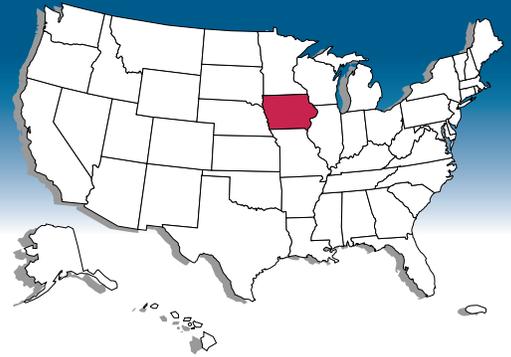




U.S. Geological Survey Programs in Iowa

U.S. Department of the Interior ■ U.S. Geological Survey



The U.S. Geological Survey (USGS) has served as the Nation's principal collector, repository, and interpreter of earth science data for more than a century. The USGS has been assessing, mapping, and reporting on Iowa's earth resources since the early 1900's. Ongoing USGS programs include activities in water availability and quality, natural hazards, biological, geographic and cartographic information, contaminated environments, land and water use, and mineral resources. Examples of these programs, many of which are conducted in partnership with State and local agencies, follow.

Ground-Water Resources

Ground water is the primary source of drinking water for Iowa's population. Information is needed by State and local governments to understand trends in water levels and water quality in the principal aquifers and to develop policy and management decisions related to their use. The USGS, in cooperation with the Iowa Department of Natural Resources (DNR), collects and compiles water-level data from a statewide network of about 150 observation wells (fig. 1). Information from this network also is used by local governments and individuals that require information on the depth to and availability of ground water at specific locations throughout Iowa.

A statewide program of ground-water sample collection and analysis from the principal aquifers is operated by the USGS in cooperation with the DNR and the University of Iowa Hygienic Laboratory. The data from this program are used by State agencies to track trends in water quality at various depths and locations throughout Iowa and to respond to undesirable concentrations of specific chemicals, such as pesticides, through policy and management decisions.

Drinking-Water Supplies

As urban populations grow in Iowa, communities need to obtain additional water supplies to meet their needs. The USGS, in cooperation with several Iowa municipalities, is studying the availability and quality of ground-water resources.

The USGS is evaluating the river-deposited sand and gravel aquifer along the Cedar River near Cedar Rapids. The evaluation is focused on determining the natural relation of the River to the aquifer and how the aquifer is affected by pumping of alluvial wells. The availability and quality of ground water in undeveloped areas of the aquifer also is being determined.

In Johnson County, the USGS is collecting ground-water level information from the Silurian bedrock aquifer for the cities of Iowa City and Coralville. The bedrock aquifer is used by several communities in the area, as well as by numerous rural residents with private

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wells. Because of the density of withdrawals within the greater Iowa City area, there has been a history of alleged withdrawal interference problems in the bedrock aquifer. As population growth results in continued development of the aquifer, the potential for interference problems will likely increase. The USGS is collecting background water-level information that can be used by municipal and private well owners to manage their well withdrawals and to document water levels in the aquifer.

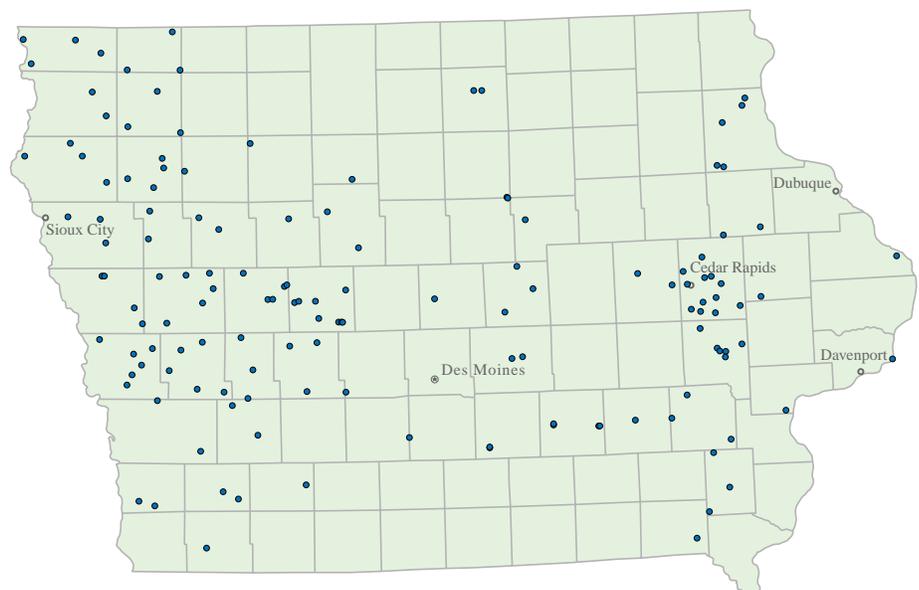


Figure 1. Locations of wells in the ground-water level network in Iowa.

Studies of Biological Resources

The USGS provides information to Federal and State agencies on the rivers and agricultural lands in Iowa. The USGS's Iowa Cooperative Fish and Wildlife Research Unit at Iowa State University is helping evaluate the benefits of the Conservation Reserve Program (CRP) to ring-necked pheasants, which is a popular game bird in Iowa. The CRP, which is administered by the U.S. Department of Agriculture (USDA), has taken millions of acres of marginal farmland out of production throughout the United States and converted them to improve habitat for wildlife. Impacts on population dynamics are being examined. The Unit investigates impacts of habitat fragmentation on other, game and non-game bird and mammal species. Agricultural chemical use also has been studied as it affects other organisms. The fishery resources of the State and, especially the Mississippi River, are a focus for aquatic ecosystem research.

The USGS participates in the upper Mississippi and the lower Missouri River initiatives that were developed in the wake of the catastrophic Mississippi River flood of 1993. The programs were established to provide government agencies in Iowa and adjacent States information to help restore and manage the natural functions and economic values of the upper Mississippi, the Illinois, and the lower Missouri Rivers. Other EMTC activities include the administration of the Upper Mississippi River System Long Term Resource Monitoring Program (LTRMP), in cooperation with the U.S. Army Corps of Engineers (USACE) and the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. The State-operated LTRMP field stations collect inventory and monitoring data on vegetation, water quality, fishes, and invertebrates to support development of integrated resource-management options.

Oil and Gas Resources

In an effort to assess properly the future energy resource potential of the Nation, the USGS is conducting a National Petroleum Assessment of undiscovered conventional and unconventional natural gas and oil resources. With these estimates, energy planners can plan for the future.

Iowa is situated along a geologic feature known as the midcontinent rift system. This feature could have produced structures capable of trapping natural gas and oil resources. As part of the USGS's ongoing National Petroleum Assessment, this area is being evaluated for its potential to contain and produce commercial quantities of petroleum. Scientists from the USGS are working with DNR personnel to determine the potential for hydrocarbon in this region.

Effects of Land Use on Water Resources

The USGS is participating with the DNR and various State and Federal agricultural agencies in efforts to determine the effects of changes in land use and management on streamflow and water quality in several small watersheds in Iowa. The primary purpose of these inter-agency efforts is to implement best-management plans in a watershed and to observe the changes in flow and water-quality that result from these changes. The observed changes are often compared with data collected from a similar nearby stream for which management practices have not been changed. Watersheds that are selected for this type of comparison are used to demonstrate the effectiveness of changes in land management to local land owners and to provide public education on the effects of land use on water resources.

In northeastern Iowa, two studies of the effects of land use are in progress. Streamflow is being measured in the Big Spring ground-water basin, and streamflow and sediment data are being collected from the Sny Magil and the Bloody Run watersheds. Data collected from the Big Spring watershed, which is a ground-water basin that discharges primarily through Big Spring near Elkader, are used by DNR and other agency managers to evaluate the long-term effectiveness of intensive management changes and public education efforts that were implemented during the 1980's. Sny Magil, which is a small tributary stream to the Mississippi River, was selected for implementation of improved land-management practices to reduce sediment and nutrient inputs. Bloody Run is an adjacent watershed being measured for comparison.

The USGS, in cooperation with the DNR, is collecting streamflow and sediment data in the Walnut Creek watershed in Jasper County. Much of the Walnut Creek watershed is included in a recently established National Wildlife Refuge. Refuge managers will eventually convert much of the formerly intensively farmed land in the watershed to a restored prairie. This conversion of land use offers a unique opportunity to determine its effect on streamflow and suspended-sediment concentrations at a scale not often available for study.

National Water-Quality Assessment Program

The goals of the USGS's National Water-Quality Assessment (NAWQA) Program are to describe the status and trends in the water quality of selected watersheds throughout the Nation and to identify the factors that affect their water quality. The Eastern Iowa Basins study that is being conducted as part of the NAWQA Program is focused on the Cedar, the Iowa, the Skunk and the Wapipinincon River Basins (fig. 2). The study currently is in the intensive data-collection phase of implementation. Progress and information collected from this Program are being communicated and provided to water-management and other water-resource agencies in the State.

Missouri Basin Study

The USGS and the State Geological Surveys of Iowa, Kansas, Missouri, and Nebraska have formed a partnership to study geologic aspects of land-use issues in the Middle Missouri Basin. These studies are conducted in a corridor that



Figure 2. National Water-Quality Assessment Program study area in Iowa.

encompasses Omaha and Lincoln, Nebraska; Council Bluffs, Iowa, Kansas City, Missouri and Kansas; and Topeka, Kansas. Most of the areas between the cities are a mix of smaller urban centers and intervening rural areas that support intensive agricultural activities. A variety of geologic factors affect land use in the corridor. Geologic constraints, such as collapsing or expanding soils, landslides, subsidence, and flooding, pose problems, especially in urban areas. Disposal of municipal and industrial wastes, which include hazardous wastes, is of concern in terms of past practices and future needs. Erosion, sedimentation, and pollution from nonpoint discharges are major issues in the Basin. The identification, protection, and extraction of construction materials present a continuing problem, as does reclamation of mining areas. Geologic information obtained in these studies is essential to understanding the carrying capacity of the land, identifying potential consequences of land uses on the natural system, and determining methods to reduce or mitigate those conflicts and consequences.

Collection of Streamflow Data

One of the most-used aspects of USGS programs in Iowa is streamflow-data collection and reporting. The USGS operates a statewide network of about 120 gaging stations (fig. 3) and surface-water

stage recorders for a variety of Federal, State, and local agencies. Streamflow information is used by the National Weather Service during storms to issue flood warnings and forecasts and by the USACE in operating the four Federal reservoirs in Iowa and in support of commercial navigation on the Mississippi and the Missouri Rivers. The DNR and the Iowa Department of Transportation use streamflow data to monitor the hydrologic conditions of the State, to provide a historical data base that is used to develop water-related policy and management decisions, and to design construction projects. Local government agencies use streamflow data for a wide variety of activities that range from local flood-warning systems that help protect lives and property to providing discharge volumes used in complying with wastewater-discharge permit requirements. Private citizens and businesses have access to USGS streamflow data.

In addition to the gaging-station network, the USGS maintains a statewide network of peak-stage recording gages on small drainage basins for the Iowa Department of Transportation. Data from this program are used to determine flood frequency and discharge for the numerous small, ungaged drainage basins. Flood-frequency and discharge data are used by State and county transportation engineers in the design of bridges and other structures.

The most readily apparent material that flows with the water in Iowa's streams is suspended sediment. Suspended sediment can have serious negative effects for some users of the resource and is an indication of the amount of erosion that occurs in a watershed. The USGS collects samples and determines the concentration of suspended sediment in water from a variety of sites in Iowa. The USACE uses the data to provide information on the amount of sediment that enters and potentially is deposited in Federal reservoirs in Iowa and the Mississippi and the Missouri Rivers because of problems to navigation caused by sediment deposition. The DNR is using sediment data as part of land-use and land-management studies to monitor water quality in several watersheds throughout Iowa.

In addition to measurements of water in streams, the USGS is collecting data on ground-water levels in the Missouri River alluvial aquifer in western Iowa for the USACE. The USACE is developing a revised management plan for the Missouri River. The stage of the Missouri River and ground-water levels in the adjacent alluvial aquifer are being studied at two locations in Iowa and three locations in Missouri to determine the effect of higher levels of flow on the adjacent flood plain. Data that are collected by the USGS are used by the USACE to verify predictions of the effects of changes in river flow on the aquifer.

Topographic Maps

Among the most popular and versatile products of the USGS are its 1:24,000-scale topographic maps (1 inch on the map represents 2,000 feet on the ground). These maps depict basic natural and cultural features of the landscape, such as lakes and streams, highways and railroads, boundaries, and geographic names; contour lines are used to depict the elevation and shape of terrain. Iowa is covered by 1,129 maps at this scale. These maps are useful for civil engineering, land-use planning, natural-resource monitoring, and other technical applications, and have long been favorites with the public for outdoor uses, including hiking, camping, exploring, and back-country fishing expeditions.

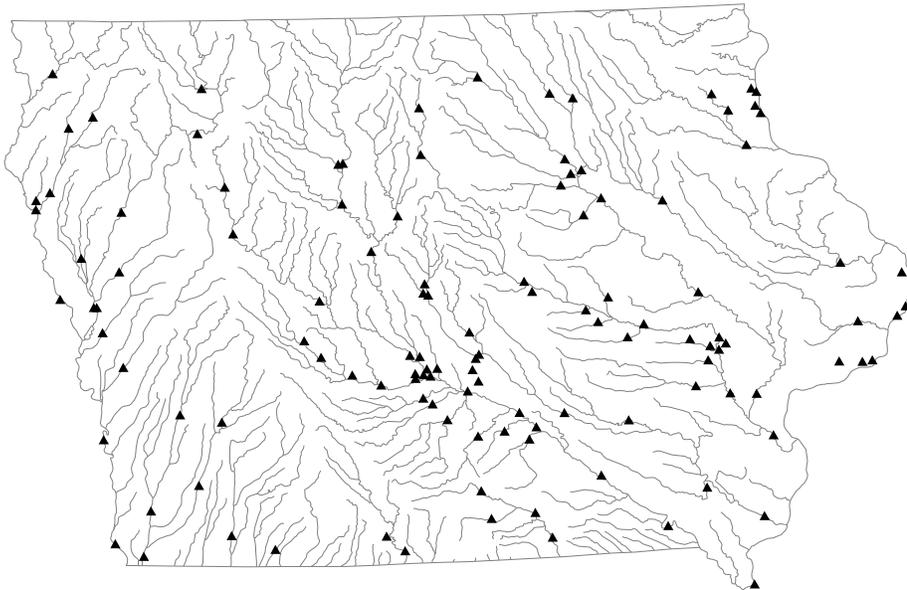


Figure 3. Locations of active streamflow-gaging stations in Iowa.

Mapping Partnerships

The USGS has participated in jointly funded map production and revision projects in Iowa for many years and, more recently, has prepared digital cartographic data in cooperation with Federal and State agencies in Iowa. In 1993, the USGS completed contour digital line graph (DLG) data statewide for the 1:100,000-scale topographic map series under a joint funding agreement with the DNR. Other DLG data layers and digital raster graphics (digitized images of topographic maps) are now being produced under similar agreements with the DNR.

The USGS also is preparing digital orthophotoquads (DOQ's) and digital elevation models (DEM's) for parts of Iowa under cost-share agreements with the USDA's Natural Resources Conservation Service. A DOQ is a digital image of an aerial photograph in which displacements caused by the camera and the terrain have been removed. A DEM is a sampled array of regularly spaced elevation values registered to a map base.

Mapping partnerships do not always involve the exchange of funds. In some cases, production tasks are shared among cooperating agencies. The benefits of work/share arrangements include the leveraging of limited resources (equipment, personnel, space, and funds), avoiding duplication of effort, producing standardized products, and accelerating data availability.

Sharing Spatial Data

The Competitive Cooperative Agreements Program (CCAP) of the National Spatial Data Infrastructure (NSDI) was established by the Federal Geographic Data Committee through the USGS to help form partnerships with the non-Federal sector that will assist in the evolution of the NSDI. The CCAP provides funding to State and local government agencies, academia, and the private sector to encourage resource-sharing projects through the use of technology, networking, and interagency coordination. The DNR and the Iowa Department of Education have been funded by CCAP to establish a prototype NSDI clearinghouse node. The node is being developed and maintained by the State Library of Iowa and the Iowa DNR; it will initially offer a directory of geospatial data information sources that are being created and maintained on an Internet

server at the State Library and access will be provided to the DNR's Natural Resource Geographic Information System library.

Geologic Mapping

Geologic mapping in Iowa is being conducted through a USGS program called STATEMAP. STATEMAP is one of the external funding opportunities offered by the USGS's National Cooperative Geologic Mapping Program (NCGMP). Agreements are open to all 50 State Geological Surveys. Funding announcements for STATEMAP are issued each year, and a competitive proposal process is used to distribute funds. Federal funding is matched equally by the recipients of the cooperative agreements. Typically, proposals focus on issues of importance to the environment and society, such as ground-water quality, geologic hazards, and landfill siting and management. Proposals also address a range of resource issues, such as oil and gas assessments, coal quantity, sand and gravel resources, and economic mineral development. The geologic map data generated are archived at the State Survey level and within the National Geologic Map Data Base of the NCGMP.

STATEMAP funds important geologic mapping projects in Iowa. These projects provide local agencies and private individuals with the geologic information required to evaluate the suitability of land tracts for development, housing density, construction practices, septic-system density and design, agricultural practices, waste disposal, ground-water and well-head protection, and emergency responses to accidental release of hazardous materials in these areas.

Earth Science Information

The Earth Science Information Centers (ESIC's) provide information about USGS programs, products, and technological developments to the public. The ESIC in Iowa City was established under a cooperative agreement between the USGS and the DNR. As part of the national ESIC network, this office provides information on such earth-science topics as cartography, geography, digital data, remote sensing, geology, geophysics, geochemistry, hydrology, geohydrology, aerial photography, and land use. It is supported by the USGS with reference materials, technical assistance, training and outreach activities, and access to USGS data bases.

For More Information

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Additional earth science information can be found by accessing the USGS Home Page on the World Wide Web at <http://www.usgs.gov/>

For more information on all USGS reports and products (including maps, images, and computerized data), call **1-800-USA-MAPS**

The **USGS** provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, biological, and land resources. We help find the natural resources needed to build tomorrow, and supply the scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by natural and human activities. The results of our efforts touch the daily life of almost every American.

U.S. Geological Survey
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