, Capitan Reef, Animas, Playas, Lordsburg, Santa Fe County, and upper Rio Grande (fig. 4). These measurements will be verified and entered into the data base along with measurements from about 200 annual wells, 300 additional Eastern High Plains wells, and daily values from recorder wells.

A decision will be made regarding a new, more timely format for publishing water-level data. The ground-water-depletion maps for the Internal Revenue Service accounting system will be completed.

Reports in Progress: Data from this program will continue to be published in the annual report, "Water resources data, New Mexico."

Reports Released:

Borland, J.P., Cruz, R.R., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1991, Water resources data, New Mexico, water year 1990: U.S. Geological Survey Water-Data Report NM-90-1, 466 p.

Borland, J.P., DeWees, R.K., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1992: Water resources data, New Mexico, water year 1991: U.S. Geological Survey Water-Data Report NM-91-1, 557 p.

Cruz, R.R., DeWees, R.K., Funderburg, D.E., Lepp, R.L., Ortiz, D., and Shaull, D., 1993, Water resources data, New Mexico, water year 1992: U.S. Geological Survey Water-Data Report NM-92-1, 526 p.

Reports on water-resources data for New Mexico are published annually.

Cruz, R.R., 1990, Ground-water depletion, in feet, allowed in a part of Curry County, New Mexico, by U.S. Internal Revenue Service for calendar year 1989: New Mexico State Engineer Office Map CU-30, 1 sheet.

___1990, Ground-water depletion, in feet, allowed in central Lea County, New Mexico, by U.S. Internal Revenue Service for calendar year 1989: New Mexico State Engineer Office Map LC-32, 1 sheet.

__1990, Ground-water depletion, in feet, allowed in northern Lea County, New Mexico, by U.S. Internal Revenue Service for calendar year 1989: New Mexico State Engineer Office Map LN-32, 1 sheet.

____1990, Ground-water depletion, in feet, allowed in Portales valley, Roosevelt County, New Mexico, by U.S. Internal Revenue Service for calendar year 1989: New Mexico State Engineer Office Map RO-33, 1 sheet.

___1991, Groundwater levels, Mimbres Basin north, New Mexico, 1982-1987: New Mexico State Engineer Office Map GWL-MBN 82/87, 1 sheet.

___1991, Groundwater levels, Mimbres Basin south, New Mexico, 1982-1987: New Mexico State Engineer Office Map GWL-MBS-82/87, 1 sheet.

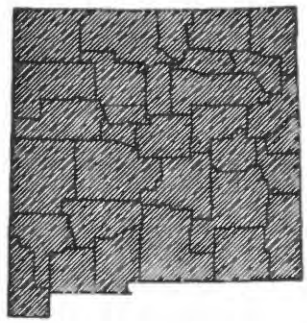
__1991, Groundwater levels, Nutt-Hockett, New Mexico, 1982-1987: New Mexico State Engineer Office Map GWL-NH-82/87, 1 sheet.

Cruz, R.R., and Gabaldon, H.K., 1992, Groundwater levels, Santa Fe County, New Mexico, 1983-1988: New Mexico State Engineer Office Map GWL-SFC-83/88, 1 sheet.

WATER-QUALITY NETWORK (NM003)

Period of Project: Continuous since 1937

Study Location: Statewide



Principal Investigator: Richard L. Lepp

Cooperating Agencies: New Mexico State Engineer Office, U.S. Bureau of Land Management, Pecos River Commission, U.S. Bureau of Reclamation, U.S. Bureau of Indian Affairs, Canadian River Municipal Water Authority, Albuquerque Metropolitan Arroyo Flood Control Authority, and Federal Program

Problem: Water-resources planning and water-quality assessment require standardized information. The chemical, biological, and physical quality of surface water and ground water needs to be monitored and defined consistently throughout the State.

Objective: Provide water-quality data for Federal, State, and local planning and for management of interstate and international waters.

Approach: Operation of a network of water-quality stations provides data that describe chemical concentrations, constituent loads, and time trends. Continuous-record surface-water stations (table 3 and fig. 6) provide chemical and biological water-quality data. Information also is collected at numerous partial-record stations, miscellaneous sites, and wells in conjunction with other projects. Eleven surface-water stations also are part of the Geological Survey's National Stream-Quality Accounting Network. Miscellaneous water-temperature data, recorded at the time that streamflow is measured, are available from subdistricts or field headquarters offices in New Mexico. The type of data collected and the number of continuous-record stations where these data are collected are listed in the following table:

Type of data	Number of stations
Physical data	
Specific conductance, pH, dissolved oxygen, etc.	66
Suspended sediment or daily sediment	58
Chemical data	
Major dissolved inorganic constituents	63
Chemical analyses of fluvial sediments	15
Nutrients	37
Trace elements	54
Radiochemicals	12
Organic compounds	28
Biological data	
Bacteria	31

Table 3.--Surface-water-quality stations in operation during water year 1992

EXPLANATION

Type of data

B	Biological (bacteria, phytoplankton, etc.)
C	Major dissolved inorganic constituents (sodium, chloride, sulfate, etc.)
D	Daily sediment
M	Chemical analyses of fluvial sediments (streambed or lake-bottom materials)
N	Nutrients (nitrogen and phosphorus compounds)
O	Organic compounds (insecticides, herbicides, organic carbon, etc.)
P	Physical measurements (specific conductance, pH, dissolved oxygen, etc.)
R	Radiochemicals (uranium, radium, etc.)
S	Suspended sediment (concentration and particle size)
T	Trace elements (arsenic, iron, lead, etc.)

Funding source

ADEQ	Arizona Department of Environmental Quality
AMAFCA	Albuquerque Metropolitan Arroyo Flood Control Authority
BIA	U.S. Bureau of Indian Affairs
BLM	U.S. Bureau of Land Management
BR	U.S. Bureau of Reclamation
CRMWA	Canadian River Municipal Water Authority
GS	U.S. Geological Survey
PRC	Pecos River Commission
SEO	New Mexico State Engineer Office/Interstate Stream Commission

Stations are in New Mexico unless otherwise indicated. --, no data.

Table 3.--Surface-water-quality stations in operation during water year 1992--Continued

Station number	Station name	Type of data	Funding source	Drainage area (square miles)	Period of record (water years)
		Canadian River Basin			
07207000	Cimarron River near Cimarron	CNOPST	SEO	294	1979, 1981 to current year
07207500	Ponil Creek near Cimarron	CPS	SEO	171	1981 to current year
07208500	Rayado Creek at Sauble Ranch near Cimarron	CPS	SEO	65	1981 to current year
07215500	Mora River at La Cueva	PS	SEO	173	1981 to current year
07221500	Canadian River near Sanchez	BCMNOPST	GS, SEO	6,015	1975 to current year
07226560	Ute Reservoir at site B, 0.6 mile above Ute Dam	BCMNOPST	SEO	11, 140	1963 to current year
07227000	Canadian River at Logan	CPT	CRMWA	11,141	1957-62, February to September 1992
07227100	Revuelto Creek near Logan	CPT	SEO, CRMWA	786	1959 to current year
07227140	Canadian River above New Mexico-Texas State line	CPT	CRMWA	12,616	1969-73, 1975-86, November 1991 to September 1992
		Rio Grande Basin			
08251500	Rio Grande near Lobatos, Colo.	BCNPRST	GS	7,700	1969 to current year
08267500	Rio Hondo near Valdez	CNOPST	SEO	36.2	1986 to current year
08269000	Rio Pueblo de Taos near Taos	CPT	BIA	66.6	1987 to January 1992 (discontinued)
08271000	Rio Lucero near Arroyo Seco	CPT	BIA	16.6	1987 to March 1992 (discontinued)
08276300	Rio Pueblo de Taos below Los Cordovas	CNOPST	SEO	380	1981, 1986 to current year
08276500	Rio Grande below Taos Junction Bridge near Taos	BCMNOPST	SEO	9,730	1975 to current year
08279000	Embudo Creek at Dixon	CPT	SEO	305	1970 to current year

Table 3.--Surface-water-quality stations in operation during water year 1992--Continued

Station number	Station name	Type of data	Funding source	Drainage area (square miles)	Period of record (water years)
08284100	Rio Chama near La Puente	CNOPST	SEO	480	1986 to current year
08290000	Rio Chama near Chamita	BCOPST	SEO	3,144	1948-85, 1987 to current year
08291600	Rio Grande at Santa Clara	COPST	BIA	--	1987 to November 1991 (discontinued)
08313000	Rio Grande at Otowi Bridge near San Ildefonso	BCDMNPRST	GS, SEO	14,300	1947 to current year
08317200	Santa Fe River above Cochiti Lake	CNOPST	SEO	231	1974-75, 1979, 1981 to current year
08317300	Cochiti Lake near Cochiti Pueblo	BCMNOPST	SEO	14,900	1981 to current year
08319000	Rio Grande at San Felipe	BCMNOPST	SEO	16,100	1975 to current year
08324000	Jemez River near Jemez	CNOPRST	SEO	470	1981 to current year
08329700	Campus Wash at Albuquerque	BCNOPST	AMAFCA	--	1990 to current year
08329900	North Floodway Channel near Alameda	BCNOPST	AMAFCA	--	1982-83, 1991 to current year
08330000	Rio Grande at Albuquerque	BCDNPS	GS, BR, SEO	17,440	1969 to current year
08330775	South Diversion Channel above Tijeras Arroyo near Albuquerque	BCNOPT	AMAFCA	--	June 1988 to current year
08331000	Rio Grande at Isleta	BCNOPRST	SEO	18,100	1972 to current year
08332010	Rio Grande Floodway near Bernardo	CDNOPST	SEO, BR	19,230	1957 to current year
08334000	Rio Puerco above Arroyo Chico near Guadalupe	DPS	BLM	420	1948-56, 1981 to current year
08341400	Bluewater Lake near Bluewater	CPT	BIA	201	1966-69, 1987 to February 1992 (discontinued)
08343500	Rio San Jose near Grants	BCMNOPRST	SEO	2,300	1980-82, 1986 to current year
08349800	Rio Paguate below Jackpile Mine near Laguna	CPRT	BIA	107	1977, 1987 to January 1992 (discontinued)
08353000	Rio Puerco near Bernardo	CDPRT	SEO, BLM	7,350	1947 to current year
08354800	Rio Grande Conveyance Channel at San Acacia	PS	SEO	--	1959 to current year
08354900	Rio Grande Floodway at San Acacia	BCDNOPST	SEO, BR	26,770	1937-56, 1959 to current year
08358300	Rio Grande Conveyance Channel at San Marcial	BCDMNPRST	GS, SEO, BR	--	1954 to current year

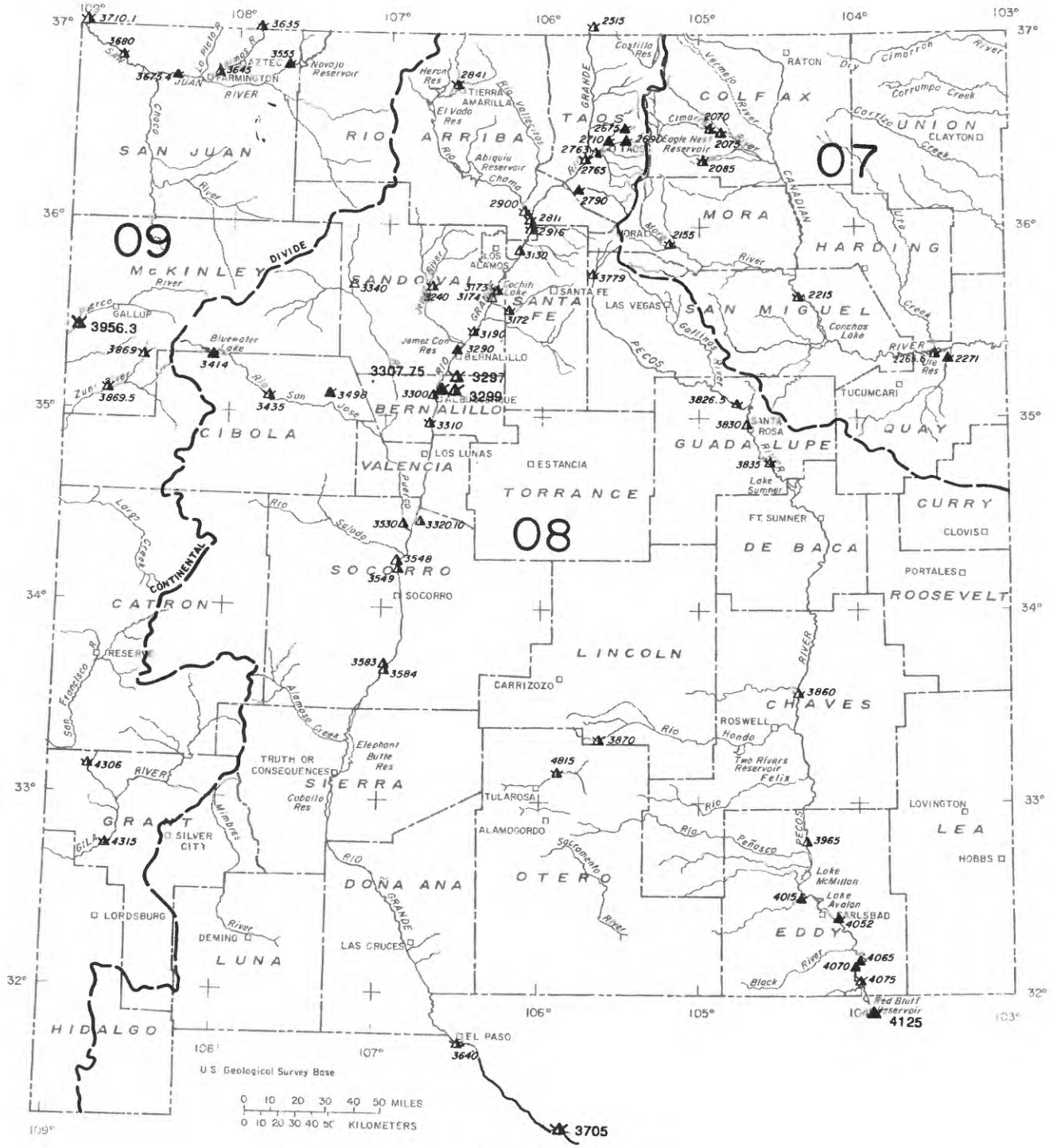
Table 3.--Surface-water-quality stations in operation during water year 1992--Continued

Station number	Station name	Type of data	Funding source	Drainage area (square miles)	Period of record (water years)
08358400	Rio Grande Floodway at San Marcial	DPS	GS, SEO, BR	27,700	1905-7, 1946 to current year
08364000	Rio Grande at El Paso, Tex.	BCNPST	GS	32,207	1930 to current year
08370500	Rio Grande below old Fort Quitman, Tex.	BCNPST	GS	31,990	1930 to current year
09395630	Puerco River near Manuelito	CPRST	ADEQ	990	1988 to current year
		Pecos River Basin			
08377900	Rio Mora near Terrero	BCNPRST	GS	53.2	1963 to current year
08382650	Pecos River above Santa Rosa Lake	BCNOPST	GS, SEO	2,340	1976, 1981 to current year
08383000	Pecos River at Santa Rosa	CP	SEO	2,650	1905-7, 1959 to current year
08383500	Pecos River near Puerto de Luna	BCMNOPST	SEO	3,970	1937-66, 1972 to current year
08386000	Pecos River near Acme	BCMNOPST	SEO	11,380	1937 to current year
08387000	Rio Ruidoso at Hollywood	BCMNOPST	SEO	120	1963-67, 1987 to current year
08396500	Pecos River near Artesia	BCDMNOPST	SEO	15,300	1937 to current year
08401500	Pecos River below Brantley Dam near Carlsbad	CPT	SEO	17,650	1960, 1962, 1978-79, 1981 to current year
08405200	Pecos River below Dark Canyon Draw at Carlsbad	CPT	PRC	18,550	1972 to current year
08406500	Pecos River near Malaga	CPT	PRC	19,190	1937 to current year
08407000	Pecos River at Pierce Canyon Crossing near Malaga	CPT	PRC	19,260	1938-41, 1952 to current year
08407500	Pecos River at Red Bluff	BCNPST	GS	19,540	1937 to current year
08412500	Pecos River near Orla, Tex.	CP	(1)	21,210	July 1937 to current year
		Tularosa River Basin			
08481500	Tularosa Creek near Bent	BCNOPST	GS, SEO	120	1963 to current year

Table 3.--Surface-water-quality stations in operation during water year 1992--Concluded

Station number	Station name	Type of data	Funding source	Drainage area (square miles)	Period of record (water years)
		San Juan River Basin			
09355500	San Juan River near Archuleta	CP	BR	3,260	1955 to current year
09363500	Animas River near Cedar Hill	BCMNOPST	SEO	1,090	1943, 1945, 1958-59, 1969-73, 1975, 1987 to current year
09364500	Animas River at Farmington	BCDNPST	GS	1,360	1940 to current year
09367540	San Juan River near Fruitland	CP	BR	8,010	1978 to current year
09368000	San Juan River at Shiprock	BCMNOP[2]RST	GS, SEO	12,900	1941-45, 1951 to current year
09371010	San Juan River at Four Corners, Colo.	CP	BR	14,600	1978-81, 1985 to current year
09386900	Rio Nutria near Ramah	CPST	BIA	71.4	1978, 1980, 1987 to March 1992 (discontinued)
09386950	Zuni River above Black Rock Reservoir	CPST	BIA	848	1978 to March 1992 (discontinued)
		Gila River Basin			
09430600	Mogollon Creek near Cliff	BCNPRST	GS	69	1967 to current year
09431500	Gila River near Redrock	BCNPRST	GS	2,829	1967 to current year

[1] Station operated by the Texas District
[2] Continuous recorder



EXPLANATION

07 LOWER MISSISSIPPI RIVER BASIN NUMBER

08 WESTERN GULF OF MEXICO BASIN NUMBER

09 COLORADO RIVER BASIN NUMBER

RIVER BASIN BOUNDARY

3791.87 ▲ STATION AND NUMBER--Number by symbol is abbreviated station number. Complete national station number is: 08 379187

Basin number + station number

STATION AND SAMPLING FREQUENCY--

CHEMICAL QUALITY:	▲ Daily	◀ Other than daily
SUSPENDED SEDIMENT:	△ Daily	◁ Other than daily
CHEMICAL QUALITY AND SUSPENDED SEDIMENT:	◭ Both daily	⧓ Both other than daily
	◮ Daily chemical quality and other than daily suspended sediment	◬ Daily suspended sediment and other than daily chemical quality

Figure 6.--Location of surface-water-quality stations.

Progress and Significant Results: Chemical and biological water-quality data were obtained at 66 continuous-record surface-water stations and 36 partial-record stations and miscellaneous sites in water year 1992. Also, in water year 1992 36 wells were sampled to provide water-quality data for project activities. The water-quality data tables for water year 1992 were published in the report, "Water resources data, New Mexico, water year 1992."

Plans for FY 93: Continue the hydrologic-data network (table 3 and fig. 6). Minor revisions will be made in response to changes in information needs.

Reports in Progress:

Water resources data, New Mexico, water year 1993: U.S. Geological Survey Water-Data Report.

Reports Released:

Borland, J.P., Cruz, R.R., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1991, Water resources data, New Mexico, water year 1990: U.S. Geological Survey Water-Data Report NM-90-1, 466 p.

Borland, J.P., DeWees, R.K., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1992, Water resources data, New Mexico, water year 1991: U.S. Geological Survey Water-Data Report NM-91-1, 557 p.

Cruz, R.R., DeWees, R.K., Funderburg, D.E., Lepp, R.L., Ortiz, D., and Shaull, D., 1993, Water resources data, New Mexico, water year 1992: U.S. Geological Survey Water-Data Report NM-92-1, 526 p.

Reports on water-resources data for New Mexico are published annually.

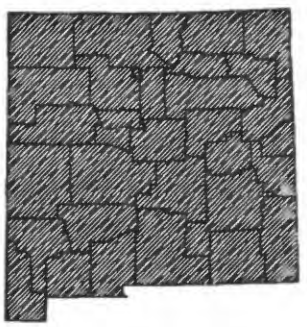
SEDIMENT STATIONS (NM004)

Period of Project: Continuous since 1937

Study Location: Statewide

Principal Investigator: David E. Funderburg

Cooperating Agencies: New Mexico State Engineer Office, U.S. Bureau of Land Management, U.S. Bureau of Indian Affairs, U.S. Bureau of Reclamation, and Federal Program



Problem: Water-resources planning and water-quality assessment require a data base of relatively standardized information. Sediment concentrations, sediment loads, and particle size of sediment transported in New Mexico rivers and streams need to be monitored and defined to determine the effects of sediment loads and temporal changes.

Objective: Provide sediment data for Federal, State, and local planning needs. Information collected is used in the evaluation of sources of sediment, effects of changing land use, effects of water management on channel stability, and regional baseline conditions.

Approach: Establish and operate a network of sediment stations to provide spatial and temporal averages and trends of sediment concentration, sediment load, and particle size of sediment transported in rivers and streams.

Progress and Significant Results: Collected sediment data at 58 streamflow-gaging stations in New Mexico, and 4 partial-record stations and miscellaneous sites. Completed and published the sediment data for water year 1992 in the annual Water-Data Report, "Water resources data, New Mexico, water year 1992." Sediment stations are listed in table 3, and the location of these stations is shown in figure 6.

Plans for FY 93: Continue collection and analysis of sediment data in New Mexico. Minor revisions will be made in response to changes in information needs.

Reports in Progress:

Gellis, A.C., Gullying at the Petroglyph National Monument, New Mexico (journal article).

Water resources data, New Mexico, water year 1993: U.S. Geological Survey Water-Data Report.

Reports Released:

Borland, J.P., Cruz, R.R., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1991, Water resources data, New Mexico, water year 1990: U.S. Geological Survey Water-Data Report NM-90-1, 466 p.

Borland, J.P., DeWees, R.K., McCracken, R.L., Lepp, R.L., Ortiz, D., and Shaull, D.A., 1992, Water resources data, New Mexico, water year 1991: U.S. Geological Survey Water-Data Report NM-91-1, 557 p.

Cruz, R.R., DeWees, R.K., Funderburg, D.E., Lepp, R.L., Ortiz, D., and Shaull, D., 1993, Water resources data, New Mexico, water year 1992: U.S. Geological Survey Water-Data Report NM-92-1, 526 p.

Reports on water-resources data for New Mexico are published annually.

AREAL APPRAISALS AND INTERPRETIVE STUDIES

Areal appraisals and interpretive studies undertaken in the New Mexico District are initiated for the investigation of a particular hydrologic problem or specified area. These projects may be active for several years and usually are conducted in cooperation with one or more Federal, State, local, or tribal agencies. Some projects continue for many years because of the need for long-term data collection and analysis.

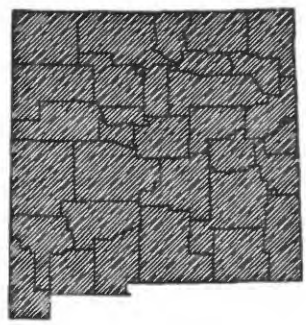
WATER-USE INFORMATION PROGRAM (NM007)

Period of Project: Continuous since 1978

Study Location: Statewide

Principal Investigator: Lynn A. Garrabrant

Cooperating Agency: New Mexico State Engineer Office



Problem: Management of the Nation's water resources requires information on water use. In 1978 State and Federal efforts were combined as part of a cooperative program to standardize a National water-use information system to collect, store, and retrieve reliable water-use data that are available for planning, operation, and management purposes. Regional aquifer studies in New Mexico also require water-use data.

Objective: Maintain a program for the collection, computer storage, and retrieval of water-use information in New Mexico using standard methods that the program will establish and refine. The Geological Survey will maintain water-use data for New Mexico in the Aggregated Water-Use Data System (AWUDS), which is part of the National Water Information System (NWIS). The Geological Survey also will conduct interpretive studies related to specific water-use categories that are of interest to the State Engineer and the public.

Approach: Water-use data are collected and compiled at 5-year intervals by county and hydrologic unit for categories of water use and source of supply. The data are stored in AWUDS. The Geological Survey works with the State Engineer Office as needed to help collect or estimate water-use data.

Progress and Significant Results: Compiled 1990 water-use data by county and hydrologic unit for 12 categories of use and entered these data into AWUDS. Most of these data were collected by the New Mexico State Engineer Office. Each State's water-use data from AWUDS were used to prepare the report, "Estimated use of water in the United States in 1990." Prepared a map report, "Water use in New Mexico in 1990," for review.

Plans for FY 93: Enter ground-water-use data for the Roswell Basin into the Geological Survey's Site-Specific Water-Use Data System. Compile results of seepage investigations that have been conducted throughout the State and publish these data in a report.

Reports in Progress:

Garrabrant, L.A., in press, Water use in New Mexico, 1990: U.S. Geological Survey Water-Resources Investigations Report 93-4199.

Reports Released:

Garrabrant, L.A., 1988, Water use in New Mexico, 1985: U.S. Geological Survey Open-File Report 88-343, 1 sheet.

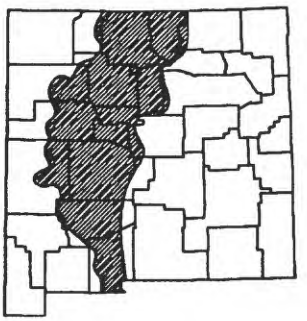
Garrabrant, L.A., Garn, H.S., and Harris, L.G., 1990, Water supply and use, in National Water Summary, 1987--hydrologic events and water supply and use: U.S. Geological Survey Water-Supply Paper 2350, p. 375-382.

Solley, W.B., Pierce, R.R., and Perlman, H.A., 1993, Estimated use of water in the United States in 1990: U.S. Geological Survey Circular 1081, 76 p.

DUTIES OF THE RIO GRANDE COMPACT COMMISSION (NM100)

Period of Project: Continuous since 1948

Study Location: Rio Grande Basin



Principal Investigator: D. Michael Roark

Cooperating Agency: Rio Grande Compact Commission

Problem: Administration of the Rio Grande Compact requires that certain water data be collected, compiled, and presented to the Commission. The Geological Survey acts as secretary to the Commission, which is composed of representatives from Colorado, New Mexico, and Texas.

Objectives: Perform the duties of the secretary as outlined in the rules and regulations of the Rio Grande Compact Commission. The principal duties are to (1) compile monthly streamflow and storage data, (2) prepare a summary of data needed for the determination of debits and credits of water, (3) prepare and publish annual reports of the Commission, and (4) complete other tasks pertaining to the administration of the Compact.

Approach: Compile streamflow and storage data at index stations and storage facilities. Send monthly reports of reservoir storage and streamflow at Rio Grande Compact stations to the commissioners and other interested parties. Summarize data annually, present to the commissioners' engineer advisers, and prepare for publication in an annual report.

Progress and Significant Results: Attended the 1992 annual meeting in April. Prepared and distributed the minutes from the 1991 annual Compact meeting. Provided monthly reports of streamflow and reservoir-storage data. Prepared, published, and distributed the 1991 report of the Rio Grande Compact Commission.

Plans for FY 93: Continue secretarial duties as in previous years.

Reports in Progress: None

Reports Released:

U.S. Geological Survey, 1990, Report of the Rio Grande Compact Commission, 1989: Albuquerque, N. Mex., 55 p.

_____1991, Report of the Rio Grande Compact Commission, 1990: Albuquerque, N. Mex., 55 p.

_____1992, Report of the Rio Grande Compact Commission, 1991: Albuquerque, N. Mex., 55 p.

_____1993, Report of the Rio Grande Compact Commission, 1992: Albuquerque, N. Mex., 55 p.

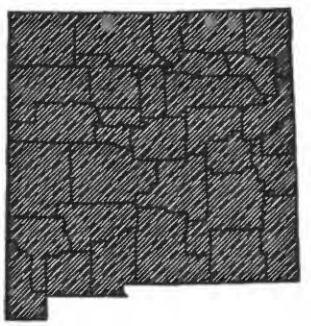
Reports of the Rio Grande Compact Commission are published annually.

NEW MEXICO DISTRICT DATA BANK (NM105)

Period of Project: Continuous since 1970

Study Location: Statewide

Principal Investigator: Roy R. Cruz



Cooperating Agency: New Mexico State Engineer Office

Problem: Providing timely compilation and distribution of large quantities of hydrologic data requires efficient data-management systems. The New Mexico District computer system provides the potential to increase the productivity of many projects and hydrologic applications. Effective data-base management is essential for the District to utilize more fully this potential for data processing, data dissemination, and use of personnel.

Objective: Provide project support through management, control, and maintenance of and refinements to widely used data bases such as the Ground-Water Site-Inventory (GWSI) data base and the Water-Data Storage and Retrieval System.

Approach: Ground-water data are transferred from the local data base (OMNIANA) to the nationally used GWSI data base.

Progress and Significant Results: Ground-water and water-quality data from approximately 31,129 wells and springs are in the New Mexico District GWSI data base. Site-duplication checks are 95 percent complete for transfer of ground-water data from the previously used OMNIANA data base to GWSI. GWSI currently is managed under the closed-system concept as part of a quality assurance program. Minimum data requirements were established for any new sites that will be added to GWSI.

Plans for FY 93: Complete site-duplication checks for the OMNIANA to GWSI data-base transfer, at which time the use of OMNIANA as a data base will cease. Continue data-file cleanup and project support.

Reports in Progress: None

Reports Released: None

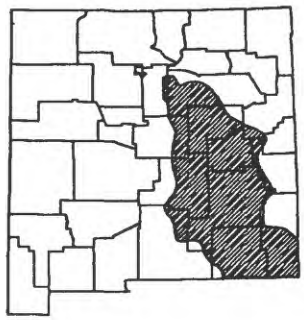
MISCELLANEOUS RIVER-REACH STUDIES, PECOS RIVER (NM106)

Period of Project: Continuous since 1970

Study Location: Pecos River Basin

Principal Investigator: Scott D. Waltemeyer

Cooperating Agency: Pecos River Commission



Problem: The Pecos River Commission, which administers the Pecos River Compact between New Mexico and Texas, requires that certain water data be collected, compiled, and presented to the Commission. The Commission also requests special studies about the relation of surface water, ground water, and water quality in specific reaches of the Pecos River. These data and the results of hydrologic studies are used for inflow-outflow computations to apportion water of the Pecos River equitably between New Mexico and Texas. The Geological Survey acts as secretary to the Commission.

Objectives: (1) Operate and maintain streamflow- and reservoir-gaging stations needed for the administration of the Pecos River Compact. (2) Provide administrative services to the Pecos River Commission. (3) Prepare an annual report to the Commission that summarizes special studies of surface water, ground water, and water quality in specific reaches of the Pecos River.

Approach: Collect continuous records of streamflow at stations in New Mexico and Texas for the computation of annual streamflow. Operate three water-quality stations to monitor changes between Carlsbad, New Mexico, and Red Bluff Reservoir, Texas. As secretary to the Pecos River Commission, provide administrative services including summaries of data and results of special studies, preparation of annual reports and minutes of meetings, and record keeping.

Progress and Significant Results: Completed streamflow and water-quality data-collection activities supported by the Commission for 1992. Computed the base-flow contribution in the reach of the Pecos River from Acme to Artesia and the flood inflow in the reach of the Pecos River from Carlsbad to the State line for 1992. Attended the 1992 annual meeting of the Commission in May.

Plans for FY 93: Continue routine data-collection activities supported by the Pecos River Commission and secretarial duties. Compute the base-flow gain in the reach of the Pecos River from Acme to Artesia and flood inflows in the reach of the Pecos River from Carlsbad to the State line.

Reports in Progress:

Annual report to the Pecos River Commission for 1993.

Reports Released:

Garn, H.S., 1988, Seasonal changes in ground-water levels in the shallow aquifer near Hagerman and the Pecos River, Chaves County, New Mexico: U.S. Geological Survey Open-File Report 88-197, 19 p.

U.S. Geological Survey, 1991, Annual report to the Pecos River Commission on investigations being made in New Mexico and Texas, calendar year 1990: Albuquerque, N. Mex., 21 p.

_____1992, Annual report to the Pecos River Commission on investigations being made in New Mexico and Texas, calendar year 1991: Albuquerque, N. Mex., 21 p.

_____1993, Annual report to the Pecos River Commission on investigations being made in New Mexico and Texas, calendar year 1992: Albuquerque, N. Mex., 19 p. Annual reports have been published since 1982.

Welder, G.E., 1988, Hydrologic effects of phreatophyte control, Acme-Artesia reach of the Pecos River, New Mexico, 1967-82: U.S. Geological Survey Water-Resources Investigations Report 87-4148, 46 p.

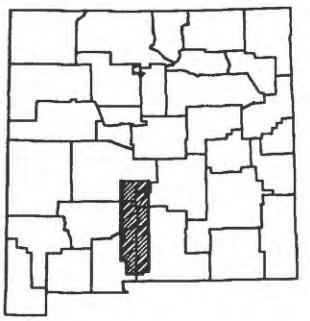
CONTINUING RECONNAISSANCE AND EVALUATION OF WATER RESOURCES ON THE WHITE SANDS MISSILE RANGE (NM109)

Period of Project: Continuous since 1960

Study Location: South-central New Mexico

Principal Investigator: Robert G. Myers

Cooperating Agency: U.S. Department of the Army, White Sands Missile Range



Problem: Because the volume of fresh ground water on the White Sands Missile Range is limited, the effects of pumpage in various well fields, such as depletion of fresh ground water and possible saline-water encroachment, need to be determined. Various military projects and activities could have an environmental impact on surface water and ground water.

Objectives: (1) Collect geohydrologic information from various sites throughout the missile range and surrounding areas. (2) Obtain water-level and pumpage data needed to evaluate ground-water depletion. (3) Conduct short-term site studies where additional water supplies are needed. (4) Provide geohydrologic information to various military projects that would assist in preparation of environmental impact statements by the missile range.

Approach: Monitor water levels semiannually in supply wells, test wells, and boreholes throughout White Sands Missile Range. Monitor the chemical water quality in selected wells throughout the range. Evaluate the water resources of new and existing areas. Advise and assist the missile range with geohydrological problems and projects.

Progress and Significant Results: Collected water samples from 13 wells throughout the southern range area. Prepared a plan to sample production wells in compliance with the New Mexico Environment Department's water-quality requirements for supply wells. Monitored water levels in supply wells, test wells, and boreholes and water quality from selected test wells and supply wells. Provided geohydrological information upon request.

Plans for FY 93: Continue monitoring water levels and water quality throughout the White Sands Missile Range. Provide geohydrological information on request.

Reports in Progress:

Basabilvazo, G.T., Myers, R.G., and Nickerson, E.L., in press, Geohydrology of the High Energy Laser System Test-Facility site, White Sands Missile Range, Tularosa Basin, south-central New Mexico: U.S. Geological Survey Water-Resources Investigations Report, 93-4192.

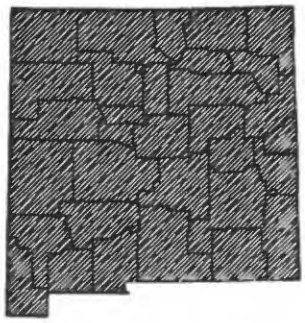
Reports Released:

Myers, R.G., and Sharp, S.C., 1992, Annual water-resources review, White Sands Missile Range, New Mexico, 1988: U.S. Geological Survey Open-File Report 92-465, 23 p.

INVESTIGATION AND ANALYSIS OF FLOOD DISCHARGES FOR UNREGULATED STREAMS IN NEW MEXICO (NM203)

Period of Project: August 1966 to September 1995

Study Location: Statewide



Principal Investigator: Scott D. Waltemeyer

Cooperating Agency: New Mexico State Highway and Transportation Department

Problem: The New Mexico State Highway and Transportation Department needs data on the magnitude, volume, and frequency of floods for the design of highway drainage structures.

Objectives: Collect, compute, and compile magnitude, volume, and flood-frequency data at gaged sites and relate these data to basin properties that can be measured by the State Highway Department. These frequency relations are used to make hydrologic estimates at ungaged sites. Special emphasis is placed on a network that monitors sites having drainage areas of generally less than 15 square miles.

Approach: A network of 109 crest-stage gages is operated for determination of annual peak discharges for New Mexico. These data are used for regional and site-specific floodflow frequency analysis. Regional relations, as related to basin and climatic characteristics, are developed for these data.

Progress and Significant Results: Indirect discharge measurements were completed as needed. A bridge scour analysis was implemented for one site as a prototype for a statewide proposal. A Federal Highway Administration Level II and III analysis was prepared. This provided pier, contraction, and abutment scour data for the bridge and for sediment-transport modeling of the reach.

Plans for FY 93: Perform three Level II bridge scour analyses. Prepare a statewide floodflow frequency report.

Reports in Progress:

Waltemeyer, S.D., Bridge scour analysis on Cuchillo Negro Creek at the Interstate 25 crossing at Truth or Consequences, New Mexico: U.S. Geological Survey Water-Resources Investigations Report.

Waltemeyer, S.D., and Thomas, Blakemore, in press, Evaluation of methods for determining the distribution of regional skew coefficient for annual maximum streamflow in the arid Western United States: journal article for American Water Resources Association Bulletin.

Reports Released:

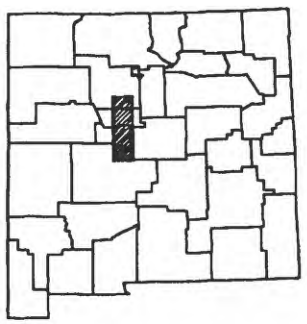
Thomas, R.P., and Gold, R.L., 1982, Techniques for estimating flood discharges for unregulated streams in New Mexico: U.S. Geological Survey Water-Resources Investigations 82-24, 42 p.

Waltemeyer, S.D., 1986, Techniques for estimating flood-flow frequency for unregulated streams in New Mexico: U.S. Geological Survey Water-Resources Investigations Report 86-4104, 56 p.

GROUND-WATER-LEVEL MONITORING IN THE ALBUQUERQUE-BELEN BASIN (NM240)

Period of Project: Continuous since 1982

Study Location: Albuquerque-Belen Basin



Principal Investigator: Dale R. Rankin

Cooperating Agency: City of Albuquerque

Problem: Ground water is used for all domestic and industrial purposes in the basin. A population increase of approximately 100 percent from 1960 to 1980 has increased the demand for ground water, increasing the stress on the ground-water system. Stress on the aquifer cannot be quantified without knowledge of water-level changes. An updated, detailed assessment is needed for future water management and for water-quality studies.

Objective: Monitor changes in ground-water levels as the system responds to increased stresses.

Approach: The Albuquerque-Belen Basin monitoring network presently consists of 82 wells and piezometers in 58 locations. Ground-water levels are measured monthly, quarterly, or semiannually. Seven wells have a continuous recorder and one well is measured during only the winter months.

Progress and Significant Results: Continued water-level data collection and network evaluation. The Tijeras (10N.05E.22.143) and Atrisco #6 (10N.02E.25.213) wells were discontinued. Started collection of water-level data from a well at the Puerto del Sol Golf Course (10N.03E.27.413). The recorder from the Montaño 3 piezometer nest was removed.

Plans for FY 93: Continue water-level data collection and network evaluation. Prepare a data report for water years 1986-90. Slug test and measure total depths of wells.

Reports in Progress: Rankin, D.R., Ground-water-level data for the Albuquerque-Belen Basin, water years 1986 through 1990: U.S. Geological Survey Open-File Report.

Reports Released:

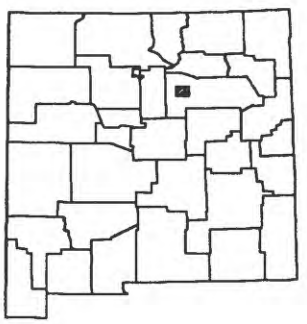
Kues, G.E., 1987, Ground-water-level data for the Albuquerque-Belen Basin, New Mexico, through water year 1985: U.S. Geological Survey Open-File Report 87-116, 51 p.

EFFECTS OF FOREST MANAGEMENT PRACTICES ON WATER QUALITY OF A HIGH MOUNTAIN STREAM IN THE SOUTHERN ROCKY MOUNTAINS OF NEW MEXICO (NM260)

Period of Project: April 1987 to September 1992

Study Location: Northwestern San Miguel County

Principal Investigator: Herbert S. Garn



Cooperating Agencies: New Mexico Environment Department, City of Las Vegas, New Mexico Highlands University, and U.S. Forest Service

Problem: Hydrologic studies are needed to determine the effects on water quality from forest harvesting activities in New Mexico and in the Southwest. Such information can be used to evaluate the effectiveness of water-quality management plans and to develop the best silvicultural management practices to control nonpoint-source pollution.

Objectives: (1) Establish baseline water-quality data to evaluate the effects of forest harvesting practices and road construction activities on the chemical and biotic characteristics of a mountain stream. (2) Compare the changes, if any, in stream quality to water-quality standards and the designated uses of the stream. (3) Relate these changes in stream quality to land-use practices.

Approach: Paired upstream and downstream water-quality stations in a municipal water-supply watershed (Gallinas Creek) and a watershed to be logged (Tecolote Creek) will be used to establish baseline water-quality data and to monitor the effects of timber harvesting and road construction activities. Stations will be operated seasonally to coincide with runoff from snowmelt and summer thunderstorms, which produce the bulk of annual precipitation. Water properties and constituents to be analyzed include major ions and nutrients and biological (aquatic invertebrates) attributes.

Progress and Significant Results: Water-quality data collection was discontinued. Collected streamflow data at one sampling site on Tecolote Creek. Data were included in the annual data report, "Water resources data, New Mexico." Data analysis for Gallinas Creek was completed.

Plans for FY 93: Compute records and prepare 1992 data for publication in the annual data report, "Water resources data, New Mexico." The timber sale in the monitored area did not occur; therefore, the project was suspended at the end of fiscal year 1992.

Reports in Progress:

Garn, H.S., Variation in water quality of Gallinas Creek, water supply for the City of Las Vegas, San Miguel County, New Mexico, with a section on Aquatic macroinvertebrates: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released:

Garn, H.S., Piatt, Jim, and Sims, Bruce, 1989, Water-quality monitoring to evaluate best management practices of timber harvesting activities, Tecolote Creek watershed, New Mexico [abs.]: Proceedings, American Water Resources Association, Conference on Advances in Management of Southwestern Watersheds, 1989, Socorro, N. Mex.

WATER-RESOURCES INVESTIGATIONS IN THE ALBUQUERQUE BASIN

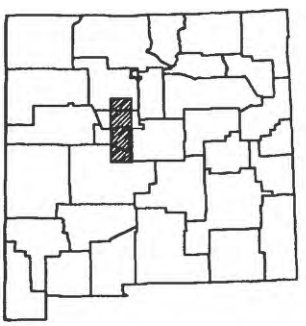
(NM265)

Period of Project: July 1987 to June 1994

Study Location: Parts of Sandoval, Bernalillo, and Valencia Counties

Principal Investigator: David W. Wilkins

Cooperating Agency: City of Albuquerque



Problem: Albuquerque is the largest single user of ground water in the Albuquerque Basin. As the prime consumer of water from the Santa Fe Group, the City of Albuquerque recognizes its responsibility to understand this resource and use it wisely. As a result, the City and the Geological Survey are participating in a program to identify and quantify hydrologic aspects of the interconnected ground-water and surface-water systems. The short-term component of the program is to conduct water studies to help determine the siting of new City wells. The long-term components are to collect, compile, and interpret geohydrologic information regarding the City's future water supply.

Objectives: Develop basinwide information about the water resources that will assist in developing an adequate supply of good-quality water for future years. The following are considered in this program: (1) evaluation of ground-water and surface-water resources of the study area, (2) estimates of the effect of present and projected water demands on surface-water/ ground-water interactions, and (3) evaluation of the potential for augmenting Albuquerque's ground-water supply.

Approach: (1) Collect and compile geophysical-log data from wells. (2) Evaluate ground-water resources in the Rio Grande flood plain, ground-water quantity and ground-water quality, and potential ground-water recharge. (3) Establish a ground-subsidence monitoring network.

Progress and Significant Results: The geophysical-log data base contains data for more than 500 logs. The Geological Survey continued completing geophysical logs in City wells that are being rehabilitated to assist in finding the causes of well failure and in evaluating the effectiveness of well rehabilitation. Surface- and ground-water data were collected for a water-budget study of the Rio Grande Bosque. River gages were operated at the Paseo del Norte and Rio Bravo Boulevard bridge crossings, and monthly measurements were made. Ground-water-level data were collected at existing piezometers at Montaño Road and Rio Bravo Boulevard. Nests of three piezometers each were drilled at Paseo del Norte adjacent to the Rio Grande; just south of Paseo del Norte west of Rio Grande Boulevard; near Montaño Road east of the Rio Grande, inside the levees; and at Rio Bravo Boulevard immediately adjacent to the Rio Grande.

More than 3,000 water-quality analyses have been entered into the City data base. An Open-File Report is being prepared that describes locations and types of logs in the geophysical-log data base. Also prepared was an Open-File Report that describes data collected through 1992. A draft of the final report was prepared that evaluates the quantity and quality of potential recharge to the Albuquerque Basin.

Plans for FY 93: Instrument all wells used in the study with continuous recorders. Continue logging City wells and complete digitizing all available geophysical logs in the Albuquerque Basin. Begin interpreting the digital logs to define the lithologic character of the basin and to understand the depositional history of the basin. Archive the water-quality data base developed for the City. Continue to collect surface- and ground-water data for the water budget of the Rio Grande Bosque. Evaluate the data-collection program and the data collected through June 1993. Prepare a technical evaluation for the City. Prepare the Open-File Report containing the data and the final report resulting from the study of potential recharge.

Reports in Progress:

Thomas, C.L., Potential recharge and quality of water for two arroyo channels, Albuquerque, New Mexico, 1988-92: U.S. Geological Survey Water-Resources Investigations Report.

Thorn, C.R., Measurements of surface-water discharge and estimates of evapotranspiration rates for grass and bare soil along a reach of the Rio Grande, Albuquerque, New Mexico, 1989-91: U.S. Geological Survey Open-File Report.

Reports Released:

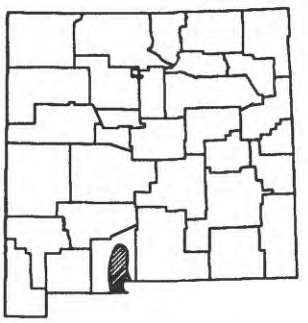
Kaehler, C.A., 1990, Lithology of basin-fill deposits in the Albuquerque-Belen Basin, New Mexico: U.S. Geological Survey Water-Resources Investigations Report 89-4162, 14 p., 3 pls.

MONITORING NETWORK OF THE GROUND-WATER FLOW SYSTEM IN THE MESILLA BASIN, SOUTH-CENTRAL NEW MEXICO (NM267)

Period of Project: October 1987 to September 1995

Study Location: Mesilla Basin in Doña Ana County, New Mexico, and El Paso County, Texas

Principal Investigator: Edward L. Nickerson



Cooperating Agencies: New Mexico State Engineer Office, Elephant Butte Irrigation District, City of Las Cruces, and New Mexico State University

Problem: Urban growth within the Mesilla Basin and adjacent areas has resulted in a significant increase in ground-water withdrawals. Historically, ground-water data within the basin have been obtained on a nonrecurring and unsystematic basis. Economic and efficient management of the surface-water and ground-water resources of the Mesilla Basin requires monitoring the magnitudes and rates of water-level changes in wells throughout the basin and their relation to the surface-water system.

Objectives: (1) Document changing hydrologic conditions within the Mesilla ground-water basin. (2) Identify stream-aquifer relations. (3) Establish a continuous, long-term data base that will permit quantitative evaluation of the surface-water and ground-water flow systems.

Approach: Annual water-level measurements are made in the wells currently in the Mesilla Basin observation-well network. These network wells are completed in the Rio Grande flood-plain alluvium/Santa Fe Group aquifer system.

Hydrologic data are collected at three Mesilla Valley hydrologic sections located at Las Cruces, near Mesquite, and near Cañutillo. Each hydrologic section consists of a river-stage station and several observation-well groups aligned perpendicular to the Rio Grande at depth intervals from 35 to 801 feet. The hydrologic sections consist of a total of 3 river-stage stations, 34 observation wells, and 37 continuous-record and monthly-record stations. Continuous data will be collected at 23 stations equipped with water-level recorders. Water levels will be measured monthly at the remaining 14 stations.

Progress and Significant Results: Made annual water-level measurements in 181 wells in the Mesilla Basin observation-well network. Collected water-level data at the Mesilla Valley hydrologic sections, 23 continuous-record stations, and 14 monthly-record stations. The river-stage station at the Las Cruces hydrologic section, Rio Grande below Picacho Bridge, was upgraded to a low-flow discharge station. Measured streamflow at low flow during the nonirrigation season, November through February, and computed streamflow record.

Plans for FY 93: Measure water levels in 162 network observation wells. Continue operation and maintenance of the Mesilla Valley hydrologic sections. Approximately 14 of 34 recorder wells were discontinued in February 1990.

Reports in Progress: None

Reports Released: None

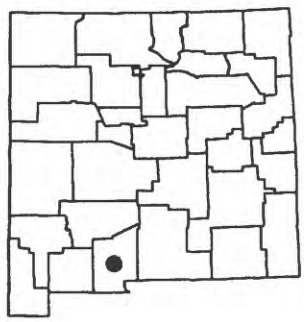
DETERMINATION OF INCISED, BURIED ARROYO CHANNELS IN THE HORST SEPARATING THE SOUTHERN JORNADA DEL MUERTO GROUND-WATER BASIN AND MESILLA GROUND-WATER BASIN, DOÑA ANA COUNTY

(NM269)

Period of Project: October 1988 to September 1993

Study Location: South-central New Mexico

Principal Investigator: Robert G. Myers



Cooperating Agencies: New Mexico State Engineer Office and City of Las Cruces

Problem: Geohydrologic data indicate that ground water in the Jornada del Muerto Basin moves north and some water moves west over a horst separating the Jornada del Muerto ground-water basin from the Mesilla ground-water basin; in some areas, however, the sediments overlying the horst are dry. Incised, buried arroyo channels through the horst may transmit ground water from the Jornada del Muerto ground-water basin to the Mesilla ground-water basin. More information concerning the horst is needed.

Objective: Locate incised, buried arroyo channels in the horst separating the southern Jornada del Muerto ground-water basin from the Mesilla ground-water basin and collect data about the horst.

Approach: Three seismic-reflection lines perpendicular to the horst will be used to locate the axis of the horst. Three seismic-reflection lines will be run parallel to the axis of the horst to determine the possible locations of incised, buried arroyo channels.

Progress and Significant Results: Two continuous seismic-reflection lines, about 4 miles long, were started parallel to the axis of the horst south of U.S. Highway 70. Began first draft of the report.

Plans for FY 93: Complete seismic-reflection surveys. Obtain reports from the contractors, and prepare the final report.

Reports in Progress:

Myers, R.G., Sesmic-reflection surveys and hydrogeology in the vicinity of the horst separating the southern Jornada del Muerto and Mesilla ground-water basins, Doña Ana County, New Mexico: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released: None

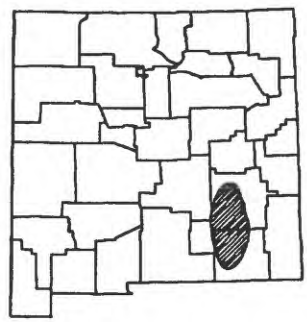
SIMULATION OF GROUND-WATER FLOW IN THE ROSWELL BASIN, CHAVES AND EDDY COUNTIES--PHASE I. DATA BASE PREPARATION (NM271)

Period of Project: January 1988 to September 1992

Study Location: Southeastern New Mexico

Principal Investigator: Douglas P. McAda

Cooperating Agency: New Mexico State Engineer Office



Problem: Large-scale uses of ground water in the Roswell Basin have resulted in the reduction of head in the major aquifers in highly developed areas and of streamflows in the Pecos River and its tributaries. The chemical quality of surface waters and water withdrawn from wells in certain areas of the basin has deteriorated. Particular aspects of the general problem have been studied individually and these investigations have provided useful information. However, it has not been possible to correlate quantitatively the findings of all studies in order to formulate, with a high degree of assurance, a basinwide program that will result in optimum distribution and use of available water resources.

Objectives: (1) Gain a better understanding of the interaction between the confined aquifer, unconfined aquifer, Pecos River, and other major hydrologic components of the Roswell Basin. (2) Develop a tool that can be used to estimate the effects of ground-water withdrawals from both aquifers on hydraulic heads in the aquifers and on streamflow in the Pecos River. The objective of phase I is to compile the hydrologic, geologic, and water-use information available for the vicinity of the Roswell Basin, which is necessary to construct and calibrate a ground-water flow model of the Roswell Basin.

Approach: Compile sources of information that describe the geohydrology of the Roswell Basin. Compile and summarize climatic records, aquifer hydraulic characteristics, well and spring records, ground-water withdrawals, surface-water records, water-quality records, surface-water diversions, irrigated acreage, and crop types.

Progress and Significant Results: Compilation of the data and information was completed in 1991, and the data report was completed.

Plans for FY 93: Project has been completed.

Reports in Progress: None

Reports Released:

McAda, D.M., and Morrison, T.D., 1993, Sources of information and data pertaining to geohydrology in the vicinity of the Roswell Basin in parts of Chaves, Eddy, DeBaca, Guadalupe, Lincoln, and Otero Counties, New Mexico: U.S. Geological Survey Open-File Report 93-144, 78 p.

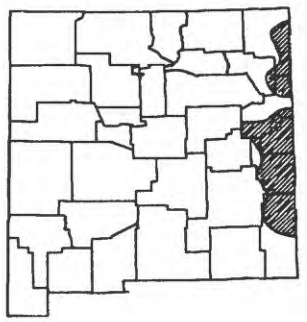
WATER-LEVEL MONITORING IN THE HIGH PLAINS OF NEW MEXICO (NM273)

Period of Project: March 1988 to current year

Study Location: Eastern New Mexico

Principal Investigator: Roy R. Cruz

Cooperating Agency: New Mexico State Engineer Office



Problem: The distribution of observation wells in the High Plains area is not adequate to characterize satisfactorily the water-level changes in the High Plains aquifer system. The present monitoring system neither provides adequate data on seasonal water-level fluctuations nor makes these data readily available to interested parties.

Objectives: (1) Enter existing and newly collected water-level data into a data base in which the data may be retrieved and plotted using computer techniques. (2) Add additional monitoring wells to the water-level monitoring network and install recorders to monitor daily fluctuations, thus allowing more detailed analysis of water-level changes shown by annual water-level measurements.

Approach: Water-level data in the data base are initially located by latitude and longitude. Approximately 10 new wells will be selected on a quarterly basis for water-level monitoring. In the Clovis-Portales area, two wells with recorders will be located in major pumpage centers to measure aquifer stress, and two will be located away from the pumpage centers to monitor stress that may not be directly related to agricultural activities in the area.

Progress and Significant Results: Formulated a work plan and entered water levels and locations of wells into a data base. Measured quarterly water levels in about 30 new wells. Obtained continuous water-level data from recorders.

Plans for FY 93: Measure water levels quarterly and service the recorders. Update water-level data base.

Reports in Progress: None

Reports Released:

Dugan, J.T., and Schild, D.E., 1992, Water-level changes in the High Plains aquifer--predevelopment to 1990 (with State summaries by E.R. Banta, L.J. Combs, and B.J. Pabst; J.T. Dugan; R.R. Cruz; J.S. Havens; J.R. Little and K.M. Neitzert; J.B. Ashworth; and K.A. Miller): U.S. Geological Survey Water-Resources Investigations Report 91-4165, 55 p.

Kastner, W.M., Schild, D.E., and Spahr, D.S., 1989, Water-level changes in the High Plains aquifer underlying parts of South Dakota, Wyoming, Nebraska, Colorado, Kansas, New Mexico, Oklahoma, and Texas--predevelopment through nonirrigation season, 1987-88: U.S. Geological Survey Water-Resources Investigations Report 89-4073, 61 p.

WATER USE OF SAGEBRUSH AND REPLACEMENT GRASS

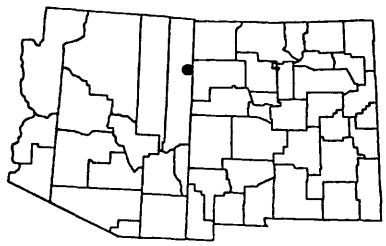
IN NORTHEASTERN ARIZONA (NM274)

Period of Project: May 1988 to September 1992

Study Location: Northeastern Arizona

Principal Investigator: Carole L. Thomas

Cooperating Agency: Navajo Nation



Problem: Little information is available about evapotranspiration, precipitation, and infiltration of precipitation in the lower areas of the Chuska Mountains. To manage these areas for grazing, evapotranspiration rates of sagebrush need to be determined as guidelines for selecting replacement grasses that have similar evapotranspiration rates. Rates of evapotranspiration from pasture grass and infiltration characteristics of precipitation into a grass ground cover are not known.

Objectives: (1) Determine the evapotranspiration rates of sagebrush and replacement grass in lower areas of the Chuska Mountains. (2) Clear one of the sagebrush sites and grow a stand of replacement vegetation suitable for livestock grazing.

Approach: Two sites that have sagebrush cover were selected. Bowen-ratio evapotranspiration data-collection equipment, using chilled-mirror technology, was installed to determine water use by sagebrush. Soil-matric-potential and temperature sensors connected to data loggers were installed at depths of 6, 12, and 24 inches. The character of the soil column was determined and precipitation gages were installed. The sagebrush cover at one site was removed after the first year of data collection and grass seeded at the selected area. The same data were collected for the grass cover as for the sagebrush covers.

Progress and Significant Results: Two evapotranspiration stations installed over sagebrush about 5.3 and 6.8 miles north of Fort Defiance, Arizona, showed that evapotranspiration rates during April through November range from 0.5 to 2 millimeters per day. After rainfall, evapotranspiration rates increase to 2 to 5 millimeters per day. Rainfall received during April through November is entirely consumed as evapotranspiration.

Soil-matric-potential and temperature sensors indicated a wetter soil condition and slightly cooler temperatures at the southern station. Sagebrush was cleared from this station. A growth of four species of native grasses and two species of native shrubs was developed under conditions of natural precipitation and soil fertility.

Plans for FY 93: Project has been completed except for publication of the report.

Reports in Progress:

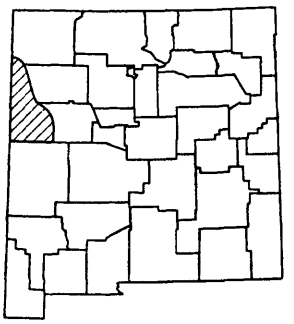
Thomas, C.L., in press, Rainfall, evapotranspiration, total soil-water potential, and soil-water content at a sagebrush site and a replacement-vegetation site near Fort Defiance, Arizona, 1989-91: U.S. Geological Survey Open-File Report 94-43, 29 p.

Reports Released: None

OCCURRENCE AND MOVEMENT OF RADIONUCLIDES AND OTHER TRACE ELEMENTS IN THE PUERCO RIVER FROM THE CHURCH ROCK TO MANUELITO GAGES, WESTERN NEW MEXICO (NM277)

Period of Project: July 1991 through June 1993

Study Location: Puerco River Basin, west-central New Mexico



Principal Investigator: Robert L. Gold

Cooperating Agencies: Navajo-Hopi Indian Relocation Committee, New Mexico Environment Department, U.S. Bureau of Indian Affairs, Arizona Department of Water Resources, Arizona Department of Environmental Quality, and the Navajo Nation

Problem: In July 1979, approximately 100 million gallons of contaminated water and sediment were released into the Puerco River when a tailings pond failed. Several radioactive isotopes and heavy metals entered the Puerco River near Church Rock, New Mexico, contaminating surface and ground waters. These waters are used for agricultural, livestock, and domestic purposes.

Objectives: (1) Determine concentrations of suspended sediment, radionuclides, and other trace elements in surface water and ground water along the reach of the Puerco River between Church Rock and Manuelito. (2) Determine the concentration of uranium in bed material of the Puerco River from Church Rock to the Arizona State line.

Approach: Establish a monitoring network of surface-water gages along the Puerco River. Sample runoff discharge at these sites by automatic and manual collection of water samples. Establish a monitoring network of observation wells at selected locations for collection of ground-water samples.

Progress and Significant Results: Analyses of surface-water and ground-water samples indicate an increased level of contaminants within the study area. Three wells were instrumented with continuous water-level recorders. Ground-water samples were collected from selected wells. Bed material samples were collected from nine cross sections of the Puerco River.

Plans for FY 93: Monitor surface-water data transmissions. Collect surface-water samples from storm runoff at the Manuelito gage. Prepare a draft of the data report. The Church Rock gage has been discontinued.

Reports in Progress:

Gold, R.L., and Rankin, D.R., Hydrologic data for the Puerco River Basin, New Mexico, water year 1992: U.S. Geological Survey Open-File Report.

Reports Released:

Wirt, Laurie, Van Metre, P.C., and Favor, Barbara, 1991, Historical water-quality data, Puerco River basin, Arizona and New Mexico: U.S. Geological Survey Open-File Report 91-196, 339 p.

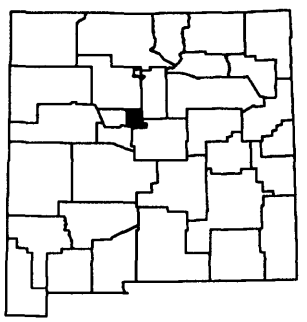
GROUND-WATER CONTAMINATION, LAND USE, AND AQUIFER VULNERABILITY IN EASTERN BERNALILLO COUNTY (NM279)

Period of Project: July 1989 to June 1992

Study Location: Eastern Bernalillo County

Principal Investigator: Georgianna E. Kues

Cooperating Agency: Bernalillo County Commission



Problem: The residents of eastern Bernalillo County are concerned about the current quality of ground water, their sole water supply, and its vulnerability to contamination. Sewage disposal is primarily on site. As of June 1988, 331 of 606 septic systems permitted in Bernalillo County were in this area east of the Sandia Mountains. The concentration of nitrate in ground water exceeds the maximum contaminant level of 10 milligrams per liter in some parts of eastern Bernalillo County. Organic compounds, including benzene, toluene, and explosives, also have been found.

Objectives: (1) Map approximate extent of ground water contaminated by nitrates and volatile organic compounds. (2) Determine rate of changes in water chemistry and whether areas of degradation are expanding. (3) Map historical changes in land use--in particular, density and age of on-site sewage disposal. (4) Map relative vulnerability of major aquifers using criteria such as depth to water, soil type, aquifer properties, recharge, and topography. (5) Describe current ground-water quality and its relation to land use, on-site sewage disposal, and aquifer vulnerability.

Approach: Conduct a literature search on the subject of ground-water contamination from on-site sewage disposal, particularly in limestone terrains. Compile existing water analyses and collect and analyze new water samples.

Progress and Significant Results: Collected samples from 20 monitoring wells on a monthly basis from January 1990 to December 1991. Produced or obtained geographic information system (GIS) coverages of soil types, house locations in 1964, septic-tank locations from 1978 to 1988, land use/land covers, and water-quality coverages on the basis of collected data. Used GIS to compare house locations and distances to faults and selected water-quality properties and distance to roads. Compared land use/land covers to ground-water-quality data to determine the impact of land use on ground-water quality. Determined that 17 of 20 monitoring wells have experienced some level of ground-water contamination and that about 95 percent of soils in the area are not suitable for use as septic-tank absorption fields.

Plans for FY 93: Complete and publish report. Project has been completed except for publication of the report.

Reports in Progress:

Kues, G.E., Ground-water contamination, land use, and aquifer vulnerability in eastern Bernalillo County, central New Mexico, 1990-91: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released:

Kues, G.E., 1992, Ground-water-quality monitoring for septic-tank-use effects, central New Mexico: Proceedings, American Water Resources Association Symposium on the Future Availability of Ground Water Resources, Raleigh, N.C., April 12-16, 1992, p. 273-276.

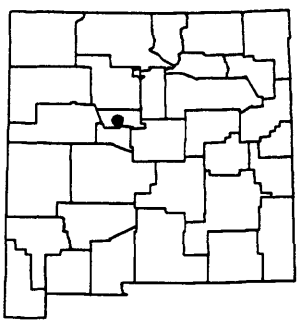
TRAVELTIME AND REAERATION CHARACTERISTICS OF THE RIO GRANDE FLOWING THROUGH ALBUQUERQUE (NM282)

Period of Project: September 1991 to September 1992

Study Location: Albuquerque

Principal Investigator: Scott D. Waltemeyer

Cooperating Agency: City of Albuquerque



Problem: Maintaining suitable water quality in streams receiving wastewater is an important operational constraint on wastewater-treatment plants. Treatment plants are required to meet specific legal effluent Federal and State stream standards. Knowledge of the receiving water's ability to assimilate is crucial to plant managers, regulatory agencies, and the general public. Wastewater discharges at the City of Albuquerque's Southside Water Reclamation Plant may be affecting the water quality in the Rio Grande. Residuals in wastewater, such as organic compounds, nitrogen compounds, and residual chlorine, may deplete the river's dissolved-oxygen concentration to levels below regulatory standards. A study of the reaeration capacity of the Rio Grande is being conducted to measure the river's wastewater assimilation capability.

Objectives: (1) Define and quantify the reaeration coefficients of the Rio Grande downstream from the City of Albuquerque's wastewater-treatment plant during critical low-flow periods. (2) Define the dispersion characteristics of the Rio Grande at a higher streamflow by use of a tracer dye study.

Approach: Reaeration coefficients of a stream are estimated using propane gas and a tracer dye. Propane gas is forced through porous-plate diffusers at two or three points in a stream cross section. A constant rate injection is required for 1 to 2 hours. Rhodamine-WT dye is simultaneously injected as the dispersion-dilution tracer. Gas and dye response curves are determined at downstream sites and reaeration coefficients are calculated for the river reaches.

Progress and Significant Results: Reaeration coefficient data were presented to the cooperator. Because of the successful results of the first period of study, the cooperator decided not to conduct the second period of study.

Plans for FY 93: Project has been completed except for publication of the report.

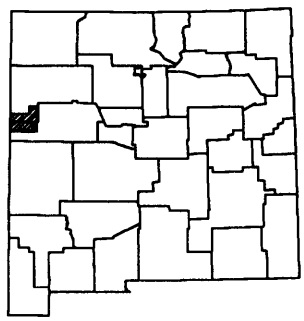
Reports in Progress: Waltemeyer, S.D., Traveltime and reaeration characteristics of a reach of the Rio Grande flowing through Albuquerque, New Mexico: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released: None

CHARACTERIZATION AND EVALUATION OF EROSION IN WATERSHEDS ON THE ZUNI RESERVATION (NM283)

Period of Project: January 1991 to September 1994

Study Location: McKinley and Cibola Counties, west-central New Mexico



Principal Investigator: Allen C. Gellis

Cooperating Agency: Pueblo of Zuni

Problem: Active arroyo incision and headward growth of gullies on the Zuni Reservation are responsible for significant erosion. In an effort to prevent further erosion, the Zuni Tribe is considering watershed rehabilitation measures. Because the geomorphic and hydraulic factors involved in controlling erosion are complex, a systematic data-collection program is needed for a better understanding of these processes.

Objectives: (1) Evaluate the erosional conditions of channels and hillslopes on the Zuni Reservation. (2) Determine the geomorphic and hydraulic changes occurring in arroyos since incision began at the turn of the century. (3) Evaluate the condition of current and historical sediment-control structures.

Approach: Establish a data base on hydrology, hydraulics, channel geometry, and other geomorphic aspects of selected watersheds using channel surveys, erosion pins, sediment traps, and GIS analysis. Compile historical information on channels.

Progress and Significant Results: Two streamflow-gaging stations were installed. Surveys of two watersheds, Y-Unit Draw and Conservation Draw, are 90 percent complete. Resurveys were conducted in selected reaches after an August 1992 storm, including a survey of high-water marks at Conservation Draw. Runoff-sediment traps were installed in four locations of various land covers, including sage, mixed grass, piñon and juniper, and pasture. Delineation of a land-cover map for the Rio Nutria watershed is 90 percent complete. Step-backwater surveys were performed at Y-Unit Draw and Conservation Draw.

Plans for FY 93: Install runoff-sediment traps in the Conservation Draw watershed. Monitor erosion in grazed and ungrazed areas. Digitize the land-cover map into GIS. Begin delineating gullies and roads from a 1934 set of aerial photos. Continue channel surveying and install temporary staff gages at three irrigation ditches. Complete step-backwater analysis.

Reports in Progress:

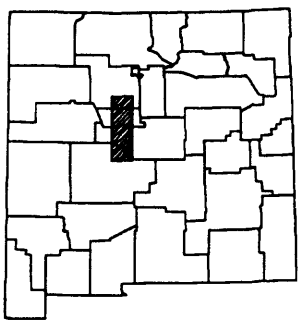
An outline of the final report has been prepared.

Reports Released: None

SIMULATION OF LONG-TERM REGIONAL AND SHORT-TERM LOCAL EFFECTS OF GROUND-WATER WITHDRAWAL ON GROUND-WATER LEVELS AND STREAMFLOW OF THE RIO GRANDE IN THE ALBUQUERQUE BASIN (NM284)

Period of Project: July 1992 to June 1994

Study Location: Albuquerque Basin



Principal Investigator: John Michael Kernodle

Cooperating Agency: City of Albuquerque

Problem: The regional and local ground-water resources of the Albuquerque Basin have not been adequately defined to quantify hydraulic responses to ongoing ground-water development. Pumping water levels in production wells in the northeast quadrant of Albuquerque have unexpectedly declined more than 100 feet in recent years. Nonpumping water levels have declined 11 feet per year west of the Rio Grande in the Volcano Cliffs well field.

Objectives: Use recently gathered information to requantify ground-water resources of the Albuquerque Basin and redefine the hydraulic response of the ground-water/surface-water system to past, current, and projected demands, thereby allowing the development of sound, long-range plans for resource management. Assess the effects of selected plans for future development on Rio Grande streamflow and ground-water levels in the basin.

Approach: (1) Develop spatial data bases. (2) Provide regional hydrologic information. (3) Use numerical-modeling techniques to quantify the system. (4) Evaluate future scenarios. (5) Transfer the simulation technology to the cooperator.

Progress and Significant Results: An intensive literature search was completed. Base maps were prepared, and existing water-table and potentiometric maps were digitized and entered into GIS. A map of 1992 water-table altitudes was begun. Current period-of-record hydrographs were prepared for about 75 wells in the study area and about 25 wells in the immediate Albuquerque area. Cultural, demographic, and population data were compiled. GIS coverages were prepared using 1970-90 census data. Annual ground-water-withdrawal data were compiled. Spatial-data acquisitions included accurate locations of City wells, City annexation history, City water-utilities expansions, land-use and plat data, location of precipitation stations, delineated urban drainage areas, and regional and local topographic data.

Plans for FY 93: Compilation of ground-water-withdrawal data will continue, with emphasis on post-1980 data for industrial, agricultural, and small public-supply systems. Climatic data will be compiled. Stream-aquifer hydraulics in the Rio Grande flood plain will be investigated. A surface-water budget will be developed. Ground-water-flow modeling of the basin will begin.

Reports in Progress: None

Reports Released:

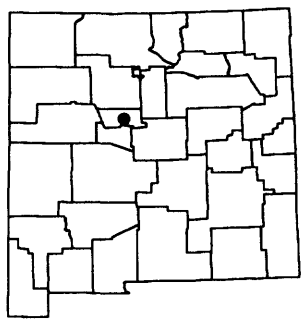
Thorn, C.R., McAda, D.M., and Kernodle, J.M., 1993, Geohydrologic framework and hydrologic characteristics of the Albuquerque Basin, central New Mexico: U.S. Geological Survey Water-Resources Investigations Report 93-4149, 106 p., 1 app.

WATER QUALITY OF URBAN STORM-WATER RUNOFF IN ALBUQUERQUE

(NM285)

Period of Project: June 1992 to September 1993

Study Location: Albuquerque



Principal Investigator: Jack E. Veenhuis

Cooperating Agency: City of Albuquerque

Problem: The Water Quality Act requires large municipalities to obtain permits to control the quality of storm runoff. Permit applications must include, among other information, the quality and quantity of storm runoff in conveyance channels and storm and seasonal loads of selected pollutants in conveyance channels.

Objectives: Characterize storm-water quantity and quality for conveyances representative of land use in different parts of Albuquerque. Estimate mean concentrations and loads of selected pollutants in storm water. Assist in the design of a monitoring program that will provide representative storm-water-quality data for the life of the permit.

Approach: Establish sampling sites on five channels or arroyos and collect runoff samples from six storms at each site. Samples will be analyzed for an extensive list of pollutants specified by the U.S. Environmental Protection Agency. Channel discharge will be determined at each site. Determine mean concentrations and seasonal loads. Assist the City of Albuquerque in the design of a storm-water runoff program based on field results.

Progress and Significant Results: Five sampling sites were established and instrumented. Twenty-seven storm-water samples were collected and sent to the laboratory for analysis. Rainfall data and flow data were compiled for future analysis.

Plans for FY 93: Establish sites and collect water-quality samples for six storms at five sites. Submit samples to lab for analysis. Begin calculation of storm loads and calculate seasonal loads when possible.

Reports in Progress: None

Reports Released: None

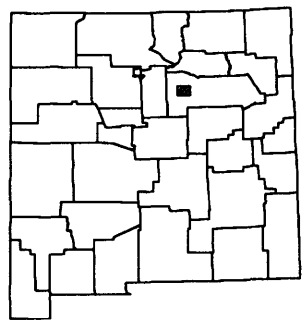
EFFECTS OF FOREST MANAGEMENT PRACTICES ON SEDIMENTATION OF A HIGH MOUNTAIN STREAM IN THE SOUTHERN ROCKY MOUNTAINS OF NEW MEXICO (NM352)

Period of Project: April 1987 to September 1992

Study Location: Northwestern San Miguel County

Principal Investigator: Herbert S. Garn

Cooperating Agency: U.S. Forest Service



Problem: Little information is available about the effects on stream sediment from forest harvesting activities in New Mexico and in the Southwest. Such information is needed to evaluate the effectiveness of sediment-control plans and to develop the best silvicultural management practices to control nonpoint-source pollution.

Objectives: (1) Evaluate the effects of forest harvesting practices and road construction activities on the suspended-sediment characteristics of a mountain stream. (2) Compare changes in stream sediment loads to land-use practices and relate these changes to water-quality standards.

Approach: Paired upstream and downstream water-quality stations will monitor the effects of timber harvesting and road construction activities. Emphasis will be placed on monitoring stream sediment loads during runoff. Stations will be operated seasonally to coincide with snowmelt runoff and summer thunderstorm runoff, which result in the bulk of the annual sedimentation. Suspended sediment and physical properties will be analyzed.

Progress and Significant Results: One streamflow sampling site was operated on Tecolote Creek. Data for 1991 and 1992 were published in the annual data report, "Water resources data, New Mexico." Data collection on Gallinas Creek was completed.

Plans for FY 93: Publish 1992 data in the annual data report, "Water resources data, New Mexico." The timber sale in the monitored area of Tecolote Creek did not occur; therefore, the project was suspended at the end of fiscal year 1992.

Reports in Progress:

Garn, H.S., Variations in water quality of Gallinas Creek, water supply for the City of Las Vegas, San Miguel County, New Mexico, with a section on Aquatic macroinvertebrates: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released:

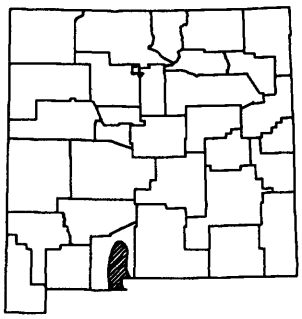
Garn, H.S., Piatt, Jim, and Sims, Bruce, 1989, Water-quality monitoring to evaluate best management practices of timber harvesting activities, Tecolote Creek watershed, New Mexico [abs.]: Proceedings, American Water Resources Association, Conference on Advances in Management of Southwestern Watersheds, Socorro, N. Mex., 1989.

MONITORING OF GROUND-WATER/SURFACE-WATER RELATIONS IN THE MESILLA BASIN, SOUTH-CENTRAL NEW MEXICO (NM356)

Period of Project: October 1987 to September 1995

Study Location: Mesilla Basin in Doña Ana County, New Mexico, and El Paso County, Texas

Principal Investigator: Edward L. Nickerson



Cooperating Agencies: U.S. Bureau of Reclamation and the International Boundary and Water Commission--U.S. Section

Problem: Large increases in population in and adjacent to the Mesilla Basin have resulted in increased withdrawals of ground water. A significant hydraulic connection exists between the ground-water flow system and the Rio Grande. Long-term hydrologic data are needed to monitor changing hydrologic conditions within the ground-water/surface-water system in the Mesilla Basin.

Objectives: (1) Expand the observation-well network in areas where data are inadequate. (2) Conduct seepage investigations on the Rio Grande. (3) Monitor ground-water and surface-water levels within the Mesilla Basin.

Approach: Conduct an inventory on about 20 existing wells completed in the Santa Fe Group for inclusion in the Mesilla Basin observation-well network. Conduct seepage investigations on the Rio Grande, including monitoring of ground-water levels and chemical analyses of water samples collected from the Rio Grande at selected sites. Assist with data collection at the Mesilla Valley hydrologic sections in conjunction with project NM267.

Progress and Significant Results: Conducted seepage investigations on the Rio Grande along a 62-mile reach downstream from Leasburg Dam near Radium Springs, New Mexico, to El Paso, Texas, on January 8-9, 1991, and December 17-18, 1991. The seepage investigations included streamflow measurements at 34 sites, monitoring of ground-water levels in the Rio Grande flood-plain alluvium, and chemical analyses of water samples collected from the Rio Grande at six sites. Conducted ground-water site inventory of 13 wells completed in the Santa Fe Group to be included in the Mesilla Basin observation-well network. Assisted with data collection of continuous water-level records at the Mesilla Valley hydrologic section.

Plans for FY 93: Conduct another seepage investigation of the Rio Grande downstream from Leasburg Dam near Radium Springs, New Mexico, to El Paso, Texas. Assist in maintenance of continuous water-level records at the Mesilla Valley hydrologic sections (project NM267). Compile geohydrologic data collected in the Mesilla Basin (projects NM356 and NM267) for distribution to cooperating agencies.

Reports in Progress: None

Reports Released: None

INTERNATIONAL HYDROLOGIC EVALUATIONS AND DEVELOPMENT OF AN INTERNATIONAL WATER-RESOURCES DATA BASE IN SUPPORT OF THE TOPOGRAPHIC ENGINEERING CENTER, FORT BELVOIR, VIRGINIA (NM359)

Period of Project: Continuous since 1985

Principal Investigator: Dale R. Rankin

Cooperating Agency: U.S. Army Corps of Engineers, Topographic Engineering Center, Fort Belvoir, Virginia

Problem: In the past, most United States military deployments have been in nonarid areas of the world where freshwater supplies were relatively accessible. Recently U.S. military planners have recognized a need for water-support planning in parts of the world where water resources are limited and difficult to access.

Objective: Determine distribution and availability of surface water, ground water, and existing water-supply facilities in various parts of the world.

Approach: Compile hydrologic and geologic data to be incorporated into a worldwide water-resources data base. Analyze and interpret compiled water-resources information. Use results to prepare hydrologic maps of the study areas.

Progress and Significant Results: In fiscal years 1991-92, hydrologic investigations were completed for specified areas in Pakistan, Saudi Arabia, and Honduras. In addition, a data search and data collection were conducted for the area covered by the 1:250,000 Las Cruces, New Mexico, map sheet.

Plans for FY 93: Continue hydrologic investigations of areas in Saudi Arabia. Begin hydrologic investigations of specified areas in North Africa.

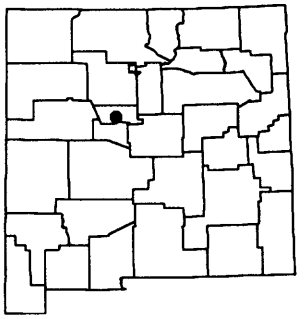
INVESTIGATION OF POSSIBLE GROUND-WATER CONTAMINATION AT KIRTLAND AIR FORCE BASE (NM360)

Period of Project: October 1988 to December 1993

Study Location: Albuquerque

Principal Investigator: Ralph W. Wilcox

Cooperating Agency: U.S. Air Force



Problem: Ten sites on Kirtland Air Force Base have been identified where past or present activities may have contaminated ground water. These sites include: three inactive landfills, a fire training area, an explosive ordnance disposal area, a ranch where cratering was tested with explosives, the arroyo (Tijeras Arroyo) that drains the base, a sewage lagoon, a golf course, and a golf course pond.

Objectives: Determine the presence, extent, and movement of contaminants at the sites.

Approach: Collect shallow soil, sediment, and sludge samples at a number of sites, deep soil samples (5 to 100 feet) at well sites, and surface-water samples at several sites and analyze for nutrients, metals, volatile organic compounds, semivolatile organic compounds, and explosives. Install 10 monitoring wells. Collect ground-water samples from the wells and analyze for similar compounds. Conduct aquifer tests in the monitoring wells to determine the hydrologic properties of the uppermost aquifer. Conduct an electromagnetic and a magnetometer surface-geophysical survey at one site and a soil gas survey at one site. Use the results of the laboratory analyses and the surveys to determine the presence, extent, and movement of any contaminants that may be discovered.

Progress and Significant Results: Remedial action was taken by the Air Force on sludge found in the sewage lagoons. Completed first draft of the technical report and submitted to the Air Force. Completed the Installation Restoration Program Information System Management System (IRPIMS) data base.

Plans for FY 93: Complete second-draft and final technical report, and submit to the Air Force.

Reports in Progress: Final technical report.

Reports Released: None

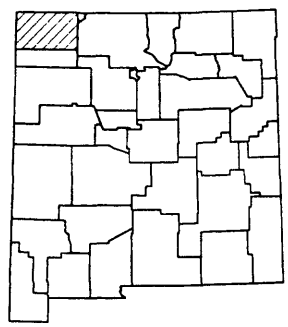
RECONNAISSANCE INVESTIGATION OF IRRIGATION DRAINAGE IN THE SAN JUAN RIVER AREA, SAN JUAN COUNTY, NORTHWESTERN NEW MEXICO (NM362)

Period of Project: January 1990 to January 1992

Study Location: San Juan County

Principal Investigator: Paul J. Blanchard

Cooperating Agency: Federal Program



Problem: Previous studies in the San Juan River area indicated that concentrations of some inorganic and organic substances in water and biota may be large enough to cause or have the potential to cause harmful effects to human health or wildlife. Also, the geologic units of the area have the potential to yield significant amounts of selenium and other trace elements to water, sediment, and biota. About 78 percent of the water used in San Juan County is for irrigation; about 60,000 acres are irrigated by four U.S. Department of Interior (DOI)-sponsored irrigation projects. Water-quality problems, including high selenium concentrations, have been attributed to irrigation drainage in other areas of the Western United States; similar problems could exist in the study area.

Objectives: Determine if irrigation drainage from the DOI-sponsored irrigation projects in the San Juan River area: (1) has caused or has the potential to cause significant harmful effects on human health, fish, or wildlife; or (2) may reduce the suitability of water for beneficial uses.

Approach: The study includes collection and analysis of water, bottom-sediment, and biota samples from the San Juan River upstream from, downstream from, and adjacent to DOI-sponsored irrigation projects; from diversions from the river; and from wetlands, ponds, and streams within and at areas of irrigation discharge. Samples are analyzed for major ions, selected trace metals, and selected pesticides. Acute toxicity tests are conducted on water samples from selected sites. The project team also includes personnel from the U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, and U.S. Bureau of Indian Affairs; a Geological Survey hydrologist serves as team leader.

Progress and Significant Results: Project has been completed.

Plans for FY 93: Prepare a work plan for a second, more detailed study of the San Juan River area and begin work on the new study.

Reports in Progress:

Thomas, C.L., in press, Reconnaissance and detailed studies of water and sediment quality associated with irrigation projects of the San Juan River area, New Mexico [abs.].

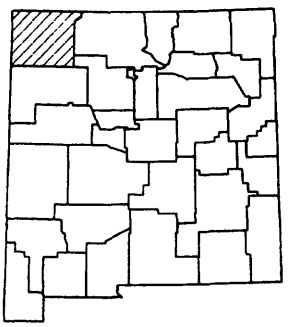
Reports Released:

Blanchard, P.J., Roy, R.R., and O'Brien, T.F., 1993, Reconnaissance investigation of the water quality, bottom sediment, and biota associated with irrigation drainage in the San Juan River area, San Juan County, northwestern New Mexico: U.S. Geological Survey Water-Resources Investigations Report 93-4065, 141 p.

RECONNAISSANCE STUDY OF THE WATER QUALITY OF THE SAN JUAN AND CHACO RIVERS AND SELECTED ALLUVIAL AQUIFERS FROM NEAR FARMINGTON TO BELOW SHIPROCK (NM363)

Period of Project: May 1990 to June 1992

Study Location: San Juan County



Principal Investigator: Condé R. Thorn

Cooperating Agency: U.S. Bureau of Reclamation

Problem: Reconnaissance studies completed by the Bureau of Reclamation identified ground-water discharge and surface-water inflow to the San Juan River that have increased the salinity in the river. Specific areas of salinity input are not known.

Objective: Provide water-quality data to evaluate the potential contribution of increased salinity in the San Juan and Chaco Rivers from natural ground-water discharge and from oil- and gas-well installation.

Approach: Analyze water samples collected at 16 surface-water and ground-water sites during July, August, October, and December 1990 and January 1991.

Progress and Significant Results: Data have been collected and compiled.

Plans for FY 93: Project has been completed.

Reports in Progress: None

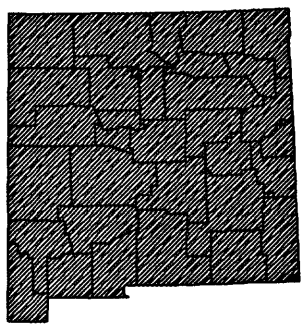
Reports Released:

Thorn, C.R., 1993, Water-quality data from the San Juan and Chaco Rivers and selected alluvial aquifers, San Juan County, New Mexico: U.S. Geological Survey Open-File Report 93-84, 37 p.

COMPUTATIONAL GROUND-WATER HYDROLOGY (NM365)

Period of Project: Continuous since September 1990

Study Location: Statewide



Principal Investigator: Logan H. Kuiper

Cooperating Agency: Federal Program

Problem: To enhance knowledge in the field of computational hydrology, porous media flow, including solute transport in variable density, saturated/unsaturated flow, and multiphase flow, needs to be investigated. Numerical and computational techniques need to be developed, along with computer code to solve scientific problems in the earth sciences.

Objectives: (1) Develop new mathematical and numerical techniques for the solution of the equations for ground-water flow and solute transport. Central to this effort are the development and implementation of improved preconditioners for use with linear system solvers, particularly for convection-dominated transport. (2) Develop complete ground-water flow and transport models. (3) Develop numerical models and techniques for the simulation of specific physical processes of interest to the Geological Survey. (4) Develop computer codes in various languages for various types of computer architecture that are most useful for specific studies.

Approach: The approach used will be that of the field of scientific computing as exists in literature. Extensions of these disciplines will be developed. Supercomputing methods will be emphasized.

Progress and Significant Results: The code for solute transport, Finite Element Integrated Solute Transport Analysis (ELISA), was completed, and a preliminary report was drafted. The code for two-phase flow (water and steam) was developed and used in the Yucca Mountain investigation. The results were presented at a meeting of the American Geophysical Union.

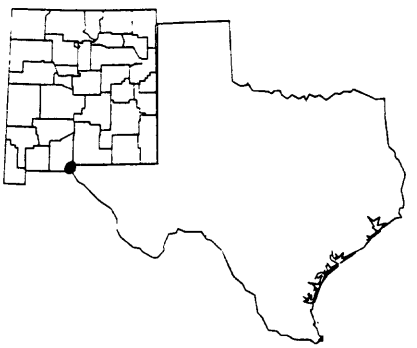
Plans for FY 93: Publish the report.

Reports in Progress:

Kuiper, L.H., ELISA--Finite Element Integrated Solute Transport Analysis: U.S. Geological Survey Water-Resources Investigations Report.

Reports Released: None

INVESTIGATION OF LAND-SURFACE SUBSIDENCE IN THE EL PASO, TEXAS, AREA--PHASE II (NM366)



Period of Project: July 1992 to September 1995

Study Location: El Paso, Texas

Principal Investigator: Charles E. Heywood

Cooperating Agency: International Boundary and Water Commission--U.S. Section

Problem: The proposed extension of the American Canal will reduce aquifer recharge and may contribute to additional land subsidence.

Objectives: Quantify recent historical subsidence in the El Paso area. Distinguish the components of land subsidence due to compaction in the deep versus shallow parts of the aquifer. Determine the hydraulic diffusivities of compacting clay beds and the long-term elastic and inelastic storage properties of the aquifer system. Determine the preconsolidation stress in the vicinity of the proposed changes to the surface-water system. Evaluate the predictions of the preliminary subsidence model using additional data.

Approach: Install two extensometers to monitor compaction in both the deep and shallow portions of the aquifer system. Resurvey existing benchmarks with conventional spirit levels and the Global Positioning System (GPS) to quantify recent altitude changes due to subsidence and to facilitate future surveys. Conduct laboratory consolidation testing on clay cores to determine hydraulic diffusivity and compressibility for comparison with field measurements. Install six piezometers to monitor aquifer pore pressure at various depths and to enable stress-strain analysis of extensometer records.

Progress and Significant Results: The deepest drilled hole (1,125 feet) was logged with two complete suites of geophysical sensors. Six 4-inch-diameter cores were taken from major clay units at various depths. The deep extensometer was completed at a depth of 1,000 feet; the shallow extensometer was completed at a depth of 339 feet. Both extensometers are referenced to the same surface datum table. The compaction records are being continuously recorded on analog strip charts and half-hourly on a digital data logger. The temperatures at five points of the extensometer apparatus and barometric pressure are also being recorded every 30 minutes.

Six piezometers were installed with 10-foot stainless steel screens at depths of 114 to 124 feet, 181 to 191 feet, 348 to 358 feet, 566 to 576 feet, 659 to 669 feet, and 1,044 to 1,054 feet. The altitudes of the piezometer nests were surveyed, and the piezometric head in each piezometer is being digitally recorded every half hour.

Benchmarks in El Paso were resurveyed to first order, first class accuracy by the National Geodetic Survey. Several points were also surveyed to high accuracy with the GPS in differential mode.

Plans for FY 93: Expand the network of GPS points and make precision gravity measurements at those points. Analyze piezometric and compaction data. Conduct laboratory consolidation testing.

Reports in Progress:

Heywood, C.E., Monitoring aquifer compaction and land subsidence due to ground-water withdrawal in the El Paso, Texas-Juarez, Chihuahua, area, in Prince, K.R., Galloway, D.L., and Leake, S.A., eds., U.S. Geological Survey Subsidence Interest Group Conference, Edwards Air Force Base, Antelope Valley, Calif., November 18-19, 1992: Abstracts and summary: U.S. Geological Survey Open-File Report.

Reports Released:

Kernodle, J.M., 1992, Results of simulations by a preliminary numerical model of land subsidence in the El Paso, Texas, area: U.S. Geological Survey Water-Resources Investigations Report 92-4037, 35 p. [Phase I of project].

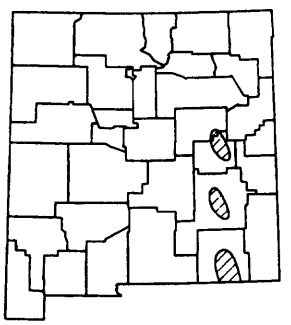
FIELD SCREENING OF BOTTOM SEDIMENT AND BIOTA FOR CONCENTRATIONS OF MAJOR IONS, TRACE ELEMENTS, AND ORGANOCHLORINE PESTICIDES ASSOCIATED WITH IRRIGATION DRAINAGE IN THE MIDDLE PECOS RIVER DRAINAGE, NEW MEXICO (NM368)

Period of Project: October 1991 to October 1992

Study Location: Eastern and southeastern New Mexico

Principal Investigator: Paul J. Blanchard

Cooperating Agency: Federal Program



Problem: The middle Pecos River drainage in New Mexico is an important migratory bird flyway. Two DOI-sponsored irrigation projects are located in the drainage: (1) the Fort Sumner Project immediately south of Fort Sumner, which contains about 6,500 irrigable acres; and (2) the Carlsbad Project immediately south of Carlsbad, which contains about 25,000 irrigable acres. Irrigation drainage from these projects could have the potential to cause harmful effects on human health, fish, and wildlife, or may adversely affect the suitability of water for other beneficial uses.

Objectives: (1) Determine if greater-than-background concentrations of major ions, trace elements, and organochlorine pesticides are present in bottom sediment and fish in the Pecos River downstream from the two irrigation projects. (2) Determine if concentrations of these constituents in bottom sediment and bird embryos from a representative site in the Bitter Lake National Wildlife Refuge (NWR), which is between the two irrigation projects, are large enough to be potentially harmful to wildlife on the refuge.

Approach: Collect and analyze bottom-sediment and fish samples from eight sites on the Pecos River, and collect and analyze a bottom-sediment and a bird-embryo sample from Bitter Lake NWR. Compare analytical results to determine if differences in concentration exist among sites, and if so, determine if the larger concentrations occur near irrigation drains. Compare concentrations in biota to those in the literature that are reported to cause adverse effects to wildlife.

Progress and Significant Results: Sample collection and analysis have been completed and the results were reported to the DOI Irrigation Drainage Water Quality Program.

Plans for FY 93: Project has been completed.

Reports in Progress: None

Reports Released: None

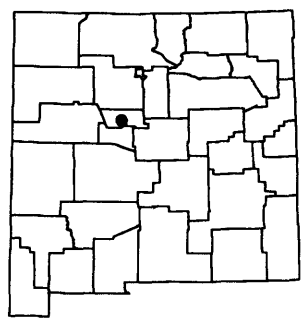
LITHOLOGIC LOGGING OF CORE CUTTINGS FROM ENVIRONMENTAL RESTORATION SITES, SANDIA NATIONAL LABORATORIES, KIRTLAND AIR FORCE BASE (NM369)

Period of Project: May 1992 to September 1994

Study Location: Albuquerque

Principal Investigator: Cynthia G. Abeyta

Cooperating Agency: Sandia National Laboratories



Problem: Sandia National Laboratories (SNL) Environmental Restoration Division is conducting investigations to characterize the Kirtland Air Force Base (KAFB) regional hydrogeology. The investigation includes identification of the geologic framework of SNL sites located on KAFB that have the potential to contaminate the environment or endanger health. SNL is in the process of drilling boreholes and installing monitoring wells at SNL and KAFB to collect data for the Environmental Restoration investigations.

Objective: Collect hydrologic and geologic data to describe the hydrogeologic environment on and adjacent to the SNL project sites. Hydrologic and geologic data also will be used by the Environmental Restoration Program as input for the design of well installations, remediation strategies, and modeling of ground-water flow and contaminant transport. Investigation of the hydrogeologic environment requires that lithologic data be collected in a format that can be readily used in statistical distributions.

Approach: On-site hydrologic and geologic data are collected during the borehole drilling process as the core and cuttings are retrieved from various drilling operations. Data collected include: (1) lithologic descriptions, (2) general field observations, (3) location of water tables and perched saturated zones, (4) description of contaminants that may be visible or have an odor, and (5) interpretations of depositional environments. Data are analyzed and interpreted. Results will be published in site-specific final technical reports that may include lithologic logs, stratigraphic columns, geophysical logs, cross sections, fence diagrams, core analyses, or other related data.

Progress and Significant Results: In fiscal year 1992, data were collected from four boreholes at the South Fence Road site, eight boreholes at the Area 5 Liquid Waste site, one borehole at the Tech Area 2 site, two boreholes at the Chemical Waste Landfill, and one borehole at the Mixed Waste Landfill. The data have been reviewed, verified, and edited. Major sections of the final reports are being completed.

Plans for FY 93: Complete data collection at the South Fence Road site, Area 5 Liquid Waste site, and Tech Area 2 site. Complete data analysis, interpretation, and final technical reports.

Reports in Progress: Final technical reports.

Reports Released: None

RIO GRANDE VALLEY NATIONAL WATER-QUALITY

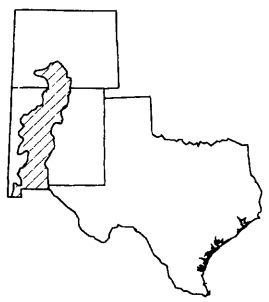
ASSESSMENT PROGRAM (NM425)

Period of Project: Continuous since October 1990

Study Location: Rio Grande Valley upstream from El Paso, Texas, in Colorado, New Mexico, and Texas

Principal Investigator: Sherman R. Ellis

Cooperating Agency: Federal Program



Problem: The Nation's water resources are composed of many interrelated ground- and surface-water systems that respond to natural and human factors. A corresponding set of hydrologic, chemical, and biological characteristics reflects the water quality associated with these natural and human factors. Many National water-quality concerns arise from the recognition of recurring local and regional problems related to managing and protecting water quality.

Objectives: (1) Provide a description of current water-quality conditions such that the Rio Grande Valley can be integrated into a National assessment of the Nation's water quality. (2) Define long-term trends (or lack of trends) in water quality. (3) Identify, describe, and explain, to the extent possible, the major natural and human factors that affect observed water-quality conditions and trends within the Rio Grande Valley.

Approach: Water-quality data will be acquired from other agencies, then entered into the National Water-Quality Assessment program (NAWQA) data base. Surface-water and ground-water data will be collected. Biological and habitat data will be collected at about 10 surface-water sites. Types of water-quality data to be collected are common ions, nutrients, trace elements, pesticides and other organic compounds, and biological. Ground-water activities include collecting data on specific types of land use, such as irrigated row crops and urban areas, then relating the water quality to land use.

Progress and Significant Results: Bed-sediment and tissue samples were collected at about 17 sites during FY 92. An analysis of existing data has been completed and a report has been written. A report, to be published in the American Water Resources Association Monogram Series, was approved for publication.

Plans for FY 93: Water will be sampled at about 18 surface-water sites and ground water sampled at an agricultural area and an urban area. About 40 samples to be analyzed for 2-4, D and atrazine will be collected at selected surface-water sites. Biological sampling and habitat assessment will be conducted at about 10 sites.

Reports in Progress:

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INQUIRIES AND HOW TO ORDER NEW MEXICO DISTRICT PUBLICATIONS

Inquiries regarding projects described in this report may be directed to the District Office, Subdistrict offices, or Field Headquarters in which the work originated or is being conducted.

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A monthly catalog, "New Publications of the Geological Survey," lists reports and maps published during the previous month. Free subscriptions to the monthly list are available on application to the Geological Survey, 582 National Center, Reston, Virginia 22092.

Open-File Reports and Water-Resources Investigations Reports can be purchased from the U.S. Geological Survey, Earth Science Information Center, Open-File Reports Section, Box 25286, MS 517, Denver Federal Center, Denver, Colorado 80225 (telephone 303-236-7476). Please specify the report number.

The New Mexico District Water-Data Reports, published annually, are available through the National Technical Information Service, U.S. Department of Commerce, Springfield, Virginia 22161. Water-Data Reports are compilations of streamflow data, ground-water levels, and water quality of surface and ground water. Beginning with water year 1990, all Water-Data Reports will also be available on Compact Disc - Read Only Memory (CD-ROM). Each single CD-ROM disc will include all Water-Data Reports published for the current water year for the entire Nation, including Puerto Rico and the Trust Territories.

Maps, map reports, and formal series reports (Professional Papers, Bulletins, Water-Supply Papers, Circulars, and Techniques of Water-Resources Investigations) can be purchased from the U.S. Geological Survey, Map Distribution Branch, Box 25286, MS 306, Denver Federal Center, Denver, Colorado 80225 (telephone 303-236-7477 or 1-800-USA-MAPS).

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