



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—Western Lake Michigan Drainage Basin

In 1991, the U.S. Geological Survey (USGS) began to implement a full-scale National Water-Quality Assessment (NAWQA) program. The long-term goals of the NAWQA program are to describe the status and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources and to provide a sound, scientific understanding of the primary natural and human factors affecting the quality of these resources. In meeting these goals, the program will produce a wealth of water-quality information that will be useful to policy makers and managers at the national, State, and local levels.

A major design feature of the NAWQA program will enable water-quality information at different areal scales to be integrated. A major component of the program is study-unit investigations, which comprise the principal building blocks of the program on which national-level assessment activities are based. The 60 study-unit investigations that make up the program are hydrologic systems that include parts of most major river basins and aquifer systems. These study units cover areas of 1,200 to more than 65,000 square miles and incorporate about 60 to 70 percent of the Nation's water use and population served by public water supply. In 1991, the Western Lake Michigan drainage basin was among the first 20 NAWQA study units selected for study under the full-scale implementation plan.

STUDY UNIT DESCRIPTION

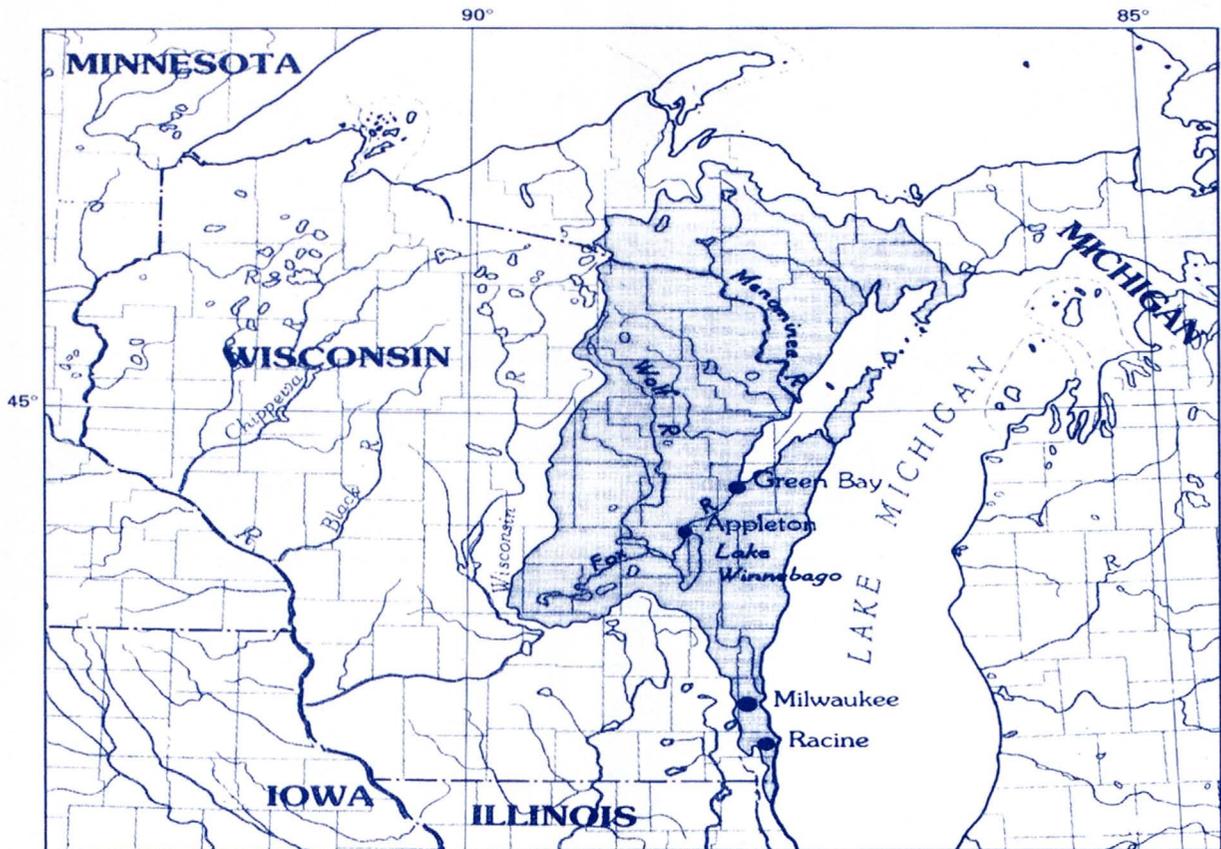
The Western Lake Michigan study unit drains a 20,000-square-mile area located in eastern Wisconsin and the upper peninsula of Michigan. The unit is comprised of Lake Michigan, the Fox-Wolf River, and the Menominee-Oconto-Peshtigo River basins in Wisconsin, and the Ford and Escanaba River basins in Michigan. The overall population in the study unit is 2,240,000 (1988). The major cities and their population are Milwaukee, 636,000; Green Bay, 88,000; Racine, 86,000; and Appleton, 59,000. The Green Bay area, located along the lower Fox River, has the highest density of paper pulp mills in the world. Agriculture also is a major activity, with 27 percent of the study unit devoted to cropland and

6 percent to pasture. About 50 percent of the study area, predominantly in the northwestern part of the basin, is forested, with streams and lakes offering excellent fishing (trout, walleye, northern pike, and bass), canoeing, and other recreation. Lake Winnebago, a 137,000-acre lake in the Fox River basin, is a major surface-water feature of the study unit. The Milwaukee River basin in the south (part of the Lake Michigan basin) has the greatest population, with agriculture and Wisconsin's trademark cheese and milk industry the major economic activities.

Silurian dolomite is the uppermost bedrock in the Lake Michigan basin; Ordovician and Cambrian sandstones and dolomite are exposed in the Fox River basin; and Precambrian crystalline rocks are exposed in the Wolf, Menominee, Oconto, Peshtigo, Ford, and Escanaba River basins. The topography of the study area was shaped by glaciation. Diagonally from northwest to southeast (divided roughly in thirds), surficial deposits are generally predominantly outwash and ice-contact deposits; glacial lake and ground-moraine deposits; and ground- and end-moraine deposits. Some isolated lake deposits occur along the western shores of Lake Michigan.

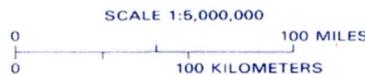
The study unit has a mean annual air temperature of 44 degrees Fahrenheit and annual precipitation of 28 to 32 inches, of which 8 to 15 inches leaves the unit as streamflow. This runoff is carried by numerous streams throughout the study unit, the major ones being the Escanaba, Brule-Menominee, Oconto, and Peshtigo Rivers in the northwest; Fox and Wolf Rivers in the central area; and Kewaunee, Twin, Manitowoc, Sheboygan, and Milwaukee Rivers in the eastern and southern part of the study unit.

Freshwater use in the study unit totals about 704 million gallons per day. Public suppliers provide about 371 million gallons per day, of which 69 million gallons per day is from ground-water sources. Rural domestic users obtain about 8 million gallons per day from surface-water sources and about 13 million gallons per day from ground-water sources. Industrial water use totals about 253 million gallons per day, of which 239 million gallons per day is from surface-water sources. Commercial, agricultural, and mining uses total about 53 million gallons per day. The major industrial instream use of surface water is for



Base from U.S. Geological Survey
U.S. base map 1: 5,000,000

Shaded area is study unit



hydroelectric and thermoelectric power. Ground water is the major source of public water supply except in those areas that border Lake Michigan and some communities adjacent to Lake Winnebago.

MAJOR WATER-QUALITY ISSUES

The major water-quality issues in the Western Lake Michigan drainage basin study unit are:

- Nonpoint-source contamination of surface and ground water by agricultural chemicals, including nitrate and pesticides. Aldicarb, atrazine, and alachlor are the most commonly detected pesticides;
- Contamination by toxic substances, including PCBs, other synthetic organic compounds, and trace elements in bottom sediments of rivers and harbors (Menominee River at Marinette, lower Fox River, Sheboygan Harbor, and Milwaukee Harbor);
- Nonpoint-source pollution and nutrient enrichment of rivers and lakes from industrial and municipal waste discharges; and
- Acidification and mercury contamination of recrea-

tional lakes in poorly buffered watersheds in the northwestern part of the study unit.

COMMUNICATION AND COORDINATION

Communication and coordination between USGS personnel and other interested scientists and water-management organizations are critical components of the NAWQA program. The Western Lake Michigan drainage basin study will have a local liaison committee consisting of representatives from Federal, State, and local agencies, and universities and the private sector. The liaison committee for the Western Lake Michigan study unit will be formed in summer 1991.

Information on technical reports and hydrologic data related to NAWQA and the Western Lake Michigan drainage basin study can be obtained from:

District Chief, Water Resources Division
U.S. Geological Survey
6417 Normandy Lane
Madison, Wisconsin 53719

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J.O. Setmire, 1991