DEVELOPING A 3D MODEL IN GIS TO ASSESS THE POTENTIAL EXTENT OF THE JEWEL CAVE SYSTEM: A TOOL FOR MANAGING THE UNKNOWN

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

Abstract

Park boundaries, and barometric airflow studies indicate that as much as 97% remains to be discovered. A first approximation of the maximum extent of humanly passable cave passages has been modeled in three dimensions, based on volume estimates from barometric air flow, constraints presented by geologic contacts, the water table, and known structural features. These relationships have been quantified and analyzed using structural and potentiometric contours from the U.S. Geological Survey Black Hills Hydrologic Study, surface and subsurface mapping by the National Park Service, and other sources. The model serves as an important management tool for an enormous resource that requires proactive measures to ensure its continued protection.