

MAPPING SURFACE GEOLOGY TO PROTECT CAVE AND KARST RESOURCES OF THE JEWEL CAVE SYSTEM

*Michael E. Wiles
Jewel Cave National Monument
11149 US Highway 16
Custer, SD 57730*

Abstract

Jewel Cave is a vast cave system in the Mississippian Madison Formation in the southern Black Hills of South Dakota. It is a resource that is still being discovered. Strong barometric winds in the cave have demonstrated that the 133 miles presently known represent only about 3% of the total volume. Thus, most of the cave system is yet to be found.

Maps of cave passages overlain by detailed surface geologic maps have demonstrated a spatial relationship between cave passages and geologic contacts, providing a general indication of where undiscovered passages are likely to exist.

They have also shown that hydrologic connections are directly related to the surface exposure of the two permeable subunits in the lower part of the overlying Minnelusa Formation. These exposures constitute zones of infiltration which, as a management tool, represent zones of vulnerability — areas where the cave is susceptible to impacts from surface activities via hydrologic connections.

The resulting maps have been used as a predictive tool to anticipate where the undiscovered portions of the cave might be found. This information has already been used to help prioritize efforts to protect the known and unknown portions of the cave system via a mineral withdrawal and a land exchange.
