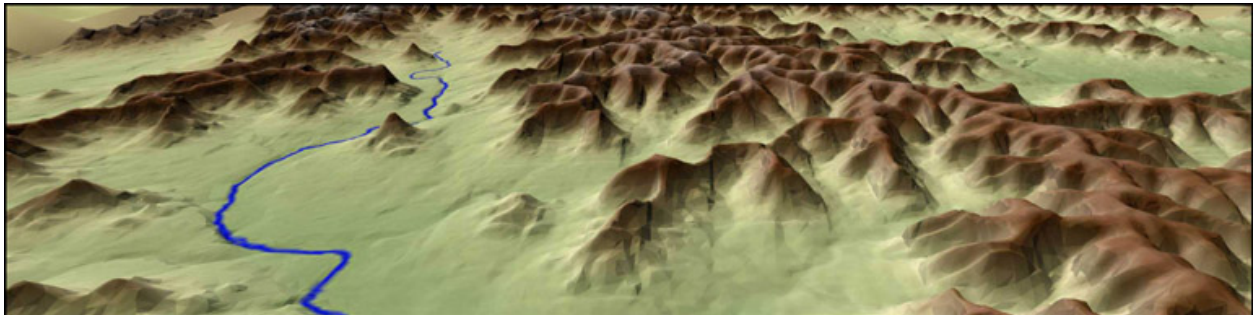


# Edwards Aquifer Visualization

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The Witte Museum, science, and history museum in San Antonio, provided an arena and raised funding for the Bureau of Economic Geology to prepare a visualization of flow processes in the Edwards aquifer as part of the Wittes 2005 special exhibit focusing on the Edwards aquifer World of Water. The visualization became part of the permanent exhibit in 2006. Museum staff, working with a community advisory board, requested a virtual field trip through the aquifer following rainfall in the recharge zone through flow paths within the aquifer to discharge at San Marcus Springs. In the Museum, the visualization is presented in a cave environment, which is a curved 3-screen, 3-projector system that surrounds the viewer and occupies one's peripheral vision to provide an immersive viewpoint, as if the viewer is experiencing the trip themselves. To show at the Austin Geological Survey poster session, we have prepared a single screen version.



Fly over Edwards Aquifer terrain.

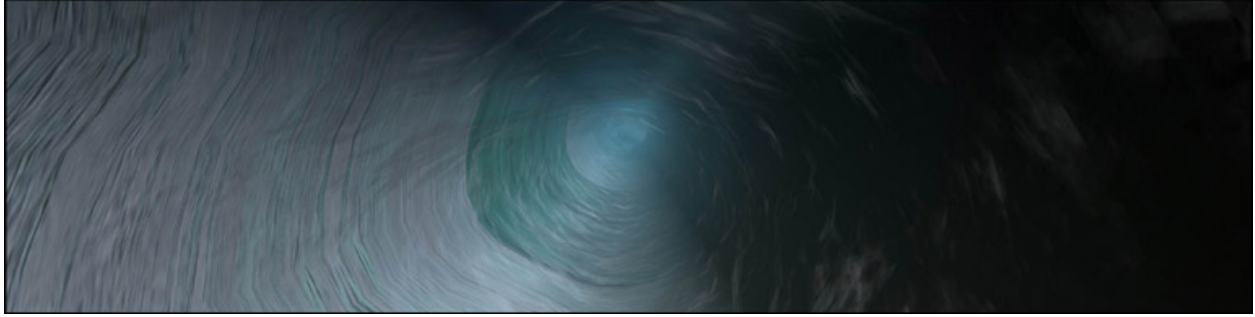
Key in providing public access to current research was use of high-resolution three-dimensional data sets to create the visualization. Bureau staff collected ILRIS surveys of the internal surface of four Edwards caves. The Texas Cave Management Association, the members of the Bexar County and Travis County Grottos of the National Speleological Society, staff of the Edwards Aquifer Authority, and Texas Parks and Wildlife provided cave access and logistical support. Segments of these cave geomorphology data sets were used to create visualizations of the larger aperture vadose and phreatic flow

systems of the aquifer. The visualization of smaller diameter pore systems were created from a C-T scan of a carbonate rock sample from Pipe Creek by Jim Jennings and Charlie Kerans (Reservoir Characterization Research Laboratory) and scanned by at the High-Resolution X-ray Computed Tomography Facility at The University of Texas at Austin. To populate the aquifer with selected cave adapted species, Dean Hendrickson, Curator of Ichthyology, Texas Memorial Museum, loaned us preserved specimens of two Texas blindcats, *Satan eurystoma* and *Trogloglanis pattersoni*, which were scanned by Julian Humphries, DigiMorph.Org, at the High Resolution X-ray Computed Tomography Facility at The University of Texas at Austin. Scans were co-funded by John G. Lundberg, Department of Ichthyology, Academy of Natural Sciences. Jean Krejca (Integrative Biology, The University of Texas at Austin), Glenn Longley (Texas State University), and Gerald W. Sneegas provided movies, photographs, and consultation to create visualizations of cave adapted animals.



Underwater cave entrance into the Edwards Aquifer.

Data sets were subsampled, imported into 3-D Studio Max, combined with whole earth and digital elevation models, and used to create a realization of a trip from space, to central Texas, into a sinkhole, and through cavern, pore, and fracture systems of the aquifer to discharge at San Marcus Spring. Special effects were added by The University of Texas at Austin Faculty Innovation Center. The file was then rendered into a movie format. A narrative script written by Barbara Hendricks and recorded by Sandy Woods was added along with a sound file prepared by Faculty Innovation Center.



Edwards Aquifer water moving up a well.

In addition, Bureau staff prepared a short movie documenting the techniques used to create the aquifer visualization to complement the visualization and document how cutting-edge science is brought to the public.



Toothless blindcat (*Trogloglanis pattersoni*) swimming in Edwards Aquifer.

Susan Hovorka, Reuben Reyes, John Andrews, Jerome Bellian, and Scott Rodgers are staff at the Bureau of Economic Geology, The University of Texas at Austin. The project was funded by the Witte Museum in San Antonio and includes the results of many Edwards researchers.

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