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

National Water-Quality Assessment Program—Eastern Iowa Basins

NAWQA
Fact Sheet

In 1991, the U.S. Geological Survey (USGS), Department of the Interior, began the National Water-Quality Assessment (NAWQA) Program. The long-term goals of the NAWQA Program are to describe the status of and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources and to identify the major factors that affect the quality of these resources. In addressing these goals, the program will provide water-quality information that will be useful to policymakers and managers at the national, State, and local levels.

The NAWQA Program will integrate water-quality information from different areal scales into the national assessment. The program will not diminish the need for smaller scale studies and monitoring presently designed and implemented by State, Federal, and local agencies to meet their individual needs. The NAWQA Program, however, will provide a large-scale framework for these activities and an improved understanding of the regional and national water-quality conditions that cannot be acquired from individual, small-scale programs and studies.

Studies of 60 hydrologic systems that include parts of most major river basins and aquifer systems (study-unit investigations) are the building blocks of the national assessment. The 60 study units range in size from less than 1,000 to more than 60,000 square miles (mi^2) and represent from 60 to 70 percent of the Nation's water use and population served by public water supplies. Twenty study-unit investigations were started in 1991, 20 additional are starting in 1994, and 20 more are planned to start in 1997. Assessment activities began in 1994 in the Eastern Iowa Basins study unit. This study will be conducted by the USGS from its office in Iowa City, Iowa.

Description of the Eastern Iowa Basins

The Eastern Iowa Basins study unit encompasses the Wapsipinicon, the Cedar, the Iowa, and the Skunk River Basins and covers about 19,500 mi^2 (see figure 1) in eastern Iowa and southern Minnesota. The four major rivers in the study unit generally flow in a southeasterly direction. The Cedar River joins the Iowa River about 30 miles (mi) upstream of the mouth of the Iowa River. The Wapsipinicon River originates in southeastern Minnesota and is about 225 mi long. The Wapsipinicon River Basin averages about 10 mi in width and has a drainage area of 2,540 mi^2. The Iowa River originates in north-central Iowa. The Iowa River Basin is long and narrow with an average width of about 20 mi and a maximum width of about 40 mi. The Cedar River originates in southern Minnesota. The Cedar River Basin is also long and narrow. The Iowa and the Cedar River Basins cover 12,640 mi^2, more than 90 percent of which is in Iowa. The Skunk River originates in central Iowa and drains about 4,350 mi^2. The Skunk River Basin averages about 24 mi in width.

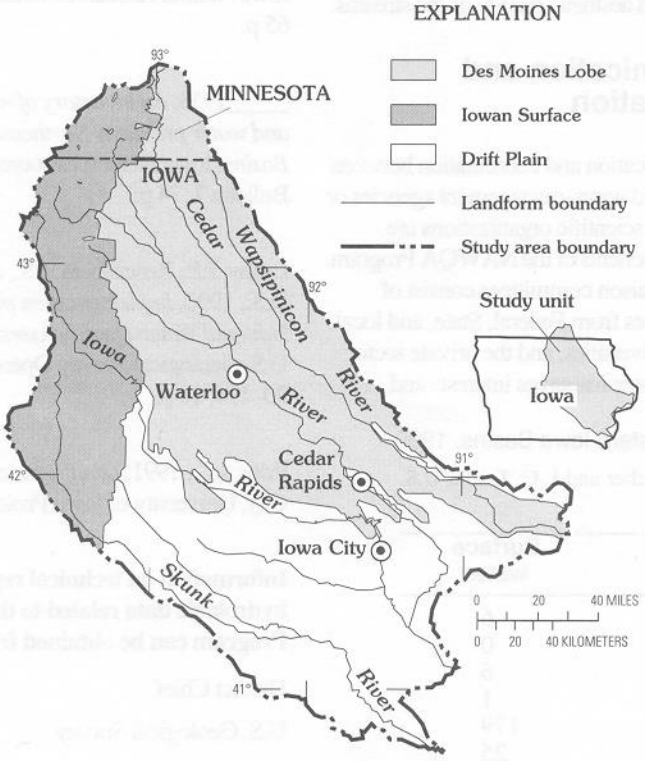

Figure 1. The Eastern Iowa Basins study unit (Iowa landforms from Prior, 1991).

The Eastern Iowa Basins study unit is divided into three major physiographically distinct regions, the Des Moines Lobe, the Iowan Surface, and the Drift Plain (see figure 1). The Des Moines Lobe is characterized by low relief with some distinct ridges near the eastern boundary and occasional depressions that form lakes, ponds, and swamps. Glacial till is the dominant surficial material with alluvium along the streams. The Iowan Surface has gently rolling topography with long slopes, low relief, and a mature drainage pattern. The surficial material is primarily glacial drift with thin layers of windblown loess on the ridges and alluvium near the streams. In the Drift Plain, streams have eroded deeply into the glacial drift and the loess mantle to produce a steeply rolling terrain with broad, flat drainage divides.

Water in the study unit originates as rainfall in late spring to late fall and as snow during winter and early spring. Average annual precipitation (1951–80) in the basin ranges from about 30 inches (in.) in the northwestern part of the study unit to about 36 in. in the southeast the part. The greatest rainfall occurs during the growing season in spring and summer. The mean April-to-October precipitation (1951–80) is about 25 in. The most intense 24-hour rainfall (5-year recurrence interval) can be more than 4 in. Snowfall has been recorded from September to May. The greatest 24-hour snowfall seldom (less than 25 percent of the years) exceeds 10 in.

Excess precipitation that either does not infiltrate into the soil or evaporates runs off to

the streams. Overland flow and ground-water discharge are the major sources of streamflow. Runoff to streams averages about 25 percent of the annual precipitation and increases from less than 7 in. in the northern part of the study unit to about 9 in. in the southeastern part. Yearly streamflow from the study unit averages about 9.2 million acre-feet. Surface water is an important source for public-water supplies for about 6 percent of the population and for power generation (see table 1). Additionally, 272 million gallons per day are used instream to produce 2.1 gigawatt-hours of hydroelectric power.

Water that infiltrates surficial unconsolidated material and ultimately the deeper bedrock formations is used as a water supply for about 94 percent of the population in the study unit. Surficial unconsolidated materials that are aquifers include glacial drift, loess, and alluvium. With the exception of alluvial aquifers, the unconsolidated aquifers generally yield small quantities of water that are used mostly for rural domestic and stock supplies. Alluvial aquifers are important sources for public-water supplies. Bedrock aquifers include the Cambrian-Ordovician, the Silurian-Devonian, and the Mississippian aquifer systems. The Cambrian-Ordovician aquifer system consists primarily of sandstone in the lower part and sandstone and interbedded limestone or dolomite in the upper part. The Silurian-Devonian aquifer comprises mainly limestone and dolomite with locally interbedded shale and evaporite beds. The Mississippian aquifer consists mainly of limestone and dolomite with some sandstone and siltstone.

Because water flows over the land surface or infiltrates the soil, human activities may have a substantial effect on the quality of ground and surface waters. The production of row crops, such as corn, and cover crops, such as alfalfa and small grains, constitutes the major land use in the study unit. Land near the streams and rivers has a combination of crops and forests. About 40 percent of the more than 1 million people in the study unit are concentrated in cities with populations of greater than 20,000 people.

Major Water-Quality Issues

Because water is an important resource in the predominantly agricultural Eastern Iowa Basins, a continuing supply of good quality water is needed. Several water-quality problems that potentially endanger this resource have been identified in collaboration with water-management agencies and other related scientific organizations. These problems include the following:

- Eutrophication—Agricultural and urban runoff of fertilizers and industrial and municipal sewage effluent increase biological production in streams and reservoirs, which causes reduced species diversity and altered species composition.
- Toxic contamination—Migration of pesticides to surface and ground water has endangered public water supplies.
- Soil erosion/sedimentation—Large quantities of soil are being transported to streams, which causes increased turbidity and siltation and thus degrades the aquatic habitat and aesthetic quality of the streams.

Communication and Coordination

Communication and coordination between the USGS and water-management agencies or other related scientific organizations are critical components of the NAWQA Program. Study-unit liaison committees consist of representatives from Federal, State, and local agencies, universities, and the private sector who have water-resources interests and responsibilities. Specific activities of each liaison committee include the following:

- Exchange information on and prioritize water-quality issues of regional and local interest.
- Identify sources of water-quality data and other information; for example, land use, demographics, soils, land-management practices, and pesticide use.
- Assist in the design and delineation of the scope of study elements.
- Review project planning activities, findings, and interpretations, including reports.

—S.J. Kalkhoff

Table 1. Reported offstream water use in the Eastern Iowa Basins, 1990

[Water use in million gallons per day. Source: E.E. Fischer and L.C. Trotta, U.S. Geological Survey, written commun., 1994]

Category	Ground water	Surface water
Public supply	115	6
Rural	20	0
Agriculture	33	6
Self-supplied industrial	20	1
Power generation	1	179
Other	12	25
Total	201	217

Selected References

Iowa Natural Resources Council, 1955, *An inventory of water resources and water problems Iowa-Cedar River Basin Iowa*: Iowa Natural Resources Council Bulletin 3, 94 p.

_____1957, *An inventory of water resources and water problems Skunk River Basin Iowa*: Iowa Natural Resources Council Bulletin 5, 65 p.

_____1958, *An inventory of water resources and water problems Northeastern Iowa River Basins*: Iowa Natural Resources Council Bulletin 7, 74 p.

Leahy, P.P., Rosenshein, J.S., and Knopman, D.S., 1990, *Implementation plan for the National Water-Quality Assessment Program*: U.S. Geological Survey Open-File Report 90–174, 10 p.

Prior, J.C., 1991, *Landforms of Iowa*: Iowa City, University of Iowa Press, 153 p.

Information on technical reports and hydrologic data related to the NAWQA Program can be obtained from:

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