WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

ASSESSMENT OF SPRING DISCHARGE TO THE SNAKE RIVER, MILNER DAM TO KING HILL, IDAHO

BACKGROUND

Numerous springs and groups of springs discharge water from volcanic rocks that form the north canyon wall of the Snake River between Milner Dam and King Hill in south-central Idaho (fig. 1). Nearly all of the springs emerge from vents at elevations higher than the river; many of the vents are more than 200 feet higher. Several of the springs are in short canyons that adjoin the Snake River canyon. Of 65 springs in the United States that have an average discharge of more than 100 cubic feet per second, 11 springs (or groups of springs) are along the reach of the Snake River from Milner Dam to King Hill. The average discharge from two of these groups of springs, Thousand Springs and Malad Springs, exceeds 1,000 cubic feet per second.

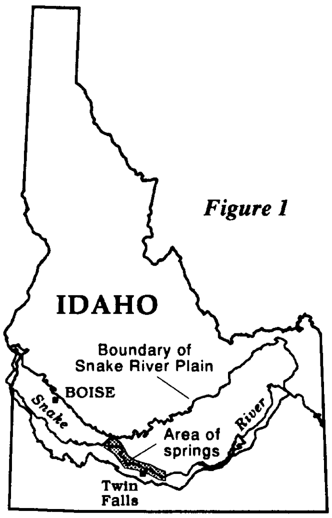

Figure 1

The U.S. Geological Survey (USGS) has measured discharge from many of these springs since 1902. Water from the springs is used by irrigators, hydroelectric producers, an aquaculture industry, and recreationists. Often in July and August, all streamflow in the Snake River upstream from Milner Dam is diverted for irrigation. Downstream from the dam, flow in the river is increased by the large volumes of water that issue from the springs and smaller volumes from agriculture drains and perennial streams. The Snake River Plain Regional Aquifer-System Analysis (RASA), which was conducted by USGS personnel, described relations between ground and surface water on the plain. This fact sheet updates the Snake River Plain RASA information and interpretations.

FLUCTUATIONS IN SPRING DISCHARGE

The annual average ground-water discharge (mainly spring flow) along the north side of the Snake River between Milner Dam and King Hill has been estimated for the period 1902 through 1991 (fig. 2). Estimates of discharge for 1902–50 were based on water-budget analysis of flow in the Snake River; estimates for 1951–80 were based on discharge measurements of 10 springs that were indexed to water-budget estimates. After 1980, development of some of these 10 springs precluded measurements of discharge. Therefore, estimates for 1981–91 were made on the basis of discharge from springs that could be measured, correlation of unmeasured with measured spring flow, and discharge records of Blue Lakes Spring (fig. 3) and Box Canyon Springs (fig. 4). Discharge of Blue Lakes Spring near Twin Falls and Box Canyon Springs near Wendell has been measured by USGS personnel since 1951. Differences between the Blue Lakes Spring and Box Canyon Springs hydrographs may reflect lag times in the effects of changes in irrigation practices and drought.

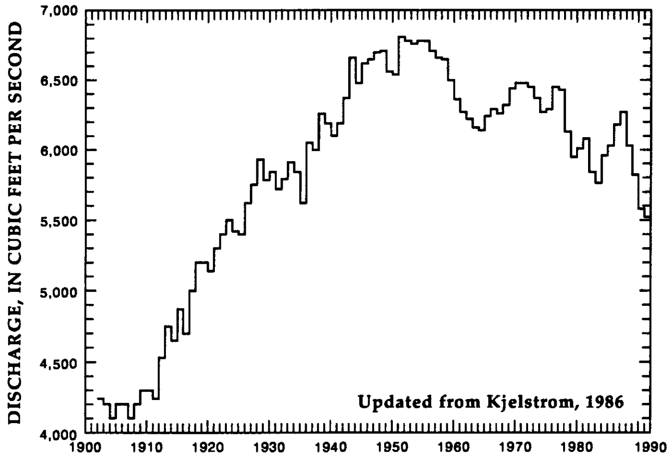

Figure 2

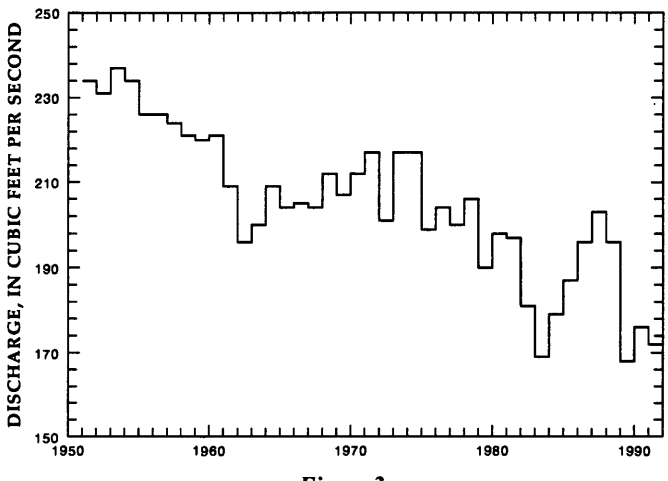

Figure 3

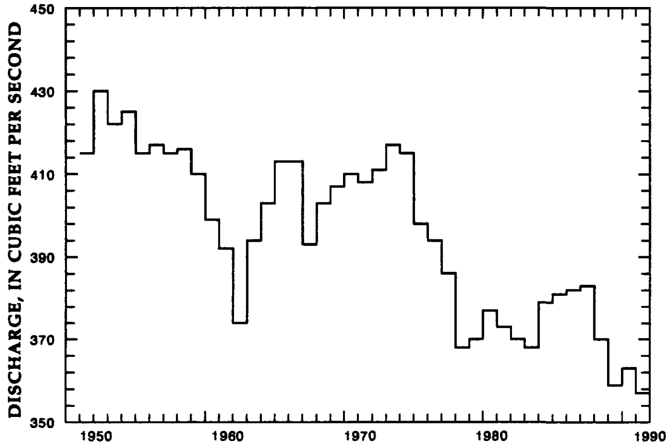

Figure 4

Discharge from all of the springs in the eastern Snake River Plain has fluctuated over the years as a result of changes in water use, irrigation practices, and precipitation. Since 1987, spring discharge has steadily decreased. Whereas increased use of ground water and changes in irrigation practices account for some of the decrease in discharge, 5 consecutive years (1987–91) of drought in southern Idaho has magnified the decrease. The drought, which has continued through May 1992, is the most severe in southern Idaho since the drought of 1929–41.

GROUND- AND SURFACE-WATER RELATIONS

The hydrograph of discharge from springs (fig. 2) is a key to understanding the hydrology of the eastern part of the Snake River Plain. From 1902 to the early 1950's, recharge from percolation of irrigation water that was applied north and east of the springs increased, which caused a rise in ground-water levels and a corresponding increase in spring discharge. In the early 1950's, pumping of ground water for irrigation increased rapidly and ground-water levels and spring discharge began to decline. Later, more efficient irrigation practices, such as conversion from flood to sprinkler irrigation, led to decreased recharge and greater ground-water-level declines. Likewise, water levels in wells indicate the same long-term trend that the ground-water discharge (spring flow) hydrographs indicate. For example, water levels in well 8S-24E-31DAC1 (fig. 5) generally declined from the early 1950's through 1991 but rose temporarily in the late 1960's and in the mid-1980's.

The hydrograph of annual average discharge of the Big Lost River at Howell Ranch near Chilly (fig. 6), a streamflow-gaging station about 95 miles northeast of Thousand Springs, is indicative of the quantity of water available to the eastern part of the Snake River Plain from tributary drainage basins. The hydrograph shows when water was available to recharge the Snake River Plain aquifer and when drought conditions prevailed. The increase in discharge from springs in the mid-1980's can be attributed to above-normal precipitation and runoff, as indicated by the large discharges of the Big Lost River from 1982 through 1984 and in 1986. Subsequent decreases in discharge from springs can be attributed largely to below-normal precipitation and corresponding small discharges from drainage basins tributary to the plain, such as the Big Lost River, from about 1987 through 1991.

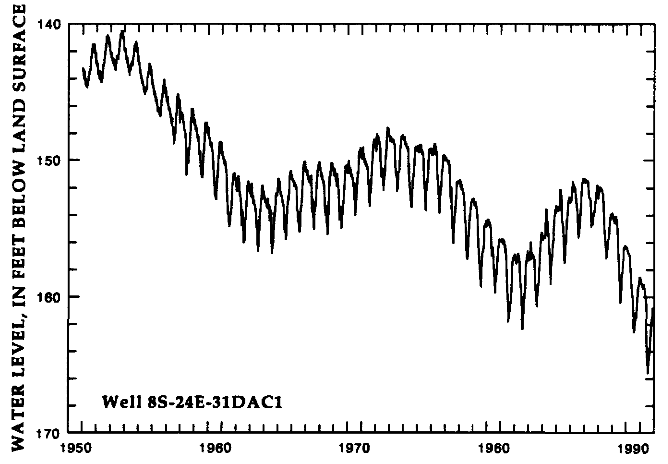

Figure 5

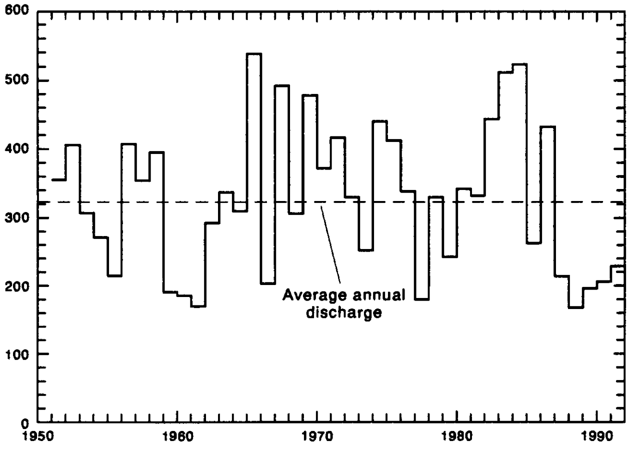

Figure 6

MONITORING SPRING DISCHARGE

Continued monitoring of discharge from some of the larger springs along the Snake River from Milner Dam to King Hill will provide the information needed for management of the ground- and surface-water resources in southern Idaho. The discharge records of Blue Lakes Spring and Box Canyon Springs are an important contribution to understanding seasonal and long-term changes in the eastern Snake River Plain regional aquifer system. In addition, these discharge records provide the basis from which future discharge from the regional aquifer system can be estimated.

SELECTED REFERENCES

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