A SUMMARY OF WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY IN IOWA, FISCAL YEAR 1990

Compiled by Richard A. Karsten

U.S. GEOLOGICAL SURVEY

Open-File Report 90-583

Iowa City, Iowa
1990

U.S. DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

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District Chief
U.S. Geological Survey
Rm. 269, Federal Building
400 South Clinton Street
Iowa City, Iowa 52244

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U.S. Geological Survey
Books and Open-File Reports
Federal Center, Bldg. 810
Box 25425
Denver, Colorado 80225

MESSAGE FROM THE DISTRICT CHIEF

The collection of hydrologic data and the investigation and assessment of the quantity, quality, and use of surface- and ground-water resources are major components of the mission of the Water Resources Division, U.S. Geological Survey. To accomplish this mission, the Iowa District is organized into a district office and two field offices. These offices are geographically located in the State to provide access and response to hydrologic events and to maintain liaison with cooperating State and Federal agencies. The Iowa District technical staff is organized into two major sections: (1) the Hydrologic Surveillance Section, which maintains the systematic hydrologic data programs for the State; and (2) the Hydrologic Studies Section, which investigates and assesses the quantity, quality, and use of the State's water resources.

The Hydrologic Surveillance Section maintains a network of hydrologic data collection sites and compiles hydrologic data collected from these sites for public distribution. These hydrologic data include records of stage and discharge of principal rivers and tributaries, chemistry and suspended sediment concentration of selected rivers, ground-water levels and water-quality of principal aquifers, precipitation chemistry, and surface- and ground-water use. Data from this network are compiled and entered in the National Water Information System data base, located in Reston, Virginia, and are published annually in the report series "Water Resources Data, Iowa".

The Iowa District has made substantial progress in developing a real-time hydrologic data base. Surface- and ground-water data at selected sites are transmitted to the Iowa District central hydrologic data base at regular intervals using satellite or ground data relay systems. This information is accessible to scientists or water managers to assess current hydrologic conditions. The development of a comprehensive real-time hydrologic network for the State is a goal of a the Iowa District for the 1990's.

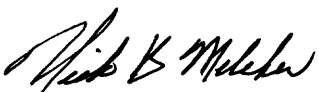
The Hydrologic Studies Section conducts investigations and assessments of the surface- and ground-water resources of Iowa which is accomplished through a series of diversified projects. Each project is managed by a designated project chief who is responsible for managing the investigative aspects of the project, maintaining a project budget, and providing public access to the findings of the project.

New projects planned for the Iowa District for the 1990's include:

- Estimating design flood discharges for Iowa using drainage basin and channel geometry characteristics.
- Investigation of the occurrence of pesticide non-active ingredients in soil and water.
- Assessment of water quality of surface water impoundments.

The effects of land use practices on water resources and the effect of chemical fertilizers and pesticides on surface- and ground-water quality is a growing public concern in Iowa. The Iowa District presently is conducting several State and Federally supported projects relating the effects of agricultural chemical use to the State's water resources. Assessing the effect of these contaminants on surface- and ground-water supplies and analyzing the processes of chemical transport through the hydrologic systems represents both a challenge and an opportunity for the Iowa District for the 1990's.

Utilizing the energy and interests of the Iowa District staff, the Iowa District can continue to assist cooperating State and Federal agencies by providing accurate and timely hydrologic information. I look forward to continuing partnerships that will provide the basis for the beneficial use and management of Iowa's water resources.



N.B. Melcher
District Chief
Iowa City, Iowa

ORIGIN AND MISSION OF THE U.S. GEOLOGICAL SURVEY

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

Since 1879, the research and fact-finding role of the U.S. Geological Survey has grown and been modified to meet the changing needs of the Nation it serves. As part of that evolution, the U.S. Geological 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's programs serve a diversity of needs and users. Programs include:

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

Along with its continuing commitment to meet the growing and changing earth-science needs of the Nation, the U.S. Geological Survey remains dedicated to its original mission to collect, analyze, interpret, publish, and disseminate information about the natural resources of the Nation -- providing 'Earth Science in the public service'.

MISSION AND PROGRAM OF THE WATER RESOURCES DIVISION

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

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

- Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources.

- Conducting analytical and interpretive water-resources appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface and ground water.

- Conducting basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems to predict their response to stress, either natural or manmade.

- Disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases.

- Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters.

Providing scientific and technical assistance in hydrologic fields to other Federal, State, and local agencies, to licensees of the Federal Energy Regulatory Commission, and to international agencies on behalf of the Department of State.

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ILLUSTRATIONS

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CONVERSION FACTORS

For readers who prefer to use metric (International System) units, conversion factors for inch-pound units used in this report are listed below:

Multiply inch-pound units	By	To obtain SI units
	Length	
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,047.0	square meter (m^2)
acre	0.4047	hectare
square foot (ft^2)	929.0	square centimeter (cm^2)

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

A SUMMARY OF WATER-RESOURCES ACTIVITIES OF THE U.S. GEOLOGICAL SURVEY IN IOWA, FISCAL YEAR 1990

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Richard A. Karsten

ABSTRACT

Water resources activities of the U.S. Geological Survey in Iowa consist of collecting hydrologic data and conducting interpretive studies. Hydrologic investigations in Iowa are made through three basic types of projects: (1) hydrologic data-collection programs; (2) local or areal hydrologic studies; and (3) statewide or regional investigations. These projects are funded through cooperative joint-funding agreements with Federal, State, and local agencies and direct Federal funds. The data and the results of the interpretive studies are published or released by either the U.S. Geological Survey or by cooperating agencies. This report describes: (1) the hydrologic data-collection programs; (2) the local or areal hydrologic investigations; and (3) statewide or regional studies conducted by the U.S Geological Survey in Iowa during fiscal year 1990 and provides a list of selected water-resources references for Iowa.

IOWA DISTRICT ORGANIZATION

The Iowa District of the U.S. Geological Survey, Water Resources Division, consists of two operating sections (the Hydrologic Studies Section and the Hydrologic Surveillance Section), two support units (the Administrative Services Section and the Computer Services Section), and three field offices (fig. 1). Personnel are based at the District Office in Iowa City and at the field headquarters in Council Bluffs, Fort Dodge, and Iowa City (fig. 2) The District operates with guidance from the Regional Office in Denver, Colorado and the National Headquarters in Reston, Virginia.

Requests for current streamflow data should be directed to the District Office or the Field Headquarters nearest the area of concern. Inquires regarding projects described in this report may be directed to the District Office listed below.

IOWA DISTRICT OFFICE

N.B. Melcher
District Chief
Water Resources Division
U.S. Geological Survey
269 Federal Building
P.O. Box 1230
Iowa City, Iowa 52244
Telephone (319) 337-4191

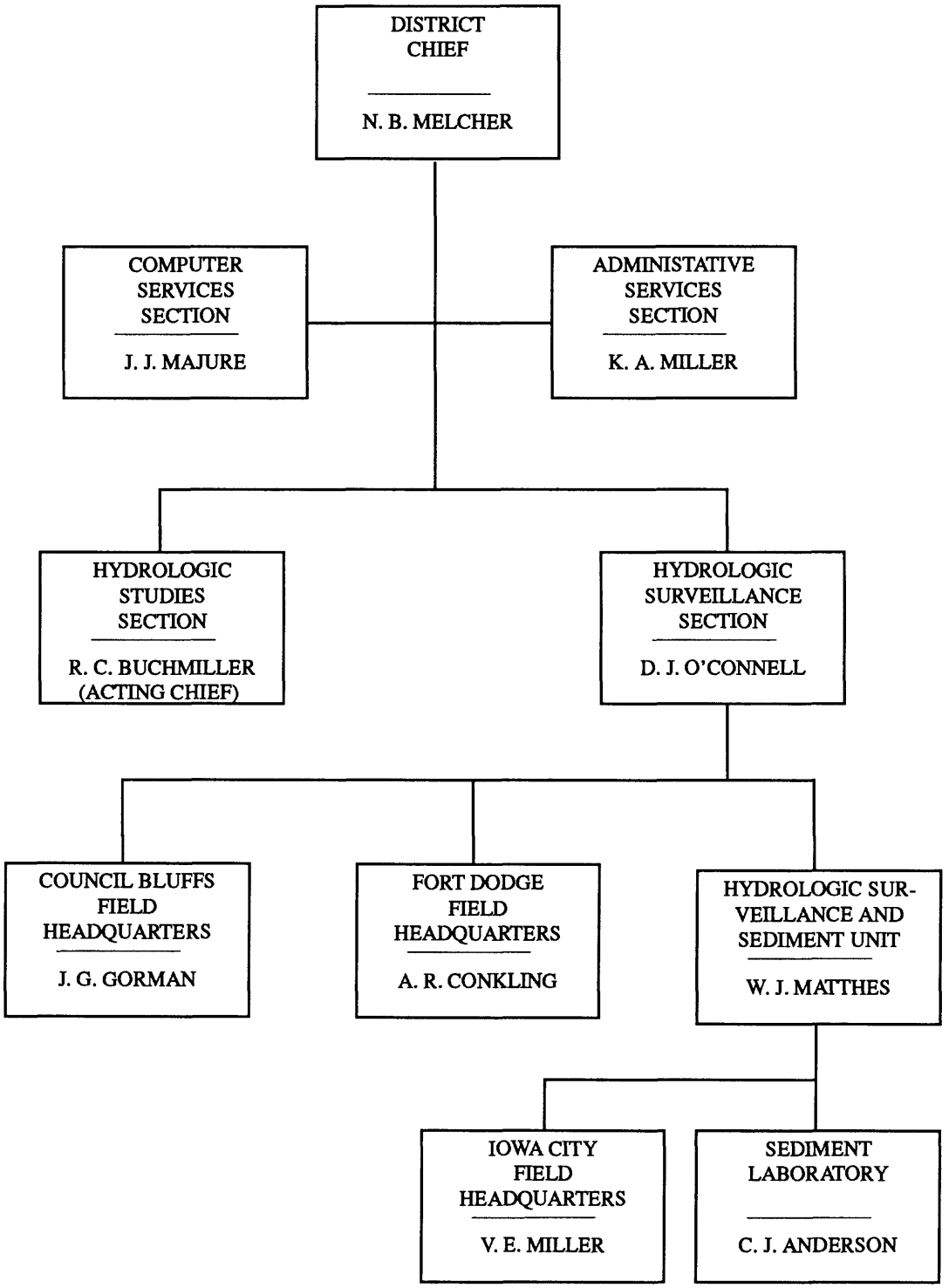

Figure 1.--Iowa district organization chart.

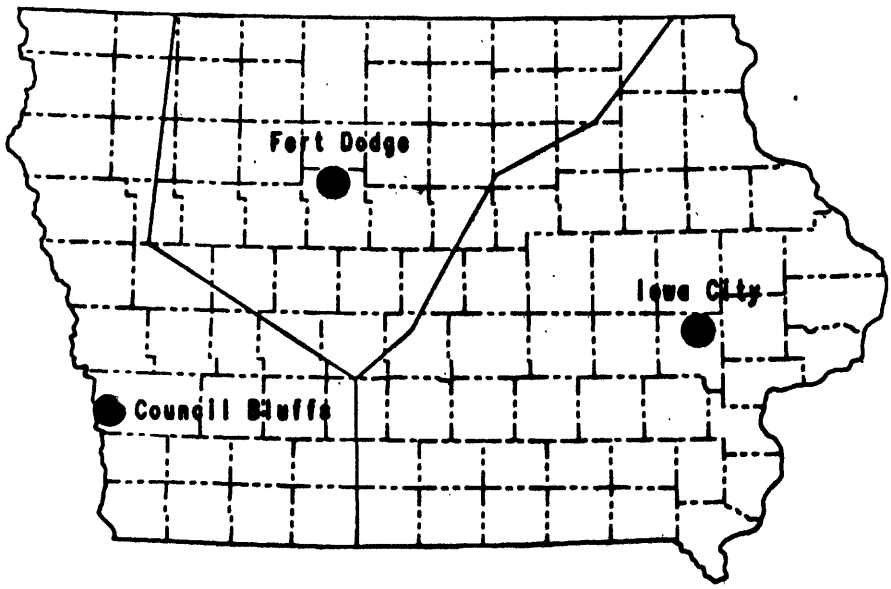

Figure 2.--Location of Water Resources Division offices and areas of field assignments in Iowa.

FIELD HEADQUARTERS

J. G. Gorman
Supervisory Hydrologic Technician
Water Resources Division
U.S. Geological Survey
250 Federal Building
P.O. Box 917
Council Bluffs, Iowa 51502
Telephone: (712) 323-8024

A.R. Conkling
Lead Hydrologic Technician
Water Resources Division
U.S. Geological Survey
456 Federal Building
P.O. Box 693
Fort Dodge, Iowa 50501
Telephone: (515) 576-4571

TYPES OF FUNDING

The hydrologic investigations and data collection efforts in the Iowa District are supported by services and funds provided by State and other agencies (table 1), matched on a 50-50 basis by Federal funds (cooperative program); by funds transferred from other Federal agencies such as the U.S. Army Corps of Engineers (OFA program); and by funds appropriated directly to the U.S. Geological Survey (Federal program). In fiscal year 1989, the financial support for these programs in Iowa was $2,952,568, which was distributed as shown in figure 3.

WHERE TO OBTAIN GEOLOGICAL SURVEY PUBLICATIONS

Current releases are described in a monthly pamphlet, "New Publications of the Geological Survey" which may be obtained from:

U.S. Geological Survey
Books and Open-File Reports
Federal Center, Bldg. 810
Box 25425
Denver, Colorado 80225

Professional Papers, Bulletins, Water-Supply Papers, Techniques of Water-Resources Investigations, Circulars, Earthquake Information Bulletins, and popular leaflets, pamphlets, and booklets may be purchased from the above address. Additional information is given in "Guide to Obtaining Information from the U.S. Geological Survey, 1982", U.S. Geological Survey Circular 900, which is available at no cost from the above address.

Table 1.--*Agencies Supporting Water-Resources Investigations During Fiscal Year 1990*

STATE AGENCIES:

Iowa Department of Natural Resources
Iowa Department of Transportation
    Highway Division
    Highway Research Board
Iowa State University
    Department of Agricultural Engineering
    Iowa State Water Resources Research Institute
The University of Iowa
    Hygienic Laboratory
    Institute of Hydraulic Research

LOCAL AGENCIES:

City of Cedar Rapids
City of Charles City
City of Clear Lake
City of Denison
City of Des Moines
City of Des Moines Water Works
City of Fort Dodge
City of Iowa City
City of Marshalltown
City of Sioux City
Union Electric Company, Keokuk
City of Waterloo
City of Waterloo Sewage Treatment Plant
West Central Iowa Rural Water Association

FEDERAL AGENCIES:

Department of Defense
    Occupational and Environmental Health Laboratory
    U.S. Army, Corps of Engineers
        Kansas City District
        Omaha District
        Rock Island District
        St. Paul District
Department of the Interior
    U.S. Geological Survey
        Water Resources Division (Federal Program)
U.S. Environmental Protection Agency

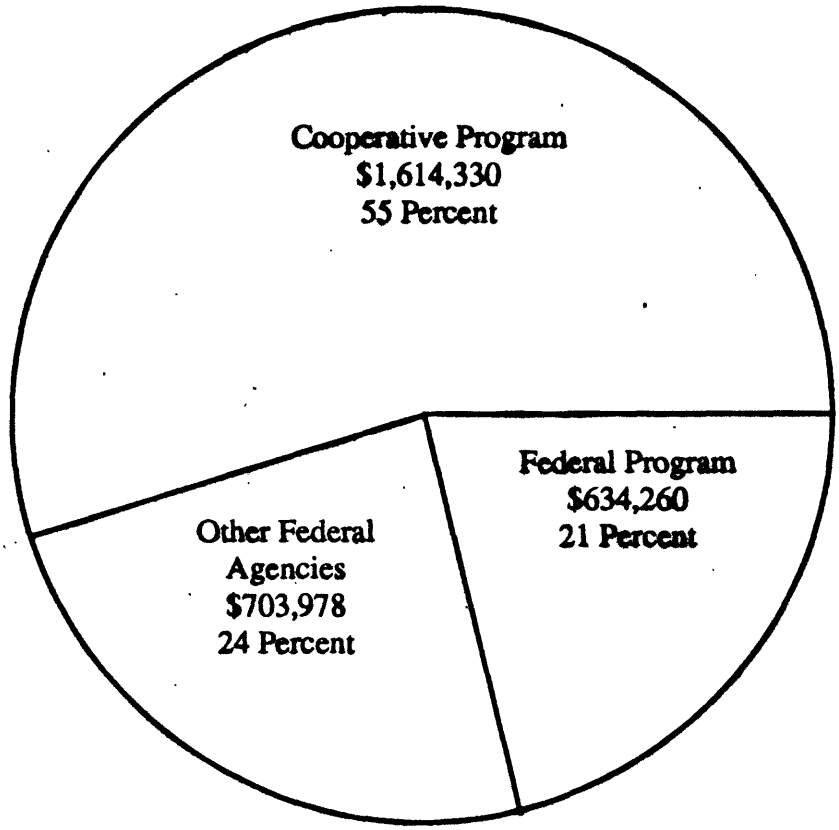

Figure 3.--Distribution of funding of the U.S. Geological Survey in Iowa, fiscal year 1988.

Reports and flood-prone area maps for Iowa are available for inspection at the Iowa District Office.

Other map information is available from:

U.S. Geological Survey
Map Distribution
Federal Center, Bldg. 810
Box 25286
Denver, Colorado 80225

Requests for miscellaneous water information and information on programs in other States may be referred to:

Water Resources Division
U.S. Geological Survey
Mail Stop 440
12201 Sunrise Valley Drive
Reston, Virginia 22092

The Geological Survey National Center maintains a library with an extensive earth-sciences collection. Local libraries may obtain books, periodicals, and maps through interlibrary loan by writing to:

U.S. Geological Survey Library
12201 Sunrise Valley Drive
Reston, Virginia 22092

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HYDROLOGIC DATA-COLLECTION NETWORKS AND PROGRAMS

SURFACE-WATER STATIONS

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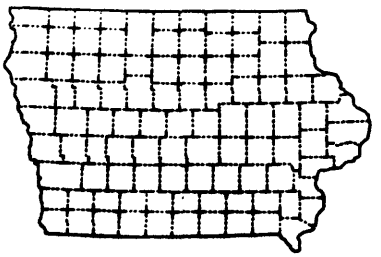


PERIOD OF PROJECT: Continuous since 1902

PROJECT CHIEF: D.J. O'Connell

STUDY AREA: Statewide

COOPERATING AGENCIES: Iowa Department of Natural Resources (Geological Survey Bureau); University of Iowa (Institute of Hydraulic Research); Iowa Department of Transportation (Highway Division); Iowa State University (Department of Agricultural Engineering and the Iowa State Water Resources Research Institute); City of Cedar Rapids; City of Des Moines; City of Fort Dodge; U.S. Army, Corps of Engineers; Union Electric Company; Des Moines Water Works; Waterloo Sewage Treatment Plant; University of Iowa; West Central Iowa Rural Water Association; City of Charles City; City of Clear Lake; City of Denison; City of Iowa City; City of Marshalltown; City of Sioux City; and City of Waterloo.

NEED FOR STUDY: Surface-water information is needed for purposes of surveillance, planning, design, hazard warning, and operation and management, in water-related fields such as water supply, hydroelectric power, flood control, irrigation, bridge and culvert design, wildlife management, pollution abatement, flood-plain management, and water resources development. To provide this information, an appropriate database is necessary.

OBJECTIVES: To collect surface-water data sufficient to satisfy needs for current uses, such as: (1) assessment of water resources; (2) operation of reservoirs or industries; (3) forecasting; (4) disposal of wastes; (5) discharge data to accompany water-quality measurements; (6) contract and legal requirements; and (7) research or special studies. To collect data necessary for analytical studies to define for any location the statistical properties of, and trends in, the occurrence of water in streams, lakes, and reservoirs for use in planning and design.

PROGRESS: Data were collected, compiled, and published. The annual data report, "Water Resources Data-Iowa, Water Year 1988" was completed during 1989. The data network consists of 117 daily streamflow stations, 4 lakes and stream-stage stations, and 4 reservoir-contents stations. A complete list of stations is given in table 2, locations are shown in figure 4, and a list of discontinued gaging stations is given in table 3.

Table 2.--*Daily discharge and surface-water-quality stations operated by the Iowa District during fiscal year 1990*

[Letter after station name designates type of data: (c), chemical; (d), discharge; (m), microbiological; (s) sediment; (t), water temperature]

Station name	Station number	Drainage area (sq mi)	Period of record
Upper Iowa River near Dorchester (d)	05388250	770	1936-90
Mississippi River at McGregor (dts)	05389500	67,500	1936-90
Turkey River at Spillville (d)	05411600	177	1956-70; 1977-90
Silver Creek near Luana (d)	05412060	4.39	1986-90
Unnamed Creek near Luana (d)	05412070	1.15	1886-90
Roberts Creek above Saint Olaf (d)	05412100	70.7	1957-77; 1986-90
Turkey River at Garber (d)	05412500	1,545	1913-16; 1919-27; 1929-30; 1932-90
North Fork Maquoketa River at Fulton (d)	05418450	516	1977-90
Maquoketa River near Maquoketa (d)	05418500	1,553	1913-90
Mississippi River at Clinton (d)	05420500	85,600	1873-1990
Wapsipinicon River near Elma (d)	05420560	95.2	1958-90
Wapsipinicon River at Independence (d)	05421000	1,048	1933-90
Wapsipinicon River near De Witt (d)	05422000	2,330	1934-90
Crow Creek at Bettendorf (d)	05422470	17.8	1977-90
East Branch Iowa River near Klemme (d)	05449000	133	1948-76; 1977-90
Iowa River near Rowan (d)	05449500	429	1940-76; 1977-90
Iowa River at Marshalltown (d)	05451500	1,564	1902-03; 1914-27; 1932-90
Timber Creek near Marshalltown (d)	05451700	118	1949-90
Richland Creek near Haven (d)	05451900	56.1	1949-90
Salt Creek near Elberon (d)	05452000	201	1945-90
Walnut Creek near Hartwick (d)	05452200	70.9	1949-90
Big Bear Creek at Ladora (d	05453000	189	1945-90
Iowa River at Iowa City (d)	05454500	3,271	1903-90
Iowa River at Marengo (d)	05453100	2,794	1956-90
Coralville Lake near Coralville	05453510	3,115	1958-90
Rapid Creek near Iowa City (d)	05454000	23.5	1937-90
Clear Creek near Coralville (d)	05454300	98.1	1952-90
South Branch Ralston Creek at Iowa City (d)	05455010	2.94	1963-90
Old Mans Creek near Iowa City (d)	05455100	201	1950-77; 1984-90
English River at Kalona (d)	05455500	573	1939-90
Iowa River near Lone Tree (d)	05455700	4,293	1956-90
Cedar River at Charles City (d)	05457700	1,054	1964-90
Little Cedar River near Ionia (d)	05458000	306	1954-90
Cedar River at Janesville (d)	05458500	1,661	1904-06; 1914-27; 1932-42; 1945-90
West Fork Cedar River at Finchford (d)	05458900	846	1945-90

Table 2.--*Daily discharge and surface-water-quality stations operated by the Iowa District during fiscal year 1990--Continued*

Station name	Station number	Drainage area (sq mi)	Period of record
Winnebago River at Mason City (d)	05459500	526	1932-90
Clear Lake at Clear Lake	05460000	22.6	1933-90
Shell Rock River at Shell Rock (d)	05462000	1,746	1953-90
Beaver Creek at New Hartford (d)	05463000	347	1945-90
Cedar River at Cedar Falls (c)	05463050	4,734	1975-79; 1984-85; 1986-90
Black Hawk Creek at Hudson (d)	05463500	303	1952-90
Cedar River at Waterloo (d)	05464000	5,146	1940-90
Cedar River at Cedar Rapids (d)	05464500	6,510	1902-90
Cedar River near Conesville (d)	05465000	7,785	1939-90
Iowa River at Wapello (dcmts)	05465500	12,499	1914-90
South Skunk River (head of Skunk River) near Ames (d)	05470000	315	1920-27; 1932-90
Squaw Creek at Ames (d)	05470500	204	1919-27; 1965-90
South Skunk River at Colfax (d)	05471050	803	1985-90
Indian Creek near Mingo (d)	05471200	276	1958-75; 1985-90
South Skunk River near Oskaloosa (d)	05471500	1,635	1945-90
North Skunk River near Sigourney (d)	05472500	730	1945-90
Cedar Creek near Oakland Mills (d)	05473400	530	1957-77; 1977-90
Skunk River at Augusta (dcmts)	05474000	4,303	1913-14; 1914-90
Mississippi River at Keokuk (d)	05474500	119,000	1878-1990
Des Moines River at Estherville (d)	05476500	1,372	1951-90
Des Moines River at Humboldt (d)	05476750	2,256	1964-90
East Fork Des Moines River at Dakota City (d)	05479000	1,308	1940-90
Des Moines River at Fort Dodge (d)	05480500	4,190	1905-06; 1913-27; 1946-90
Boone River near Webster City (d)	05481000	844	1940-90
Des Moines River near Stratford (d)	05481300	5,452	1920-90
Saylorville Lake near Saylorville	05481630	5,823	1977-90
Des Moines River near Saylorville (dcts)	05481650	5,841	1961-90
Beaver Creek near Grimes (d)	05481950	358	1960-90
North Raccoon River near Newell (d)	05482135	233	1982-90
Big Cedar Creek near Varina (d)	05482170	80	1959-90
North Raccoon River near Sac City (d)	05482300	700	1958-90
Black Hawk Lake at Lake View	05482315	23.3	1970-75; 1978-90
North Raccoon River near Jefferson (d)	05482500	1,619	1940-90
East Fork Hardin Creek near Churdan (d)	05483000	24	1952-90
Middle Raccoon River near Bayard (d)	05483450	375	1979-90

Table 2.--*Daily discharge and surface-water-quality stations operated by the Iowa District during fiscal year 1990--Continued*

Station name	Station number	Drainage area (sq mi)	Period of record
Lake Panorama at Panora	05483470	433	1979-90
Middle Raccoon River at Panora (d)	05483600	440	1958-90
South Raccoon River at Redfield (d)	05484000	994	1940-90
Raccoon River at Van Meter (dc)	05484500	3,441	1915-90
Walnut Creek at Des Moines (d)	05484800	78.4	1971-90
Des Moines River below Raccoon River at Des Moines (d)	05485500	9,879	1940-90
Fourmile Creek at Des Moines (d)	05485640	92.7	1971-90
North River near Norwalk (d)	05486000	349	1940-90
Middle River near Indianola (d)	05486590	503	1940-90
South River near Ackworth (d)	05487470	460	1940-90
Des Moines River near Runnells(d)	05487500	11,655	1985-90
White Breast Creek near Dallas (d)	05487980	342	1962-90
Lake Red Rock near Pella	05488100	12,323	1963-90
English Creek near Knoxville (d)	05488200	90.1	1985-90
Des Moines River near Tracy (d)	05488500	12,479	1920-90
Cedar Creek near Bussey (d)	05489000	374	1947-90
Des Moines River at Ottumwa (d)	05489500	13,374	1917-90
Des Moines River at Keosauqua (d)	05490500	14,038	1903-06; 1910-90
Rock River near Rock Valley (d)	06483500	1,592	1948-90
Big Sioux River at Akron (d)	06485500	8,424	1928-90
Missouri River at Sioux City (ds)	06486000	314,600	1897-1990
Perry Creek at 38th Street, Sioux City (d)	06600000	65.1	1945-69; 1981-90
Floyd River at Alton (d	06600100	268	1955-90
West Branch Floyd River near Struble (d)	06600300	180	1955-90
Floyd River at James (d)	06600500	886	1934-90
Missouri River at Decatur, Nebraska (d)	06601200	316,200	1987-90
West Fork ditch (head of Monana-Harrison ditch) at Hornick (d)	06602020	403	1939-69; 1974-90
Monona-Harrison ditch near Turin (d)	06602400	900	1939-90
West Okoboji Lake at Lakeside Laboratory near Milford	06604200	125	1933-90
Ocheyedan River near Spencer (d)	06605000	426	1977-90

Table 2.--*Daily discharge and surface-water-quality stations operated by the Iowa District during fiscal year 1990--Continued*

Station name	Station number	Drainage area (sq mi)	Period of record
Little Sioux River at Linn Grove (d)	06605850	1,548	1972-90
Little Sioux River at Correctionville (d)	06606600	2,500	1918-25; 1928-32; 1936-90
Maple River at Mapleton (d)	06607200	669	1941-90
Little Sioux River near Turin (d)	06607500	3,526	1958-90
Soldier River at Pisgah (d)	06608500	407	1940-90
Boyer River at Logan (d)	06609500	871	1918-25; 1937-90
Missouri River at Omaha, Nebraska (ds)	06610000	322,800	1928-90
Missouri River at Nebraska City, Nebraska (ds)	06807000	410,000	1929-90
West Nishnabotna River at Hancock (d)	06807410	609.	1959-9
West Nishnabotna River at Randolph (d)	06808500	1,326	1948-90
East Nishnabotna River near Atlantic (d)	06809210	436	1960-90
East Nishnabotna River at Red Oak (d)	06809500	894	1918-25; 1936-90
Nishnabotna River above Hamburg (dcmts)	06810000	2,806	1922-23; 1928-90
Tarkio River at Stanton (d)	06811840	49.3	1957-90
Missouri River at Rulo, Nebraska (d)	06813500	414,900	1949-90
Nodaway River at Clarinda (dcts)	06817000	762	1918-25; 1936-90
Platte River near Diagonal (d)	06818750	217	1968-90
East Fork One Hundred and Two River near Bedford (d)	06819185	85.4	1983-90
Elk Creek near Decatur City (dcmts)	06897950	52.5	1967-90
Thompson River at Davis City (d)	06898000	701	1918-25; 1941-90
Weldon River near Leon (d)	06898400	104	1958-90
Chariton River near Chariton (d)	06903400	182	1965-90
South Fork Chariton River near Promise City (d)	06903700	168	1967-90
Rathbun Lake near Rathbun	06903880	549	1969-90
Chariton River near Rathbun (d)	06903900	549	1956-90
Chariton River near Moulton (d)	06904010	740	1979-90

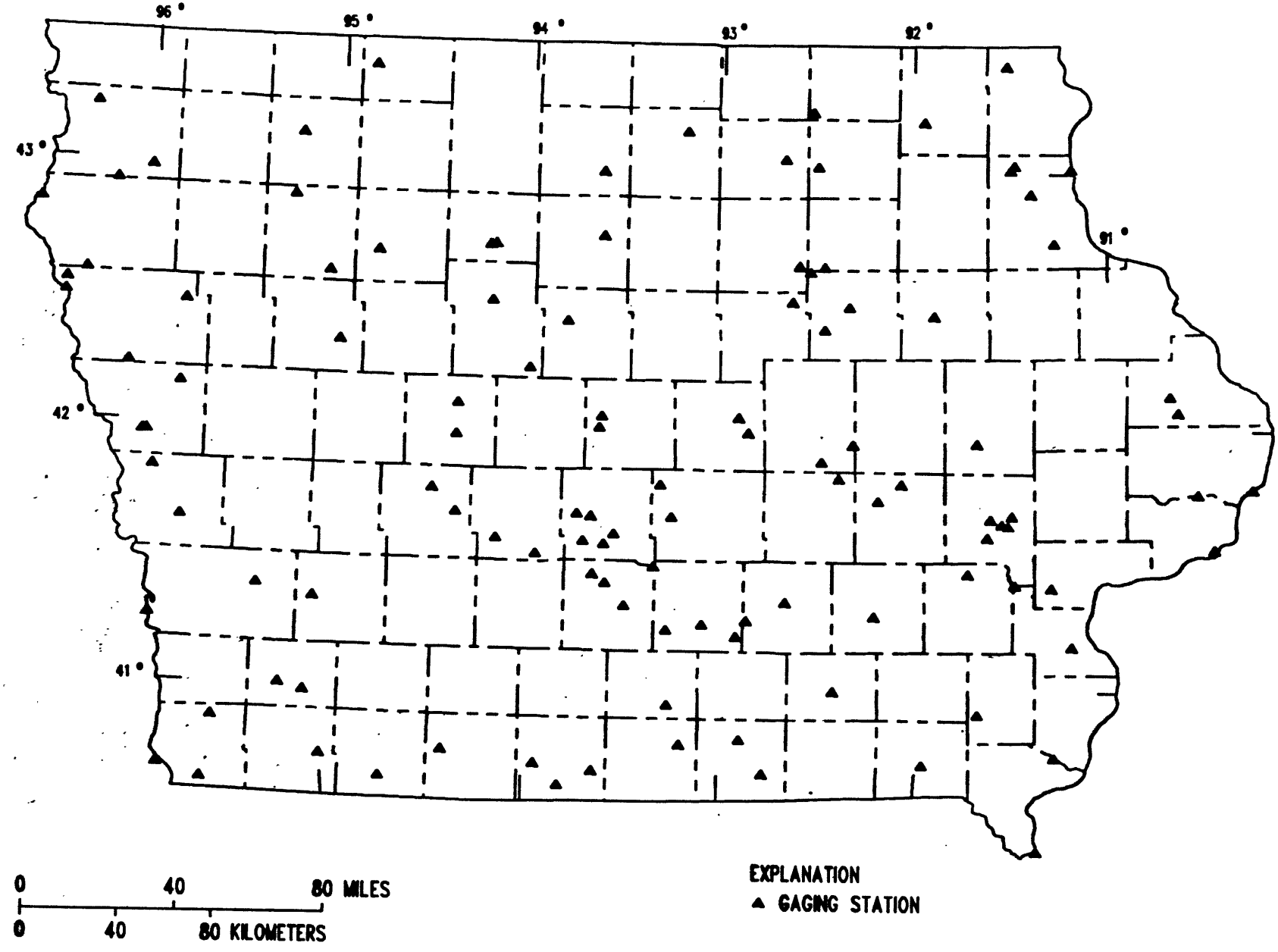


Figure 4.--Location of continuous-recording gaging stations.

Table 3.--*Discontinued gaging stations*

[The following stream-gaging stations have been discontinued in Iowa. Continuous daily streamflow records were collected and published for the period of record shown for each station]

Station name	Station number	Drainage area (sq mi)	Period of record
Upper Iowa River at Decorah	05387500	511	1952-83
Upper Iowa River near Decorah	05388000	568	1913-14; 1919-27; 1933-51
Paint Creek at Waterville	05388500	42.8	1952-73
Yellow River at Ion	05389000	221	1934-51
Mississippi River at Clayton	05411500	9,200	1930-36
Turkey River at Elkader	05412000	891	1932-42
Little Maquoketa River near Durango	05414500	130	1934-82
Maquoketa River near Manchester	05417000	305	1933-73
Maquoketa River near Delhi	05417500	347	1933-40
Bear Creek near Monmouth	05417700	61.3	1957-76
Maquoketa River above North Fork Maquoketa Rivernear Maquoketa	05418000	938	1913-14
Wapsipinicon River at Stone City	05421500	1,324	1903-14
Crow Creek at Eldridge	05422420	2.20	1977-82
Crow Creek at Mt. Joy	05422450	6.90	1977-82
Pine Creek at Muscatine	05448150	38.9	1975-82
Eagle Lake inlet near Britt	05448285	3.83	1975-80
Eagle Lake outlet near Britt	05448290	11.3	1975-80
West Branch (West Fork) Iowa River near Klemme	05448500	112	1948-58
Iowa River near Iowa Falls	05450000	665	1911-14
Upper Pine Lake at Eldora	05450500	14.9	1936-70
Lower Pine Lake at Eldora	05451000	15.9	1936-70
Iowa River near Belle Plaine	05452500	2,455	1939-59
Lake Macbride near Solon	05453500	27.0	1936-71
Ralston Creek at Iowa City	05455000	3.01	1924-87
Cedar River at Mitchell	05457500	826	1933-42
Shell Rock River near Northwood	05459000	300	1945-86
Shell Rock River at Marble Rock (Greene)	05460500	1,318	1933-53
Shell Rock River at Greene	05461000	1,357	1933-42
Shell Rock River near Clarksville	05461500	1,626	1915-27; 1932-34
Fourmile Creek near Lincoln	05464130	13.78	1962-67; 1969-74

Table 3.--*Discontinued gaging stations--Continued*

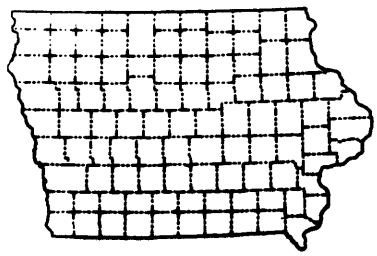
Station name	Station number	Drainage area (sq mi)	Period of record
Half Mile Creek near Gladbrook	05464133	1.33	1962-67; 1969-74
Fourmile Creek near Traer	05464137	19.51	1962-74; 1975-80
Prairie Creek at Fairfax	05464640	178	1966-82
South Skunk River below Squaw Creek near Ames	05471000	556	1952-79
Lake Keomah near Oskaloosa	05472000	3.06	1936-71
Skunk River at Coppock	05473000	2,916	1913-44
Big Creek near Mount Pleasant	05473500	106	1955-79
East Fork Des Moines River near Burt	05478000	462	1971-74
East Fork Des Moines River near Hardy	05478500	1,268	1940-54
Des Moines River near Fort Dodge	05479500	3,753	1911-13
Lizard Creek near Clare	05480000	257	1940-82
Des Moines River near Boone	05481500	5,511	1920-68
Des Moines River at Des Moines	05482000	6,245	1905-06; 1915-61
Storm Lake at Storm Lake	05482140	28.3.	1970-75
Springbrook Lake near Guthrie Center	05483500	5.18	1936-71
Raccoon River at Des Moines	05485000	3,590	1902-03
Lake Ahquabi near Indianola	05487000	4.93	1936-71
White Breast Creek near Knoxville	05488000	380	1945-62
Muchakinock Creek near Eddyville	05489190	70.2	1975-79
Lake Wapello near Drakesville	05490000	7.75	1936-71
Sugar Creek near Keokuk	05491000	105	1922-31; 1958-73
Fox River at Bloomfield	05494300	87.7	1957-73
Fox River at Cantril	05494500	161	1940-51
Rock River at Rock Rapids	06483270	788	1959-74
Dry Creek at Hawarden	06484000	48.4	1948-69
West Fork ditch at Holly Springs	06602000	399	1939-69
Loon Creek near Orleans	06603920	31	1971-74
Spirit Lake outlet at Orleans	06604100	75.6	1971-74
Milford Creek at Milford	06604400	146	1971-74
Little Sioux River at Spencer	06605100	990	1936-42
Little Sioux River at Gillett Grove	06605600	1,334	1958-73
Little Sioux River near Kennebeck	06606700	2,738	1939-69
Odebolt Creek near Arthur	06607000	39.3	1957-75
Maple River at Turin	06607300	725	1939-41
Little Sioux River near Blencoe (Turin)	06607510	4,470	1939-42

Table 3.--*Discontinued gaging stations--Continued*

Station name	Station number	Drainage area (sq mi)	Period of record
Steer Creek near Magnolia	06609200	9.26	1963-69
Thompson Creek near Woodbine	06609590	6.97	1963-69
Willow Creek near Logan	06609600	129	1972-75
Indian Creek at Council Bluffs	06610500	7.99	1954-76
Mosquito Creek near Earling	06610520	32.0	1965-79
Waubonsie Creek near Bartlett	06806000	30.4	1946-69
West Nishnabotna River at Harlan	06807320	316	1977-82
West Nishnabotna River at (near) White Cloud	06807500	967	1918-24
Mule Creek near Malvern	06808000	10.6	1954-69
Spring Valley Creek near Tabor	06808200	7.6	1955-64
Davids Creek near Hamlin	06809000	26.0	1952-73
West Nodaway River at Villisca	06816500	342	1918-25
Honey Creek near Russell	06903500	13.2	1952-62
Chariton River near Centerville	06904000	708	1938-59

GROUND-WATER STATIONS

IA 00-002



PERIOD OF PROJECT: Continuous since 1939

PROJECT CHIEF: R.B. Lambert

STUDY AREA: Statewide

COOPERATING AGENCY: Iowa Department of Natural Resources (Geological Survey Bureau).

NEED FOR STUDY: A long-term record of water-level changes is needed to evaluate the effects of natural and manmade stresses on ground-water systems in Iowa. A long-term, regional database will provide the information needed to effectively measure the effects of development on future supplies, and provide the necessary data to effectively manage the resource.

OBJECTIVES: To collect long-term water-level data so that the response of hydrologic systems to natural climatic variations and induced stresses is known. The long-term data base will be used to analyze short-term records acquired from areal studies. The analysis of both short-term and long-term data bases can then be used in assessments of the ground-water resource, prediction of future conditions of supply and contamination concerns, and provide the necessary information for timely management of the resource.

PROGRESS: Observation well network data are collected, compiled, and published in the annual water resources data report. The ground-water section of the 1989 report will be expanded to include about 210 wells (fig. 5). Expansion and upgrading of the observation well network will be completed by 1990, and information on water-level measurements from aquifers in the State will be compiled and published in data reports. Historic hydrologic and geologic information continues to be updated in the computer data bases. The annual data release, "Water Resources Data-Iowa, Water Year 1988" was delivered May 1989 and included data for 108 observation wells.

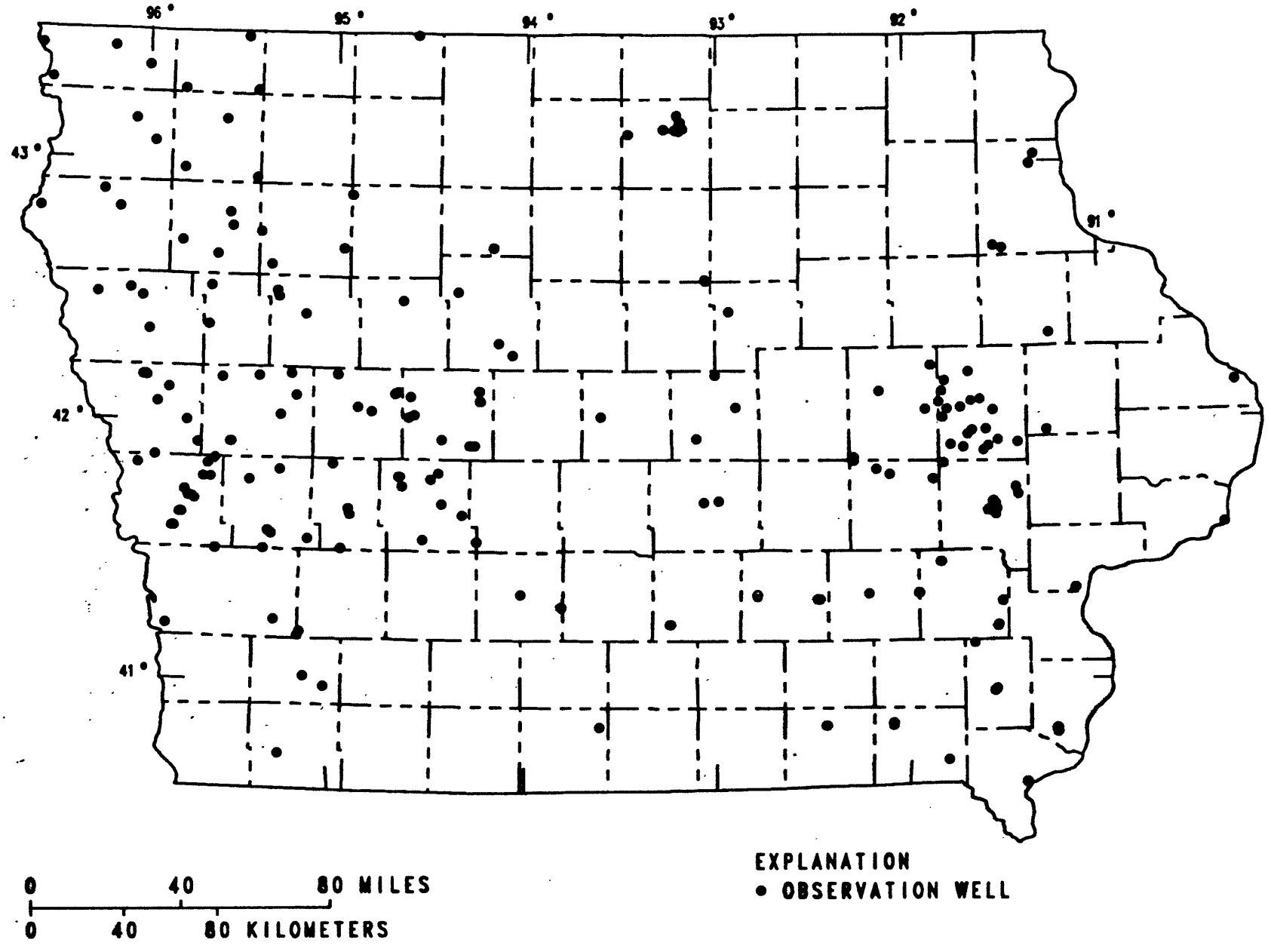
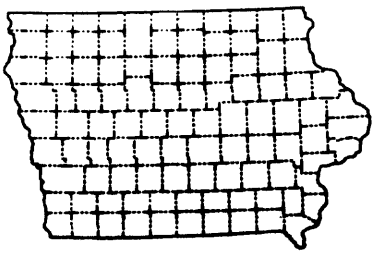


Figure 5.--Location of observation wells.

WATER-QUALITY STATIONS

IA 00-003



PERIOD OF PROJECT: Continuous since 1906

PROJECT CHIEF: M.J. Liszewski

STUDY AREA: Statewide

COOPERATING AGENCIES: U.S. Geological Survey (Federal Program) and U.S. Environmental Protection Agency.

NEED FOR STUDY: Water resource planning and water-quality assessment require a nationwide base level of relatively standardized information for planning and assessment of water resources. Furthermore, the chemical and physical quality of the rivers and streams must be defined and monitored.

OBJECTIVES: To provide a national database of water-quality data for broad Federal planning and action programs and to provide data for Federal management of interstate and international waters.

PROGRESS: Water-quality data were collected, compiled, and processed for publication in the annual data report for five National Stream-Quality Accounting Network stations and one benchmark station. The annual data report, "Water Resources Data, Iowa, Water Year 1988" was delivered in May 1989. Site locations are shown in figure 6 and a list of discontinued water-quality stations is given in table 4.

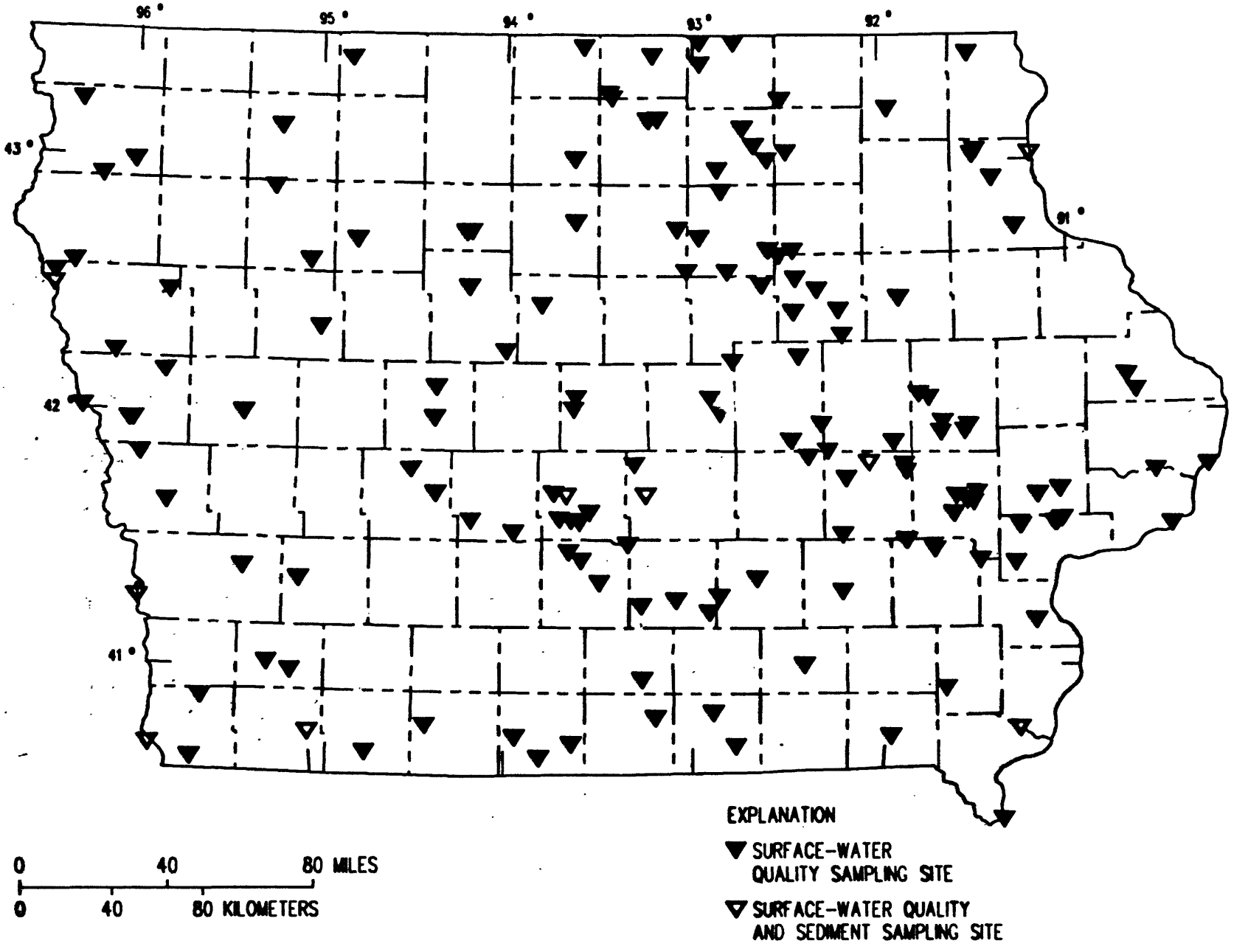


Figure 6.--Location of surface-water-quality stations.

Table 4.--*Discontinued water-quality stations*

[sq mi, square miles; S, sediment; T, water temperature; *, periodic data is available for that parameter subsequent to the period of daily record; C, chemical quality]

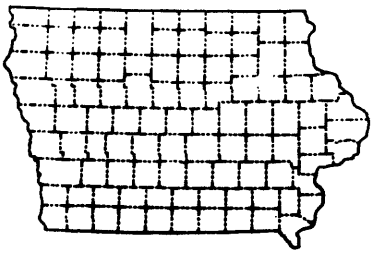
Station name	Station number	Drainage area (sq mi)	Type of record	Period of record
Upper Iowa River at Decorah	05387500	511	ST	1963-83
Upper Iowa River near Dorchester	05388250	770	ST	1975-81
Paint Creek at Waterville	05388500	42.8	T	1952-56
			S	1952-57
Turkey River at Garber	05412500	1,545	TS*	1957-62
Mississippi River at Dubuque	05414700	1,600	C	1969-73
Maquoketa River near Maquoketa	05418500	1,553	CTS	1978-82
Mississippi River at Clinton	05420500	85,600	C	1973-87
Wapsipinicon River at Independence	05421000	1,048	C*	1968-70
			T*S*	1967-70
Crow Creek at Bettendorf	05422470	17.8	CTS	1978-82
Iowa River near Rowan	05449500	429	T*S*	1957-62
Cedar River near Gilbertville	05464020	5,234	C	1971; 1975-81
Iowa River at Iowa City	05454500	3,271	CTS	1952-87
Ralston Creek at Iowa City	05455000	3.01	CTS	1906-07; 1944-88
Fourmile Creek near Lincoln	05464130	13.78	CTS	1969-74
Half Mile Creek near Gladbrook	05464133	1.33	CTS	1969-74
Fourmile Creek near Traer	05464137	19.51	CTS	1969-74
Cedar River near Palo	05464450	6,380	C	1975-79
Cedar River at Cedar Rapids	05464500	6,640	C*	1906-07; 1944-54
			T*	1944-54
			S	1943-54
Cedar River near Bertram	05464760	6,955	C	1975-81
Mississippi River at Burlington	05469720	4,000	C	1969-73
Mississippi River at Keokuk	05474500	119,000	C	1974-87
Des Moines River at Fort Dodge	05480500	4,190	C	1972-73
Des Moines River at Des Moines	05482000	6,245	C	1954-55
			TS	1954-61
E. Fork Hardin Creek near Churdan	05483000	24.0	T*S*	1952-57
M. Fork Raccoon River near Bayard	05483450	375	CTS	1979-85
M. Fork Raccoon River at Panora	05483600	440	CTS	1979-85
Raccoon River at Des Moines	05485000	3,590	CT	1945-47
Des Moines River below Raccoon River at Des Moines	05485500	9,770	C*	1944-45
			T*S	1944-47
Des Moines River below Des Moines	05485520	9,901	C	1971; 1975-81
Middle River near Indianola	05486490	503	T*S	1962-67

Table 4.--*Discontinued water-quality stations--Continued*

Station name	Station number	Drainage area (sq mi)	Type of record	Period of record
White Breast Creek near Dallas	05487980	342	C	1968-73
			TS	1967-73
Big Sioux River at Sioux City	06485950	9,410	C	1969-73
Missouri River at Sioux City	06486000	314,600	C	1972-86
Floyd River at James	06600500	882	TS	1968-73
Floyd River at Sioux City	06600520	921	C	1969-73
Missouri River at Decatur, Nebraska	06601200	316,160	C	1974-81
Little Sioux River at Correctionville	06606600	2,500	C*	1954-55
			T*	1951-62
			S	1950-62
Little Sioux River near Kennebec	06606700	2,738	T	1950-55
			S	1950-57
Little Sioux River at River Sioux	06607513	3,600	C	1969-73
Soldier River near Mondamin	06608505	440	C	1970-73
Steer Creek near Magnolia	06609200	9.26	TS	1963-69
Thompson Creek near Woodbine	06609590	6.97	TS	1963-69
Willow Creek near Logan	06609600	129	CT	1972-75
			S	1971-75
Missouri River at Omaha, Nebraska	06610000	322,800	C	1969-86
Mule Creek near Malvern	06808000	10.6	T	1958-69
			S	1954-69
Davids Creek near Hamlin	06809000	26.0	T*	1952-53; 1965-68
East Nishnabotna River at Red Oak	06809500	894	TS	1962-73
Platte River near Diagonal	06818750	217	C	1969-73
Thompson River at Davis City	06898000	701	C	1967-73
			TS	1968-73
Weldon River near Leon	06898400	104	C	1968-73
Chariton River near Chariton	06903400	182	TS	1969-73
Honey Creek near Russell	06903500	13.2	S	1952-62
Chariton River near Rathbun	06903900	551	T*S*	1962-69

SEDIMENT STATIONS

IA 00-004



PERIOD OF PROJECT: Continuous since 1943

PROJECT CHIEF: D.J. O'Connell

STUDY AREA: Statewide

COOPERATING AGENCIES: U.S. Geological Survey (Federal Program); U.S. Army, Corps of Engineers; and Iowa Department of Natural Resources (Geological Survey Bureau).

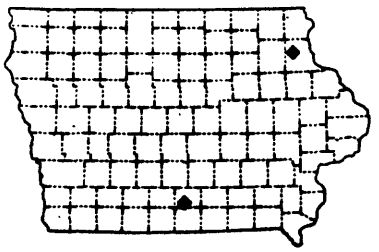
NEED FOR STUDY: Water resource planning and water-quality assessment requires a nationwide base level of relatively standardized information. Sediment concentrations and discharges in rivers and streams must be defined and monitored to aid in achieving this goal.

OBJECTIVES: To provide a national sediment data base for use in broad Federal and State planning and action programs and to provide data for Federal management of interstate waters.

PROGRESS: Data were collected, compiled, and processed for publication. The annual data report, "Water Resources Data-Iowa, Water Year 1988" was delivered in May 1989. The data network consists of seven stations where daily suspended-sediment records are collected and five stations where monthly suspended-sediment samples are collected (fig. 5). Additional activities included the collection of suspended-sediment samples and measurement of velocities at several points in five to seven verticals in a cross-section five times per year on the Missouri River at Sioux City, Iowa, Omaha, Nebraska, and Nebraska City, Nebraska. Bed-material samples also were obtained at each sampling vertical site. Data obtained in this program are published in the annual data report. Laboratory analyses of sediment samples collected by the U.S. Army Corps of Engineers (Rock Island District) and by the Alaska, Arizona, Colorado, Illinois, Indiana, Kentucky, Minnesota, Missouri, Montana, Nebraska, Nevada, North Dakota, South Dakota, Tennessee, Wisconsin, and Wyoming U.S. Geological Survey Districts were done in the Iowa District sediment laboratory.

IOWA PRECIPITATION MONITORING FOR THE NATIONAL TRENDS NETWORK

IA 84-005



PERIOD OF PROJECT: Continuous since 1984

PROJECT CHIEF: R.B. Lambert

STUDY AREA: Clayton and Lucas Counties

COOPERATING AGENCY: U.S. Geological Survey (Federal Program).

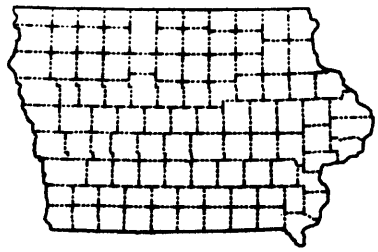
NEED FOR STUDY: The amount of substances dispersed into the atmosphere and deposited by precipitation, aerosols, and gases is expected to continue to increase throughout North America. Thus, there is an increasing need for careful measurement of the amounts, nature, and effects of these substances. Such measurements are essential for responsible management of the agricultural, forest, and aquatic ecosystems of the United States.

OBJECTIVES: The Iowa stations are part of a network to provide a regional-to-national overview of chemical composition of atmospheric deposition in the United States. This overview can be used to discover and characterize environmentally significant geographical and temporal trends in the chemical climate of North America and to assess the effects of atmospheric deposition on (1) the productivity of agricultural and forest lands; (2) the health of domestic animals, wildlife, and fish; (3) the chemistry of surface and ground water; (4) materials such as metals and carbonate building stones; and (5) the reduction in visibility resulting from the scattering and or absorption of light due to the presence of pollutants in the atmosphere.

PROGRESS: Wet deposition samples are collected weekly on a continuing basis at the two Iowa National Trends Network sites. Field values of pH and specific conductance and the chemical analyses of the precipitation are published in the U.S. Geological Survey Annual Data Report for Iowa, as well as in the National Atmospheric Deposition Program/National Trends Network Annual Data Summary of Precipitation Chemistry in the United States.

WATER USE

IA 00-007



PERIOD OF PROJECT: Continuous since 1980

PROJECT CHIEF: E.E. Fischer

STUDY AREA: Statewide

COOPERATING AGENCY: Iowa Department of Natural Resources.

NEED FOR STUDY: As the use of water increases the margin between supply and demand narrows. Hence, the need for data on the use of water becomes critical. There is a need, therefore, to develop a system to collect, store, and retrieve water-use data.

OBJECTIVES: To establish a water-use system that will contain documentation of the sources of water supplies, where and how much water is being used, how much is being consumed, and how much is returned for later use. The inventory will include acquisition of current data, establishment of a data base, and development of techniques for continued collection, storage, and retrieval of data. The system will be readily accessible to Federal and State agencies, local managers, city planners, and all who are in charge of evaluating and deciding on the feasibility of water-development projects.

PROGRESS: New State Water Use Data System (NEWSWUDS) replaced State Water Use Data System (SWUDS) as the active State water-use data base. The State conducted a major water-use inventory for years 1984 to 1988.The results of this inventory have been added to NEWSWUDS. Efforts to estimate water use for 1987 were postponed because of the large quantity of site-specific data that was being collected by the State. A report on the estimated water use for 1988 is being prepared.

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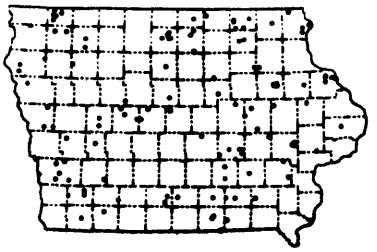
AREAL HYDROLOGIC INVESTIGATIONS

FLOOD INFORMATION AT SELECTED BRIDGE AND CULVERT SITES

IA 66-006



PERIOD OF PROJECT: Continuous since 1966

PROJECT CHIEF: R.W. Baebenroth

STUDY AREA: Statewide

COOPERATING AGENCY: Iowa Department of Transportation (Highway Research Board, Highway Division).

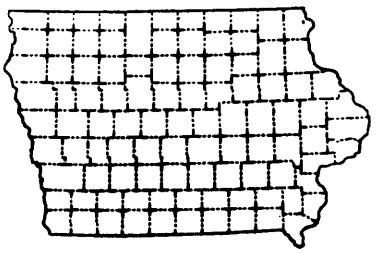
NEED FOR STUDY: Systematic flood information is needed for the proper hydraulic design of new bridges, culverts, and other flow structures (especially on small drainage basins, less than 100 square miles) and for the evaluation of existing structures. There is also a need to analyze the hydrology and hydraulics of proposed sites with little available data and to document outstanding floods at ungaged sites on an event basis. Because of the large number of small basins in the State, relatively few will ever have specific flood data available. Therefore, flood discharges are estimated from some type of model based on existing data. To define and calibrate such models for use on the variety of basins that exist in Iowa, flood data must be available from basins with a variety of characteristics such as; drainage area, topography, soil type, shape, and land use.

OBJECTIVES: On small basins with less than 100 square miles of drainage area: (1) obtain basin characteristics and systematic flood data on a network of representative basins of the various types of basins in the State; and (2) document peak discharges on ungaged basins on an event basis.

PROGRESS: Operation of the small-basin, crest-stage gage (CSG) network, including the automatic tracer-dilution sites, was continued. Annual peak flood data from the network were compiled and published for the 1988 water year in U.S. Geological Survey Water Data Report IA-88-1. Because of the drought during that year, 90 CSG sites had no floods above the base gage height of the CSG(s). Of the other 23 sites, 15 were affected by ice during the time of maximum gage height, and no peak discharges were determined. At seven of the remaining eight sites, the annual maximum gage heights were recorded during open-water periods. Peak discharges were determined at five sites; two sites had insufficient ratings to determine peak discharge. Results for the 1989 water year have not yet been compiled. Field work for one indirect discharge measurement was completed. Crest-stage gages were installed at 15 new sites on streams with drainage areas less than 25 square miles, and were discontinued at an equal number of old sites. Site selection for more new sites was continued.

FLOOD PROFILES OF IOWA STREAMS

IA 58-011



PERIOD OF PROJECT: Continuous since 1957

PROJECT CHIEF: R.W. Baebenroth

STUDY AREA: Statewide

COOPERATING AGENCY: Iowa Department of Transportation (Highway Research Board).

NEED FOR STUDY: Information is needed on flood peaks and profiles for the economical and safe location and design of bridges and other structures on or over streams and the adjacent flood plains. Defining the limits of flood inundation and establishing encroachment limits on flood plains are companion problems needing this information. Basic data on outstanding flood events are needed to calibrate the computer models to specific basin characteristics and bridge waterways.

OBJECTIVES: Define the water-surface profiles and corresponding discharges along streams in basins with at least 100 square miles of drainage area for at least one recorded flood and the expected flood(s) of one or more selected recurrence intervals, usually the 25- and 50-year floods. Evaluate the flood characteristics and hydraulics at existing and proposed flow structures on basins of all sizes on a request basis.

PROGRESS: Temporary benchmark elevations, referenced to sea level, were determined at several bridges over the East and West Nishnabotna Rivers. Low-water profile, bridge deck, and low bridge chord elevations were determined to sea level at most bridges over the East, West, and mainstem Nishnabotna Rivers in Iowa. The report "Floods in the Nishnabotna River Basin, Iowa" was reviewed within the district. Two regression equations, relating various basin characteristics (drainage area, channel slope, basin width, and basin slope) to 50-year flood discharge, were developed from a data set of eight small- and medium-sized drainage basins. The equations were used to estimate the 50-year flood discharge for an ungaged site on Stony Creek at U.S. Highway 18 in northwest Iowa. No significant flood events occurred during the year. The following is a chronological listing of flood profile reports for Iowa prepared by the U.S. Geological Survey.

FLOOD PROFILE REFERENCES

Heinitz, A.J., 1973a, Floods in the Iowa River basin upstream from Coralville Lake, Iowa: U.S. Geological Survey Open-File Report, Iowa City, 75 p.

_____ 1973b, Flood of August 2, 1972, in the Little Maquoketa River basin, Dubuque County, Iowa: U.S. Geological Survey Open-File Report, Iowa City, 28 p.

_____ 1973c, Floods in the Rock River basin, Iowa: U.S. Geological Survey Open-File Report, Iowa City, 74 p.

_____ 1977, Floods in the Big Creek basin, Linn County, Iowa: U.S. Geological Survey Open-File Report 77-209, Iowa City, 35 p.

_____ 1979, Supplement to floods in the upper Des Moines River basin, Iowa: U.S. Geological Survey Open-File Report 79- 1486, Iowa City, 6 p.

_____ 1980, Floods in the Raccoon River basin, Iowa: U.S. Geological Survey Open-File Report 80-162, Iowa City, 110 p.

_____ 1985, Floods in south-central Iowa: U.S. Geological Survey Open-File Report 85-100, Iowa City, 95 p.

_____ 1986, Floods in the Floyd River basin, Iowa: U.S. Geological Survey Open-File Report 86-476, Iowa City, 61 p.

Heinitz, A.J., and Riddle, D.E., 1981, Floods in the English River basin, Iowa: U.S. Geological Survey Open-File Report 81-67, Iowa City, 61 p.

Heinitz, A.J., and Wiitala, S.W., 1978, Floods in the Skunk River basin, Iowa: U.S. Geological Survey Open-File Report 79-272, Iowa City, 80 p.

Lara, O.G., and Heinitz, A.J., 1976, Flood of June 27, 1975, in city of Ames, Iowa: U.S. Geological Survey Open-File Report 76-728, Iowa City, 56 p.

Schwob, H.H., 1963, Cedar River basin floods: Iowa Highway Research Board Bulletin 27, Iowa Department of Transportation, Ames, 59 p.

_____ 1966, Little Sioux River basin floods: U.S. Geological Survey Open-File Report, Iowa City, 60 p.

_____ 1967, Floods on Otter Creek in Linn County, Iowa: U.S. Geo logical Survey Open-File Report, Iowa City, 22 p.

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_____ 1968b, Flood profile study, Squaw Creek, Linn County, Iowa: U.S. Geological Survey Open-File Report, Iowa City, 13 p.

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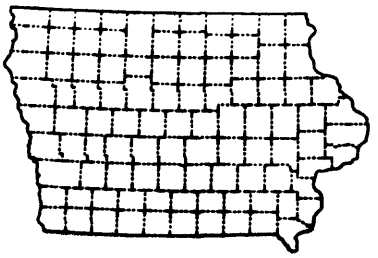
IOWA GROUND-WATER-QUALITY MONITORING PROGRAM

IA 83-047



PERIOD OF PROJECT: Continuous since 1982

PROJECT CHIEF: M.J. Liszewski

STUDY AREA: Statewide

COOPERATING AGENCIES: Iowa Department of Natural Resources (Geological Survey Bureau) and The University of Iowa Hygienic Laboratory.

NEED FOR STUDY: Ground-water quality is one of the most critical resource problems in the State of Iowa. A ground-water-quality monitoring program is needed to provide data to aid State and local management and regulatory agencies to effectively evaluate the ground-water resources of the State.

OBJECTIVES: The primary purpose of the ground water quality monitoring program is to provide consistent and representative ground water quality data that describe the chemical quality of the ground-water resources in the State. Generally, the objectives of this program are to specifically describe the baseline ground-water quality of the major aquifers of the State and to provide ground water quality data for areas of the State or aquifers in the State that are stressed by heavy use, contamination, or deteriorating quality.

PROGRESS: Samples for the spring of 1989 and the fall of 1989 for the 52 multiple-sample sites have been analyzed and the results reviewed. A larger percentage of samples contained detectable concentrations of herbicides than the spring of 1988 samples for the same wells. Results of the second round of sampling for the 52 multiple-sample sites have been analyzed and reviewed. A larger percentage of samples contained detectable levels of herbicides than the samples collected in the spring and fall of 1988 for the same wells. Samples from about 90 percent of the single-sample sites have been analyzed and reviewed. The detection rate for samples collected in 1989 is typical of past detection rates (22 percent) for wells less than 200 feet deep. The location of the sampling sites is shown in figure 7.

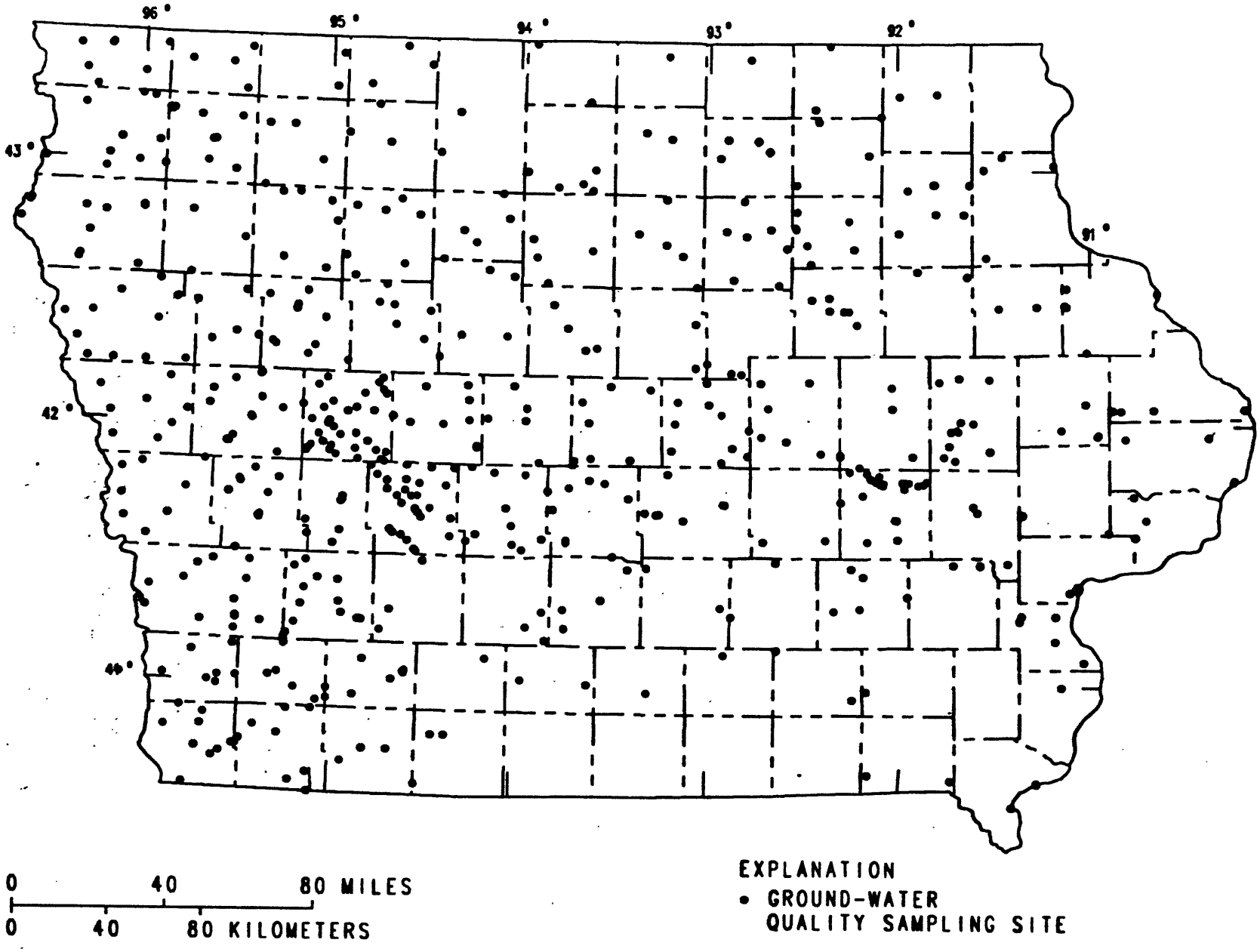
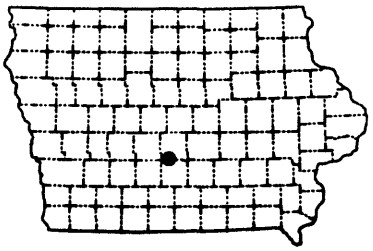


Figure 7.--Location of ground-water-quality sampling sites.

DES MOINES AIR NATIONAL GUARD BASE, INSTALLATION RESTORATION PROGRAM

IA 84-050



PERIOD OF PROJECT: 1984-90

PROJECT CHIEF: R.C. Buchmiller

STUDY AREA: Polk County

COOPERATING AGENCY: Department of the Air Force.

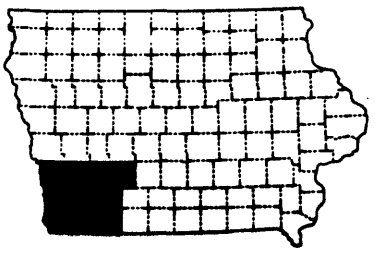
NEED FOR STUDY: Disposal of chemicals at sites on the base may pose a hazard to ground- and surface-water in the study area.

OBJECTIVES: To identify and evaluate potential problems caused by past handling or disposal of toxic or hazardous materials at the U.S. Air Force facility.

PROGRESS: Onsite work has been completed including the drilling of observation wells and the collection of soil and water samples. The chemical analyses of the soil and water samples also has been completed.

SOUTHWEST IOWA GROUND-WATER APPRAISAL

IA 85-053



PERIOD OF PROJECT: 1985-90

PROJECT CHIEF: R.C. Buchmiller

STUDY AREA: Adair, Adams, Cass, Fremont, Mills, Montgomery, Page, Pottawattamie, and Taylor Counties

COOPERATING AGENCY: Iowa Department of Natural Resources (Geological Survey Bureau).

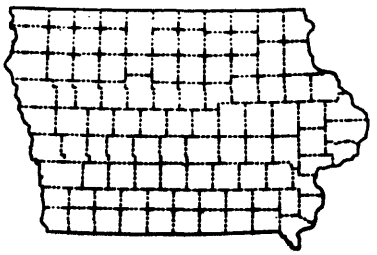
NEED FOR STUDY: Southwest Iowa is an agricultural area with limited sources of ground water. Possible ground-water sources with adequate quality and quantity of water are the alluvial, buried channel, and Dakota aquifers. Other aquifers in the area exist, but are of a discontinuous nature or contain water of undesirable quality.

OBJECTIVES: To determine the availability, quantity, and quality of ground water from the alluvial, glacial drift, and Dakota aquifers in southwest Iowa. Specific objectives are to: (1) determine the location, areal extent, and use of these aquifers; (2) evaluate the occurrence, movement, and storage of ground water, including the relation between streams and near surface aquifers; (3) estimate the potential yields to wells completed in the aquifers; (4) describe the chemical quality of the surface and ground water; and (5) report the annual municipal water withdrawals and estimate other categories of water use from the aquifers.

PROGRESS: Field work has been completed for this project. The report has been prepared and authored by personnel from the Iowa Department of Natural Resources (Geological Survey Bureau) and the U.S. Geological Survey. The report is in review and the project is complete except for the publication of the report. One report has been published from data compiled during this study, "Bedrock Topography of Southwest Iowa", by R.E. Hansen (a revision of Miscellaneous Investigations Series Report Map I-1222).

EVALUATION OF FACTORS INFLUENCING THE OCCURRENCE OF AGRICULTURAL CHEMICALS IN SHALLOW GROUND WATER IN THE CENTRAL MIDWEST

IA 87-057



PERIOD OF PROJECT: 1987-93

PROJECT CHIEF: M.R. Burkart

STUDY AREA: Illinois, Indiana, and Iowa; parts of Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin

COOPERATING AGENCY: U.S. Geological Survey (Federal Program).

NEED FOR STUDY: Agricultural chemical contamination of shallow ground-water and also of surface-water poses a major threat in much of the United States. A comprehensive evaluation of the available information is needed to identify the extent to which water resources have been affected by agricultural chemicals and what measures are necessary to mitigate the problems related to contamination.

OBJECTIVES: Develop an understanding of factors that affect the occurrence of agricultural chemicals in water resources and develop strategies to minimize or mitigate problems. To meet these goals, an interdisciplinary, interagency study procedure has been developed to integrate large-scale and regional studies. The procedure includes the following objectives: (1) understand fundamental natural processes and human input factors affecting the fate and transport of agricultural chemicals; (2) evaluate farming systems to determine their effect on water quality; (3) develop new farming systems and components that protect, improve, or remediate water quality; (4) evaluate spatial data to relate the occurrence of agricultural chemicals to human and environmental factors; (5) develop and assess models and other decision aids to protect water quality; (6) transfer technology and information to education and technical assistance agencies; (7) develop laboratory and sampling methods to provide services to researchers; and (8) understand the effect of agricultural chemicals and practices on ecosystems.

PROGRESS: Several reports describing the plan and preliminary interpretation of regional data have been published. Technical and research strategy groups were established to define needed research and data. The U.S. Geological Survey (USGS) has established a dynamic plan to implement research and information acquisition related to the eight objectives above with the Agricultural Research Service and the Cooperative State Research Service of the U.S. Department of Agriculture (USDA), the U.S.Environmental Protection Agency (EPA), and representatives of State agencies and universities. This has resulted in a general agreement to merge several initiatives into a USGS-USDA-EPA combined plan. Several plans are being prepared to go to research units in several agencies to develop projects to answer critical objectives. The scope of the initiative has been expanded to include all pesticides and nutrients. The scope is expected to expand beyond ground water to surface water and sediment as information is acquired. The location of the study area is shown in figure 8.

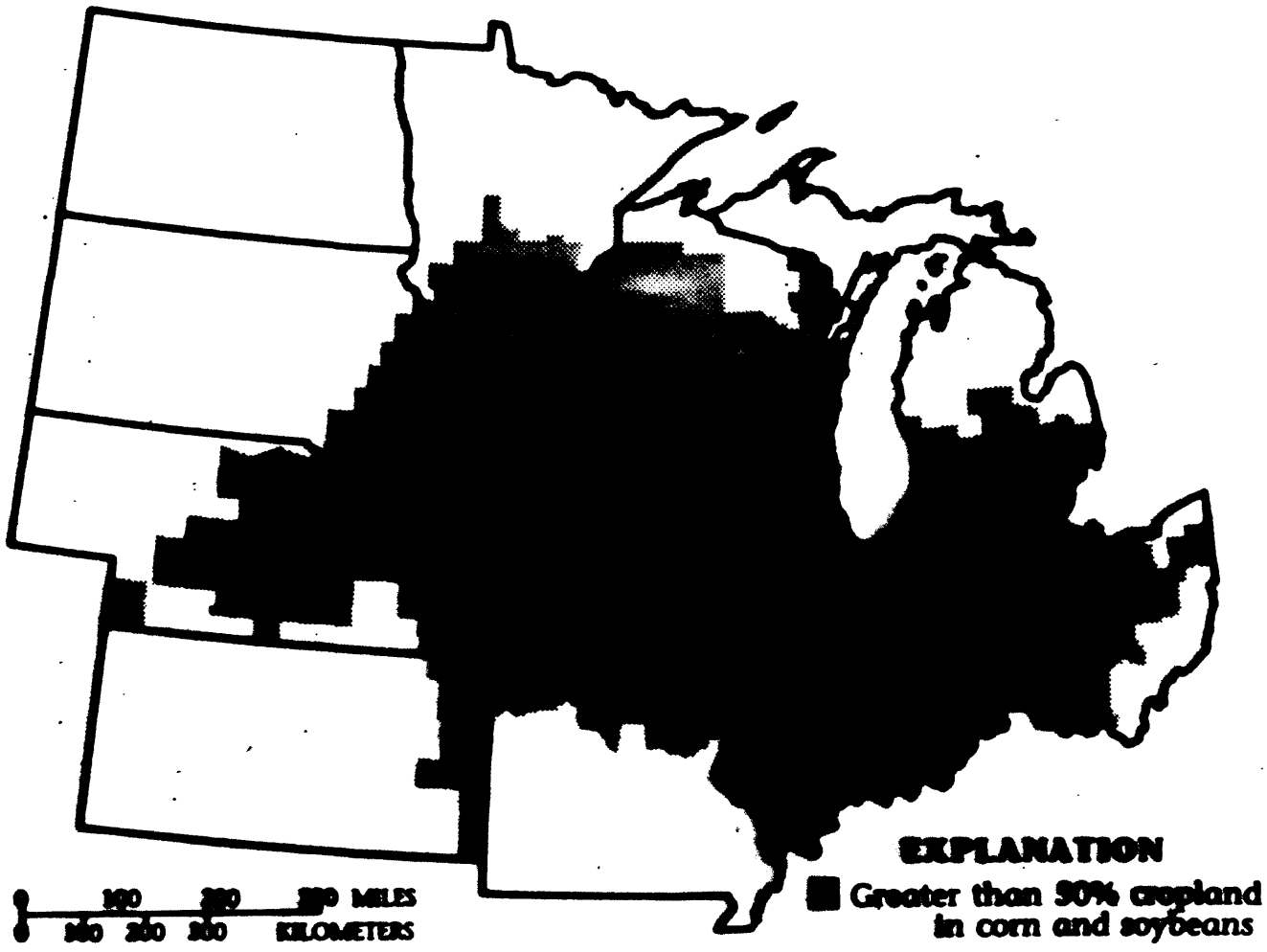
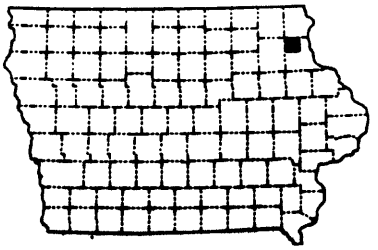


Figure 8.--Region of focus for interagency water quality research.

HYDROLOGIC ANALYSIS OF WATER QUALITY AND THE FLOW SYSTEM IN THE BIG SPRING BASIN, CLAYTON COUNTY

IA 87-058



PERIOD OF PROJECT: 1987-91

PROJECT CHIEF: S.J. Kalkhoff

STUDY AREA: Clayton County

COOPERATING AGENCY: Iowa Department of Natural Resources (Geological Survey Bureau).

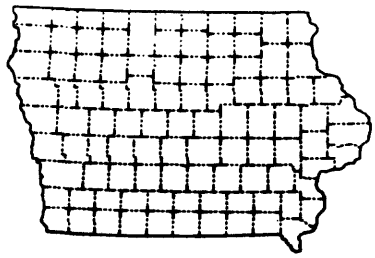
NEED FOR STUDY: Northeast Iowa is an agricultural region in an area of karst topography. Previous studies have shown that agricultural chemicals (nitrate and pesticides) have contaminated the Galena aquifer of Ordovician age which is the source for most domestic water supplies. The contaminant source is generally known, however knowledge of the flow path of ground-water and the chemical processes affecting contamination is limited. Also, the effects of modified agriculture practices on the contaminant levels in surface and ground water must be monitored.

OBJECTIVES: To further characterize the water quality in the Big Spring basin and define several aspects of the hydrologic flow system. Specific objectives include: (1) define ground-water recharge and discharge rates and quantify flow within different aquifers in the basin; (2) characterize the quality of small streams that drain into sinkholes; (3) identify the quantity and quality of water lost from streams because of seepage; (4) monitor quality and sediment load of water leaving the basin through Big Spring and Roberts Creek; and (5) define geochemical processes that affect surface-water quality.

PROGRESS: Results from the study were profoundly affected by drought conditions. Through the end of July 1989 rainfall in the study area was less than 60 percent of normal. Heavier rains in August and September brought the total rainfall closer to normal for the year. Streamflow at one surface-water monitoring site occurred only during snowmelt and briefly during rains in August and September. Streamflow leaving the study basin was very low, generally less than 1 ft^3/s (cubic feet per second) through the summer. Ground water flow leaving the basin through Big Spring was at an all time low, less than 10 ft^3/s in July. Water levels in several aquifers showed the effects of drought conditions. Water levels in the St. Peter aquifer (sandstone) dropped from 3 to 5 feet. Water levels in the shallower Galena aquifer and the alluvial aquifer varied in response to snowmelt and precipitation. Concentrations of atrazine, cyanazine, metolachlor, and alachlor were largest in samples collected from Big Spring and Roberts Creek during snowmelt. Atrazine was consistently detected at lower concentrations in water from the spring throughout the remainder of the year. Nitrate concentrations remained constant, 5.0 to 8.0 mg/L (milligrams per liter) in samples from Big Spring except during snowmelt. During snowmelt nitrate concentrations were substantially reduced, 0.3 to about 3.0 mg/L. The data collected in water year 1988 were published in Open-File Report 89-230, "Hydrologic Data for the Big Spring Basin, Clayton County, Iowa, Water Year 1988". Preliminary results of water-quality data collected in the Big Spring Basin were presented at the 101st Annual Meeting of the Iowa Academy of Science and the Second Annual National U.S. Geological Survey Water Quality Symposium in 1989.

STREAMFLOW STATISTICS FOR GAGED SITES IN IOWA

IA 88-060



PERIOD OF PROJECT: 1988-90

PROJECT CHIEF: N.B. Melcher

STUDY AREA: Statewide

COOPERATING AGENCY: Iowa Department of Natural Resources and U.S. Army, Corps of Engineers.

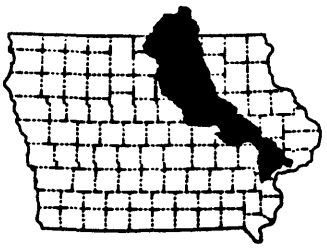
NEED FOR STUDY: The streamflow characteristics file for Iowa's interior streams has not been updated since 1974. These streamflow statistics are the basis for water-related legislation, waterways administration, and for public and private stream-related construction plans. Hence, this data must be the most recent and reliable available.

OBJECTIVES: The objectives of this study are to update the National Water Data Storage and Retrieval System (WATSTORE) streamflow characteristics file and publish commonly used statistics of low, median, and high flow.

PROGRESS: The data format has been established, the statistics for the report selected, and the data compiled. The report "Streamflow Statistics for Selected Streamgaging Stations in Iowa" by N.B. Melcher, E.E. Fischer, and S.P. Kluesner is being prepared and will be published in 1990.

THE MOVEMENT OF NONPOINT SOURCE AGRICULTURAL CHEMICALS BY THE INTERACTION OF GROUND WATER AND SURFACE WATER IN AN ALLUVIAL AQUIFER

IA 88-061



PERIOD OF PROJECT: 1988-92

PROJECT CHIEF: P.J. Squillace

STUDY AREA: All or parts of Benton, Black Hawk, Bremer, Buchanan, Butler, Cedar, Cerro Gordo, Chickasaw, Floyd, Franklin, Grundy, Hancock, Hardin, Johnson, Jones, Linn, Louisa, Marshall, Mitchell, Muscatine, Scott, Tama, Winnebago, and Worth Counties, Iowa and parts of Freeborn and Mower Counties, Minnesota

COOPERATING AGENCY: U.S. Geological Survey (Federal Program).

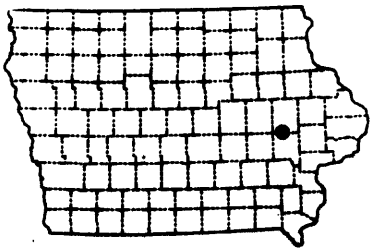
NEED FOR STUDY: Research is needed to determine how the surface-water quality affects the water quality of the alluvial aquifers and how the water quality of the ground-water leaving the alluvial aquifer affects the water quality of the streams.

OBJECTIVES: Research is needed to determine how the surface water quality affects the water quality of the alluvial aquifers and how the water quality of the ground water leaving the alluvial aquifer affects the water quality of the river. Specifically, the main objectives of this study are: (1) to describe and quantify the movement of nonpoint source contaminants and some of their degradation products from the surface water into, and out of the alluvial aquifer; and (2) to define the load and concentration of nonpoint source contaminants discharged from the alluvial aquifer to a small stream and to the Cedar River during low- and high-base flow.

PROGRESS: Two seepage runs were conducted along the main stem of the Cedar River. Forty one alluvial wells were installed and the water from the wells was sampled four times for chemical content. The alluvial aquifer material was analyzed for organic carbon content, mineralogy, and particle-size distribution.

THE HYDROLOGY OF PRE-ILLINOIAN GLACIAL TILLS IN IOWA

IA 88-063



PERIOD OF PROJECT: 1988-91

PROJECT CHIEF: R.C. Buchmiller

STUDY AREA: Linn County

COOPERATING AGENCY: Iowa Department of Natural Resources (Geological Survey Bureau).

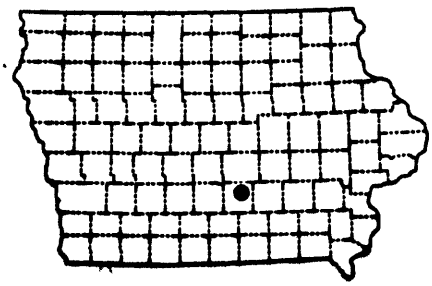
NEED FOR STUDY: No comprehensive research has been done on pre-Illinoian glacial deposits in the United States. The physics of water movement through glacial till needs to be defined, in particular, the relation of fractures in the glacial till to water movement. Changes in the chemistry of water as it moves through glacial till need to be determined, particularly as related to potential contaminants applied at land surface.

OBJECTIVES: The objectives are to determine the physics and chemistry of ground water in pre-Illinoian glacial tills.

PROGRESS: Onsite work began in September 1989 at a site in Linn County where pre-Illinoian glacial tills are present. Exploratory test holes and observation wells have been drilled at the study site.

ANALYSIS OF GROUND-WATER FLOW SYSTEM AND ASSOCIATED GEOCHEMISTRY AT RED ROCK RESERVOIR, NEAR PELLA

IA 89-065



PERIOD OF PROJECT: 1989-91

PROJECT CHIEF: K.J. Lucey

STUDY AREA: Marion County

COOPERATING AGENCY: U.S. Army, Corps of Engineers.

NEED FOR STUDY: Since completion of the Red Rock Dam on the Des Moines River in 1969, the U.S. Army Corps of Engineers has been collecting geologic and hydrologic data to investigate seepage along the dam face and downstream valley walls. The bedrock foundation of the dam in the river valley is highly fractured and weathered from dissolution of a basal gypsum zone. Seepage of reservoir water could cause dissolution of the gypsum in the bedrock and threaten the integrity of the earthen structure.

OBJECTIVES: Determine the source of the seepage around the dam, determine the flow path of any seepage, and address the potential for dissolution of gypsum from the foundation rock.

PROGRESS: A database is being prepared that contains all the water-level measurements, chemical analyses, and temperature data collected by the U.S. Army, Corps of Engineers for use in aiding in the development of an interpretation of the hydrogeology of the study site.

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