



BIGHORN CANYON

Water Quality

RESOURCE BRIEF

Importance

Bighorn Canyon National Recreation Area (NRA) is a popular recreational destination for fishing and boating on Bighorn Lake. The Bighorn and Shoshone rivers provide most of the lake's water and contribute silt, nutrients, and pesticides from agricultural, domestic, and recreational uses. Numerous spring-fed streams, influenced primarily by natural factors such as geology and topography, flow through the interior of the park into Bighorn Lake. Excess inputs of nutrients such as nitrogen and phosphorus, as well as additions of silt and *Escherichia coli* (*E. coli*) bacteria into surface water systems from both natural and anthropogenic sources, threaten aquatic ecosystems. Studying and monitoring surface water quality and composition within Bighorn Canyon NRA is essential for understanding and managing the health of the park's stream and river ecosystems.

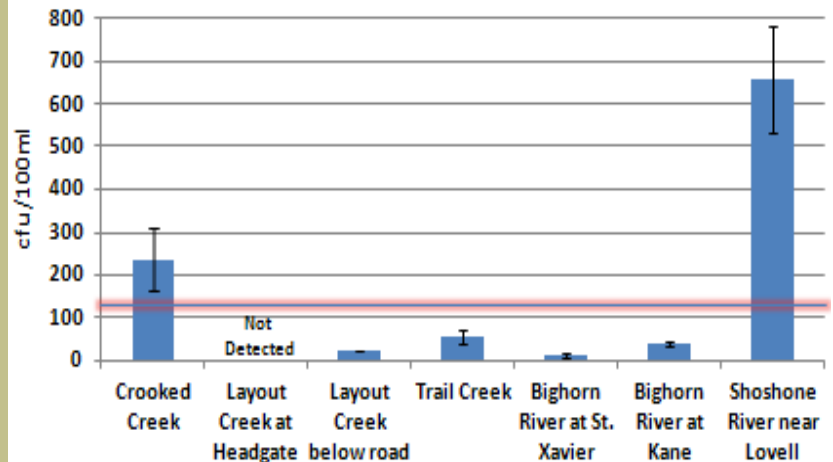


Figure 2. Mean colony forming units (cfu) of *E. coli* per 100 ml measured at each sampling site during the 2006 monitoring period ($\pm 1SD$). The horizontal line represents EPA's high *E. coli* limit of 126 cfu/100ml.

Status and Trend

To help determine the status of water quality within the park, quarterly sampling of eight sites began in 2006 (Figure 1). Measurements include pH, water temperature, conductivity, dissolved oxygen, major ions, nutrients, and *E. coli*. Initial results for most parameters are within state and national regulatory limits, though recent results for average phosphorus, sulfate, turbidity, and *E. coli* levels exceeded EPA water quality standards.

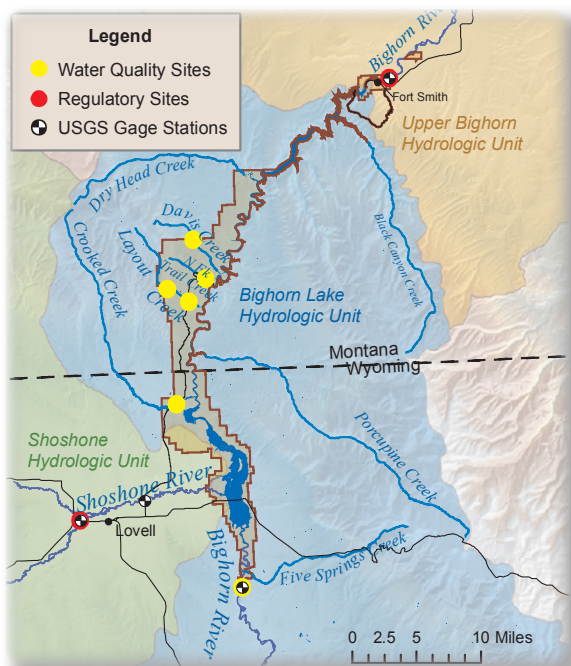


Figure 1. Location of monitoring sites.

Discussion

The chemical composition of surface water in and around Bighorn Canyon is predominantly influenced by the weathering of Cretaceous and Tertiary sedimentary rock. Variations in the chemical composition of water from different sampling sites reflect the diverse geology and topography of the region. High levels of phosphorus, most likely derived from natural sources, increase the potential for nuisance plant growth within the park's aquatic systems. Sulfate concentrations that exceed EPA drinking water standards probably result from natural factors. Elevated levels of water turbidity are not considered a direct health risk, though excessive river cloudiness may provide shelter for pathogens, reduce photosynthesis, and inhibit respiration for aquatic organisms. Concentrations of *E. coli* in park waters show significant variation, and measurements from most streams are within regulatory limits. One exception is from a sampling site on the Shoshone River (Figure 2) where excessive *E. coli* levels are most likely a result of anthropogenic factors such as sewage, agricultural and domestic waste and septic systems. Elevated concentrations of *E. coli* in aquatic ecosystems can pose a threat to human health, and levels are regularly evaluated for reporting to park managers and visitors.

