

Collection of Bathymetric Data Along Two Reaches of the Lost River Within Bluespring Cavern Near Bedford, Lawrence County, Indiana, July 2007

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Abstract

The U.S. Geological Survey (USGS), in cooperation with the Indianapolis Museum of Art (IMA), Ohio River Valley Water Sanitation Commission (ORSANCO), and Bluespring Caverns collected bathymetric data along two reaches of the Lost River within the Bluespring Cavern near Bedford, Indiana. The two reaches, designated as "upstream reach", and "downstream reach", had lengths of approximately 200 feet and 300 feet, respectively. These data were collected in support of an artwork commissioned by the IMA.

The USGS used an acoustic Doppler current profiler (ADCP) to collect the bathymetric data. ADCPs are acoustic instruments commonly used by the USGS to measure streamflow. To compute streamflow, ADCPs also measure water velocities, boat velocities, and water depths. Water-velocity measurements are made by transmitting sound at a known frequency into the water and measuring the Doppler shift, or change in sound frequency, from signals reflected off particles in the water (Oberg, Morlock, and Caldwell, 2005). Measurement of the Doppler shift of signals reflected from the river bottom determines the boat speed, and the ADCP on-board compass determines the boat direction (Wilson, Morlock, and Baker, 1997). The signals reflected from the bottom also are used to compute the depth of water. Although it has become commonplace for the USGS to use ADCPs for streamflow measurements, the collection of bathymetric data within a cavern for use in three-dimensional data-visualization products is an innovative use of the technology.

All data were collected on July 10, 2007. The ADCP was deployed from a small tethered flotation platform. All ADCP data were collected in real time on a laptop computer as binary files. The USGS quality assured the ADCP binary data files and output the water-velocity and bathymetry data in a text-file format. Computer programs were written to screen the text files for erroneous data and to format the data so they could be imported into three-dimensional data-visualization software. This software was used to create three-dimensional plots of the river reaches that showed river depths.

REFERENCES

- Oberg, K.A., Morlock, S.E., and Caldwell, W.S., 2005, Quality-assurance plan for discharge measurements using acoustic Doppler current profilers: U.S. Geological Survey Scientific Investigations Report 2005-5183, 35 p.
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