



Seeps and Springs

RESOURCE BRIEF

Importance

As a major source of surface water in Bighorn Canyon National Recreation Area, aridland springs are often ecological and cultural hotspots. Springs cover less than 1% of the land area within the park, yet prehistoric peoples, as well as animals from neighboring uplands, have gravitated to springs for centuries for water and food. While the southern end of the park receives only 6–10 inches of rain per year, springs support a high biodiversity in wetlands. Some springs support rare species, such as the plant Hapeman’s coolwort (*Sullivantia hapemanii* var. *hapemanii*), by maintaining a narrow range of environmental conditions. Major threats to Bighorn Canyon springs include 1) trampling by ungulates and visitors, 2) water withdrawal, 3) the introduction of non-native species, and 4) long-term drought.



Hillsboro Spring, April 2004.

Status and Trend

Efforts to monitor springs in Bighorn Canyon National Recreation Area began in early 2003. There were 20 spring sites known at that time. That number has grown to 33 since collaborating scientists and park staff have “discovered” new sites in remote areas. Water quality and quantity as well as geomorphology and habitat structure data show that no two Bighorn Canyon springs are alike. The combination of geology, geomorphic setting, and elevation result in springs with varying structures, chemistries, and biota. Oxygen and hydrogen isotope levels of spring water show that most springs derive their water from recharged snowpack in the Pryor Mountains to the west and the foothills of the Bighorn Mountains to the east (Fig. 1).

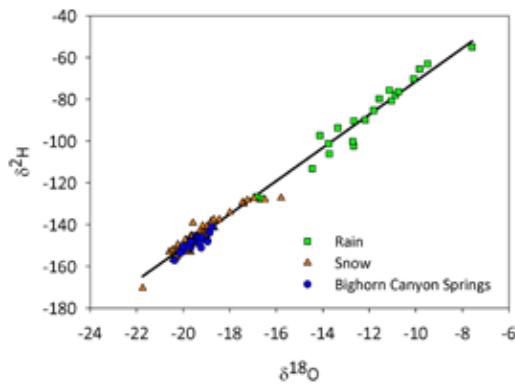


Figure 1. Analysis of oxygen isotopes (x-axis) and hydrogen isotopes (y-axis) shows that water from Bighorn Canyon springs derives from snowpack.

Discussion

Underground geology strongly influences spring water chemistry. Bighorn Canyon springs commonly flow through Madison limestone, Bighorn Dolomite, and Tensleep Sandstone strata. The map of spring calcium and magnesium illustrates that springs in close proximity, such as Hillsboro Main and Tyler’s Torrent, can have different chemical signatures because they travel through different underground flow paths or mix before emerging (Fig. 2). These springs also vary greatly in their flow rates, which range from 0.008 L/s (Hillsboro Side #1) to 7.55 L/s (Hillsboro Main). If climate change reduces underground reservoir levels, this could reduce residence time and lead to changes in water chemistry and flow in these low-volume systems.



Figure 2. Map showing locations and chemical composition of Hillsboro and Trail Creek springs in Bighorn Canyon National Recreation Area.

