91-165

WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—Upper Snake 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 groundwater 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 program's 60 study units are hydrologic systems that include principal river basins and aquifer systems throughout the Nation. These study units cover areas from 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 upper Snake River basin was among the first 20 NAWQA study units selected for study under the full-scale implementation plan.

STUDY UNIT DESCRIPTION

The 35,800-square-mile upper Snake River basin study unit extends from its headwaters in Yellowstone National Park in northwestern Wyoming to King Hill in south-central Idaho. Twenty-four major subbasins are tributary to the Snake River. The relatively flat Snake River Plain is a prominent feature in the center of the study unit. The total 1990 population within the study unit in Idaho and Wyoming was about 391,000—about 378,000 in Idaho and about 13,000 in Wyoming. The population of the study unit area in Wyoming increases significantly during the summer months, however, because of recreational opportunities in Yellowstone and Grand Teton National Parks.

Physiography

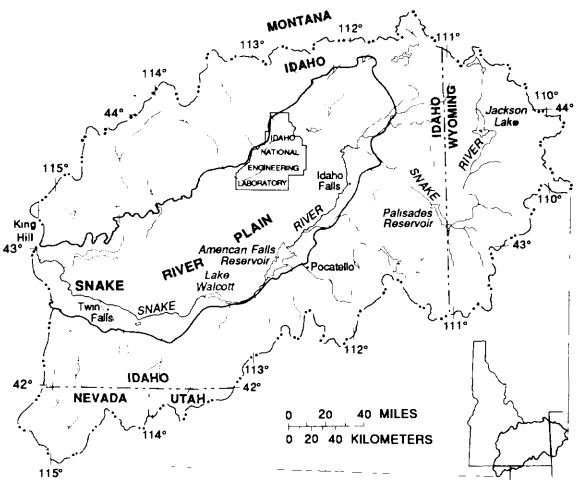
The upper Snake River basin includes parts of the Columbia Plateau, Rocky Mountain, and Basin and Range physiographic provinces. The eastern Snake River Plain is an extension of the Columbia Plateau province. The predominant vegetation is fir, pine, and aspen forests in the mountains and sagebrush and bunchgrass in the hills, on the plain, and in the valleys. The altitude of the Snake River in Wyoming ranges from about 6,800 feet above sea level near Jackson Lake in Grand Teton National Park to about 5,700 feet near Palisades Reservoir on the Idaho/Wyoming border, about 96 miles downstream. Surrounding mountains are as much as 13,770 feet above sea level. The altitude of the Snake River in Idaho ranges from about 5,400 feet above sea level at the outflow of Palisades Reservoir to 2,500 feet at King Hill, about 354 miles downstream.

The 10,800-square-mile eastern Snake River Plain is about 60 miles wide and 170 miles long. The plain is underlain by a highly transmissive water-table basalt aquifer. The predominant vegetation on the plain is sagebrush and bunchgrass. Large areas of the plain are bare basalt with little or no vegetation. The plain ranges in altitude from about 6,000 feet in the northeast to 2,500 feet at King Hill.

Geology

In the uplands northwest of the plain, pre-Tertiary sedimentary and Tertiary volcanic rocks predominate in the mountains and Quaternary-Tertiary sedimentary rocks predominate in the valleys. Uplands east of the plain are primarily Tertiary volcanic rocks and primarily pre-Tertiary sedimentary rocks southeast of the plain. The eastern Snake River Plain is underlain by a series of Quaternary olivine basalt flows, each averaging 20 to 25 feet in thickness; total thickness is as much as 5,000 feet.

The top of each basalt flow, generally less than 6 feet thick, is highly vesicular and broken, and has high hydraulic conductivity. Quaternary basalt in the eastern plain is typically within



a few feet of land surface. Near the margins of the plain, basalt is interbedded with unconsolidated sediments.

Hydrology

The Snake River from Jackson Lake to King Hill is about 450 miles long; the average gradient is about 96 feet per mile of river. Flow in the Snake River is measured at 18 gaging stations from Jackson Lake to King Hill. Surface and ground water leaves the eastern plain of the upper Snake River basin via the Snake River; the flow is measured at King Hill. Streamflow from six tributaries north of the plain does not flow directly into the Snake River but is lost to evapotranspiration and seepage to ground water underlying the plain. About 4.8 million acre-feet of water per year enters Idaho via the Snake River, and about 7.9 million acre-feet per year leaves the study unit at King Hill.

Numerous irrigation canals and pumps annually divert about 13.2 million acre-feet of water from the river to irrigate more than 2.3 million acres in the basin. About 5.1 million acre-feet recharges the regional aquifer. The remainder is either consumptively used or is returned to the Snake River as irrigation drainage. During the irrigation season, most of the flow in the river upstream from Twin Falls is diverted for irrigation.

Before irrigation began 100 years ago, two-thirds of the ground-water recharge to the eastern Snake River Plain was from drainage basins tributary to the plain. In 1980, two-thirds of the recharge was from percolation of excess surface water diverted for irrigation, one-fifth was from tributary drainage basins, and the remainder was from precipitation on the plain. Ground water discharges from the aquifers underlying the eastern plain largely from a series of springs near American Falls Reservoir and between Twin Falls and King Hill. In 1980, about 1.9 million acre-feet discharged from springs near American Falls Reservoir, and 4.4 million acre-feet discharged from springs north of the Snake River between Twin Falls and King Hill.

Land Use and Other Features

About one-half of the total study unit area is forest and grazing land, about one-third is irrigated land, and the remaining area is barren. Most of the 2.3 million acres of irrigated land within the study unit is near the Snake River and near the mouths of tributary drainage basins. Most cities and industrial centers are adjacent to the Snake River. The Nation's largest aquacultural producers (fish farms) also are located along the Snake River. Recreational areas are numerous in the Snake River basin in Wyoming. Located within the basin are Yellowstone and Grand Teton National Parks and the National Elk Refuge in Wyoming; the Idaho National Engineering Laboratory, which contains buried low-level and stored high-level radioactive wastes; the Grays Lake, Camas, Minidoka, and Hagerman National Wildlife Refuges; Craters of the Moon, City of Rocks, and Hagerman Fossil Beds National Monuments; and the Fort Hall Indian Reservation in Idaho.

Major dams and lakes in the basin are part of the U.S. Bureau of Reclamation's Minidoka Project in Idaho and Wyoming. About 4.4 million acre-feet of water is supplied annually from this project to more than 1 million acres of irrigated land. Eleven hydroelectric powerplants in the basin have a combined generating capability of 487 megawatts.

MAJOR WATER-QUALITY ISSUES

Almost half of the stream segments in the study unit assessed for water-quality conditions by the Idaho Department of Health and Welfare were affected by nonpoint-source activities. The primary nonpoint-source activities are irrigated and nonirrigated agriculture, grazing, streamflow regulation from dams and diversions, and recreation. Primary point-source activities are agricultural-related industry, municipal wastewater-treatment facilities, mining-related industry, and aquaculture. Water quality of lakes and reservoirs in the study unit is affected primarily by agricultural- and aquacultural-related activities.

Ground-water contamination from various point and nonpoint sources is generally confined to areas of a few acres to several square miles in extent. Common point sources of contamination are petroleum storage tanks, industrial chemical leaks and spills, and application of wastewater to the land. Ground-water contamination from nonpoint sources is poorly understood because of inadequate or nonexistent monitoring data. Sparse data do indicate, however, that applied agricultural chemicals have leached to the ground-water system in localized areas.

Specific water-quality issues include:

- Elevated concentrations of sediments and nutrients, and the occurrence of low dissolved oxygen and elevated water temperature in surface water associated with agriculture, grazing, and aquaculture; the result is degraded water quality and impairment of beneficial uses of water in some tributary basins and along the Snake River;
- Potential ground-water contamination by nutrients and pesticides associated with agricultural activities in intensively irrigated areas; and
- Potential surface- and ground-water contamination by nutrients from recreational activities in the upper 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. 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 will 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 upper Snake River basin study unit was formed in February 1991.

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

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