WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—White River Basin

BACKGROUND

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 the study-unit investigation. These investigations 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 White River basin was among the first 20 NAWQA study units selected for study under the full-scale implementation plan.

DESCRIPTION OF THE WHITE RIVER BASIN

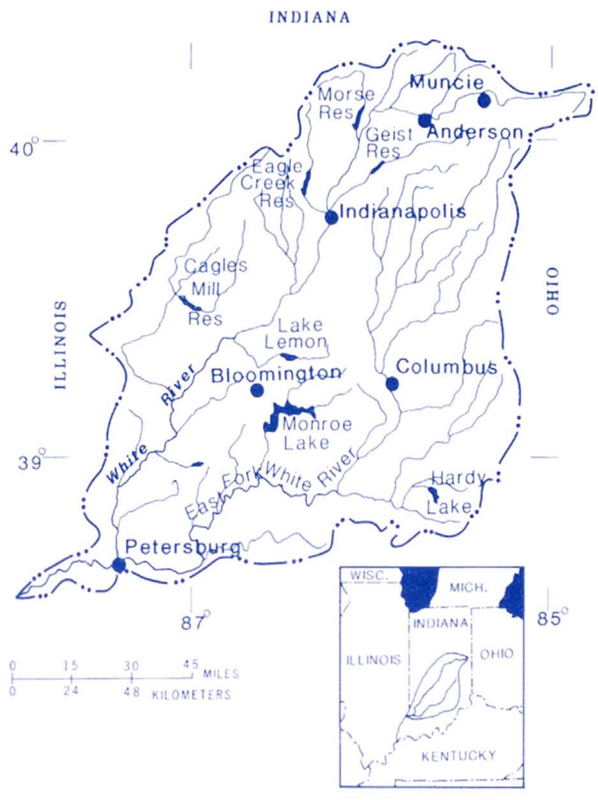
The White River basin is part of the Mississippi River system and drains 11,349 square miles of central and southern Indiana. Rivers within the basin generally flow southwest, following a regional drop in elevation of approximately 750 feet. There are two major subbasins in the river system: the eastern part of the basin (5,746 square miles) is drained by the East Fork White River, and the western part of the basin (5,372 square miles) is drained by the White River. Long-term average streamflow is approximately equal for both river systems (estimated to be about 3,800 million gallons per day each at the downstream-most reaches). The two rivers converge near Petersburg, Ind., and form a main channel that subsequently flows about 50 miles to the west where it joins the Wabash River at the Indiana-Illinois State line. This reach of the White River drains an additional 231 square miles. Long-term average streamflow within the main channel is 7,620 million gallons per day near Petersburg and is estimated to be about 8,850 million gallons per day near its confluence with the Wabash River. Streamflows generally follow seasonal fluctuations and are typically highest in April and May and lowest in late summer and fall.

Most surface waters in the White River basin are of good chemical quality and potable with appropriate treatment. Sewage effluents from urban areas in the northern part of the basin have been reduced, which has resulted in increased dissolved-oxygen concentrations and other improvements in water quality. High concentrations of sediment and agricultural chemicals, however, do enter surface waters in nonpoint-source runoff.

As many as three different glacial episodes over more than 60 percent of the basin created the three distinctly different physiographic provinces. The Tipton Till plain, the northern half of the basin, is a flat to gently undulating glacial depositional plain of Wisconsin Age. This province has glacial-drift deposits 50 to 400 feet thick that obscure the underlying bedrock topography.

The southwestern part of the basin was glaciated during Illinoian time. Because of its location near the terminus of the later Wisconsin glaciation, the area has been extensively reworked and is composed of mostly sand and gravel deposits of glaciofluvial origin.

Bedrock crops out only in the southern part of the basin. This area is characterized by alternating layers of more and less resistant rocks that form six different physiographic subregions. Subregions are differentiated on the basis of bedrock composition (predominantly shale, sandstone, and limestone) and



weathering characteristics. On a regional scale, these adjacent units form a relatively high-relief, hill and valley landscape.

The White River basin has three principal aquifer types—unconsolidated glaciofluvial, glacial drift, and carbonate bedrock. The glaciofluvial aquifers typically are unconfined and are the youngest, most productive aquifers in the basin. This type of aquifer (sand and gravel deposits in glacial channels and along flood plains) is most common in the southwestern part of the basin. Water quality in these glaciofluvial aquifers is prone to surface contamination because of high infiltration and ground-water flow rates. These aquifers have the highest median nitrate and chloride concentrations and the lowest median iron concentration of all aquifers within the State.

Isolated sand and gravel lenses enclosed by clay till (glaciofluvial) are the primary aquifers of the Tipton Till plain in the northern part of the basin. These aquifers are confined and generally yield large quantities of water to wells. Because of the relatively low infiltration rates of the clays, contamination of ground water from surface sources was not a major concern in the past. A recent concern is that the tills, because of fracturing, are not as impervious as was once thought. Elevated iron concentrations in these glaciofluvial aquifers commonly exceed the Federal secondary maximum contaminant levels for drinking water of 0.3 milligrams per liter. Water hardness also is a problem in these and most other aquifers in the basin, but is treatable.

In places where surficial glacial-drift deposits yield small quantities of water, carbonate-bedrock aquifers are used for water supply. Under the Tipton Till plain, bedrock aquifers consist of fractured limestones of Silurian and Devonian Age. Water quality in these bedrock aquifers is similar to that in the overlying glaciofluvial aquifers in the till.

Fractured limestones of Mississippian Age are the source of water in the south-central part of the basin. These aquifers crop out where overlying glacial deposits are absent. Wells typically are shallow and have low yields. Because of the karst topography and the highly fractured nature of the limestone bedrock, contamination from the surface can be rapid when it occurs.

The average annual precipitation in the study area ranges from 40 inches per year in the north to 48 inches per year in the south-central part of the basin. Rain in winter and early spring is generally long in duration, steady, and of mild intensity. Late spring and summer rains tend to be of shorter duration and higher intensity. Average monthly temperatures range from 28 degrees Fahrenheit in mid-January to 76 degrees Fahrenheit in mid-July. Average basin-wide temperatures increase gradually from 51 degrees Fahrenheit in the north to 55 degrees Fahrenheit in the south.

The population of the White River basin in 1990 was about 2.1 million. The city of Indianapolis in Marion County has 35 percent (742,000 people) of the total population of the basin. Marion County has a population density of approximately 2,000 people per square mile. Brown County, located in the south-central part of the basin, has a population density of 44 people per square mile.

Agriculture is the primary land use in the basin. Soybean and corn production is extensive in the northern half of the basin. Industrialization is significant in the larger cities of Indianapolis, Muncie, and Anderson. The southern half of the basin is not farmed as extensively as the northern half and, in times past, had active coal mines and limestone quarries. The hill and valley landscape of the southern part of the basin is very scenic and many State parks, forests, wildlife refuges, and recreational facilities are located there.

Water use during 1989 totaled 1,090 million gallons per day (88 percent surface-water withdrawals and 12 percent ground-water withdrawals). The major use of water within the basin is cooling water for fossil-fuel power-generating plants (64 percent of the total water use). Public water supply accounts for 23 percent of the total water use, whereas commercial, industrial, and irrigation uses comprise most of the remaining 13 percent. Although the basin is extensively farmed, irrigation is not necessary in the northern part of the basin because the soils tend to hold water from rainstorms for long periods of time. Some irrigation is necessary in the south-central and southwestern parts of the basin. Irrigation accounts for approximately 2 percent of the total water use in the basin.

MAJOR WATER-QUALITY ISSUES

Water-quality issues in the White River basin are related primarily to agriculture, the dominant land use, and, on a more localized scale, to urbanization. Key water-quality issues for the basin are related to the effects of:

- Nutrients transported by agricultural runoff and ground-water recharge on surface- and ground-water quality. Nitrate concentrations in ground water in areas of intensive agriculture often exceed the Federal maximum contaminant level for drinking water of 10 milligrams per liter, and can exceed this standard in surface waters during storms.
- Pesticides transported by agricultural runoff and ground-water recharge on surface- and ground-water quality. Increased levels of pesticides in fish tissue have resulted in the issuance of fish-consumption advisories for some streams in the White River basin.
- Soil erosion from agricultural areas on stream quality and aquatic habitat. Transport of pesticides and nutrients that adhere to sediments also can affect water quality in streams.
- Urban storm runoff and combined-sewer overflows on water quality of streams.
- Multiple, diverse sources of chemical compounds on regional ground-water quality (sources include landfills, hazardous-material spills, leaking underground storage tanks, and septic systems).

COMMUNICATION AND COORDINATION

Communication and coordination between USGS personnel and other interested scientists and water-management organizations are critical components of the NAWQA program. Each of the study-unit investigations will have a local liaison committee consisting of representatives who have water-resources responsibilities from Federal, State, and local agencies, universities, and the private sector. Specific activities of each liaison committee include the exchange of information about water-quality issues of regional and local interest; the identification of sources of data and information; assistance in the design and scope of project products; and the review of project planning documents and reports. A liaison committee for the White River study unit will be formed in 1991.

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

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