WATER FACT SHEET

U.S. DEPARTMENT OF THE INTERIOR, U.S. GEOLOGICAL SURVEY

NATIONAL WATER-QUALITY ASSESSMENT PROGRAM-- Northern Rockies Intermontane Basins

In 1991, the U.S. Geological Survey, Department of the Interior, began full implementation of a 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 natural and human factors that affect the quality of these resources. In addressing these goals, the program will produce a wealth of water-quality information that will be useful to policy makers and managers at National, State, and local levels.

The NAWQA program emphasis is on regional-scale water-quality problems. The program will not diminish the need for local studies and monitoring presently designed and conducted by State, Federal, and local agencies to meet their individual needs. The NAWQA program, however, will provide a national framework for conducting many of these activities and an understanding about regional and national water-quality conditions that cannot be acquired from individual, local-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 1,000 mi^2 (square miles) to more than 60,000 mi^2 and represent 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. The Northern Rockies Intermontane Basins was selected as one of 20 study units to begin assessment activities in 1994.

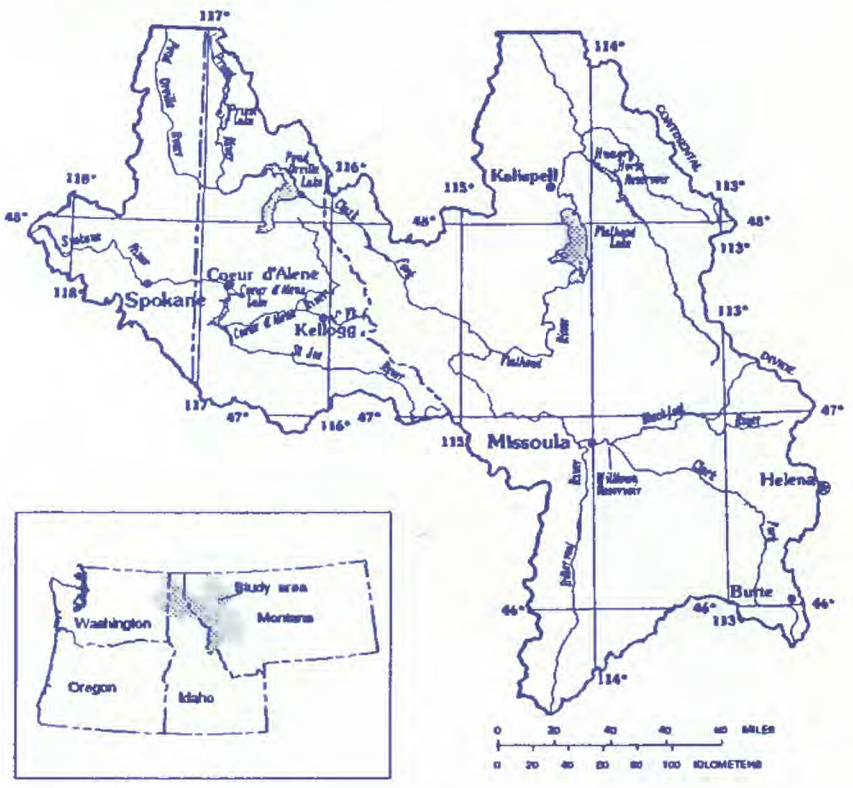
THE NORTHERN ROCKIES INTERMONTANE BASINS

The Northern Rockies Intermontane Basins study unit is a 31,500 mi^2 area in western Montana, northern Idaho, and northeastern Washington (fig. 1). The study unit lies within the Northern Rocky Mountains physiographic province. The study unit is comprised of two major river basins: the Clark Fork-Pend Oreille River Basin, which contains about 24,900 mi^2, and the Spokane River Basin, which contains about 6,600 mi^2.

The Clark Fork originates near Butte in southwestern Montana and flows 350 miles to Pend Oreille Lake in northern Idaho. Outflow from the lake is the Pend Oreille River, which flows into Canada. Major tributaries are the Blackfoot, Bitterroot, Flathead and Priest Rivers. The average annual discharge of the Pend Oreille River at the international boundary is about 28,000 cubic feet per second.

The Spokane River originates in northern Idaho and has two principal tributaries, the Coeur d'Alene and St. Joe Rivers, which flow into Coeur d'Alene Lake. Outflow from the lake is the Spokane River, which has an average annual discharge of about 7,000 cubic feet per second at Spokane, Wash.

The population of the study area was about 725,000 in 1990 with about 350,000 in Washington, 255,000 in Montana, and 120,000 in Idaho.



Annual precipitation ranges from less than 15 inches in many of the intermontane basins of western Montana to over 100 inches near the Continental Divide in northwestern Montana. Average annual runoff, primarily a result of snowmelt, ranges from over 50 inches in high-elevation basins to less than 5 inches in low-lying basins. The average annual temperature in the valleys ranges from about 40 to 55 degrees Fahrenheit, depending primarily on elevation.

The topography of the area varies from high, mountainous areas to large, flat-lying valleys. The study area has numerous large natural lakes and reservoirs, including Flathead Lake (the largest natural fresh-water lake in the western United States), Pend Oreille Lake (one of the deepest lakes in the United States), Coeur d'Alene Lake, Hungry Horse Reservoir, and Priest Lake.

Land use in the valleys includes agriculture, mining-related activities, timber processing, urban development, and recreation. Land use in the mountainous parts of the basins includes timber harvesting, mining, livestock grazing, and recreation. The Flathead, Coeur d'Alene, and Spokane Indian Reservations are either wholly or partly within the study area, and comprise about 10 percent of the area.

The average water use in the study area in 1990 was about 1,600 Mgal/d (million gallons per day). About 80 percent or 1,280 Mgal/d is from surface-water sources. About 1,200 Mgal/d is used for irrigation in Montana. Ground water used in the study area is about 320 Mgal/d. About 60 percent of the ground-water use is for municipal, domestic, and commercial supplies.

Quaternary and Tertiary basin-fill deposits contain the major aquifers in the study unit. The aquifers, which are present along most reaches of the large rivers and main tributaries, are the principal sources of ground water in the study unit. Igneous, sedimentary, and metamorphic rocks of Precambrian to Quaternary age generally are not a source of large amounts of ground water. However, because of their large extent, they contribute substantial amounts of recharge to the basin-fill aquifers. The Quaternary deposits, which generally are alluvial or glacial in origin, occur in valleys throughout the area, commonly are less than 200 feet thick, and consist of gravel, sand, silt, and clay. Thick, primarily fine-grained Tertiary deposits, which are fluvial or lacustrine in origin, generally occur in the southern part of the study unit and may contain some permeable gravels in the upper sections.

MAJOR WATER-QUALITY ISSUES

The following water-quality issues have been identified, in conjunction with organizations participating on the study-unit liaison committee, as the high priority regional-scale issues of concern to the State and local water-resource managers:

- Toxic trace metals in surface water and ground water from mining activities;
- Nutrients in surface water and ground water from point and non-point sources;
- Degradation of surface water and ground water from urban areas and suburban development; and
- Sedimentation from timber harvesting and agriculture.

The quality of surface water and ground water in both the Clark Fork-Pend Oreille and Spokane River Basins is affected by mining wastes or tailings. These tailings have been transported and deposited along more than 150 miles of river channel and flood plain from Butte to near Missoula. Transported tailings have been deposited in Milltown Reservoir and in other reservoirs downstream. Similarly, liquid wastes and tailings were discharged directly to the South Fork Coeur d'Alene River. Toxic metals from these tailings were transported and deposited along the river channel and flood plain, in a large delta extending into Coeur d'Alene Lake, and along the Spokane River downstream of Spokane, Wash.

Mine tailings contain elevated concentrations of arsenic, cadmium, copper, lead, and zinc. Toxic effects to aquatic organisms from these trace metals are illustrated by six major fish kills in the upper Clark Fork since 1984 and by the virtual absence of bottom-dwelling organisms in Coeur d'Alene Lake. Adverse effects on ground-water quality are illustrated by abandonment of water supplies from the alluvial aquifer near Milltown Reservoir owing to arsenic contamination from tailings accumulated in bottom sediments of the reservoir.

The quality of surface water is also affected by nutrients and sediment. Nitrogen and phosphorus concentrations commonly exceed criteria for biological enrichment in the Clark Fork headwaters area and are of concern in many other parts of the basin. Nutrient enrichment and potential eutrophication are of concern for Flathead, Pend Oreille, and Coeur d'Alene Lakes, where residential and commercial shoreline development and recreational use are rapidly increasing. Sources of nutrients are both natural and anthropogenic, including municipal wastes, septic-system effluent, and agriculture. Increased sediment loads from timber harvesting and attendant road building, and agriculture may be partially responsible for declines in populations of native trout species.

The quality of water in the basin-fill aquifers generally is good, with dissolved-solids concentrations less than 500 milligrams per liter. However, the quality of water in some parts of the aquifers has been affected either by mining wastes, nutrients, or urban contaminants. Overall, these coarse-grained aquifers are susceptible to contamination because of shallow depth to water, large surface exposure in the valleys where most human activity occurs, and hydraulic connection to surface water.

The Missoula and Spokane-Rathdrum Prairie alluvial aquifers have been designated by U.S. Environmental Protection Agency as sole-source aquifers. These aquifers are affected by infiltration of agricultural chemicals, septic-system effluent, municipal wastes, and possibly by metals in surface waters that recharge the aquifers.

COMMUNICATION AND COORDINATION

Communication and coordination between the U.S. Geological Survey and water-management and scientific organizations are critical components of the NAWQA program. Study-unit liaison committees have proven highly effective in this process and consist of representatives from Federal, State, and local agencies, universities, and the private sector who have water-resources responsibilities. Specific activities of each liaison committee include:

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

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

Chief, Northern Rockies Intermontane Basins NAWQA Study, U.S. Geological Survey, Federal Building, Drawer 10076, Helena, MT 59626-0076

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