

## PROJECT DESCRIPTION

The purpose of this project was to continue establishing a long term groundwater quality monitoring program at Logan Cave that would allow groundwater threats to be detected, provide a solid baseline characterization of groundwater quality, and track groundwater quality changes through time.

Logan Cave has a diverse biotic community (over 43 species) that is home to several of Arkansas' karst species of greatest conservation need. The cave provides permanent habitat for the federally threatened Ozark cavefish (*Amblyopsis rosae*), habitat for a maternity colony of federally endangered gray bats (*Myotis grisescens*), the grotto salamander (*Eurycea spelaea*), and the Benton Cave Crayfish (*Cambarus aculabrum*).

In response to rapid economic growth occurring in northwest Arkansas, a significant proportion of the approximately 11 mi<sup>2</sup> recharge zone for this cave is undergoing rapid community growth. This area is one of the top three fastest growth regions in the United States. It's necessary to monitor the groundwater in the cave to determine if conservation measures that are being required are sufficient to protect cave water and the populations of rare and endangered species.

## OBJECTIVES AND ALTERNATIVES

The two main objectives for this project are to determine baseline groundwater conditions at Logan Cave and track water quality changes over time in relation to species population trends.

## METHODS AND PROTOCOLS

Grab samples of groundwater were collected once a month during baseflow conditions to minimize direct impacts from heavy precipitation events. Samples were analyzed for the following constituents: pH, Alkalinity, Conductivity, Turbidity, Chlorophyll a, Coliform & *E. coli*, & Hardness; other specific analyses also include: Cl, F, SO<sub>4</sub>, NO<sub>3</sub>-N, PO<sub>4</sub>-P (as SRP), NH<sub>3</sub>-N, TN, TP, TOC, TSS and Dissolved Trace Elements (Al, As, B,

Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, S, Se, Ti, & Zn).

## DATA MANAGEMENT

Data (report from TNC) is stored at Holla Bend NWR.

## DATA ANALYSIS / MODELS

Data will be used to establish baseline groundwater conditions at Logan Cave NWR and compared to some previously available data if available.

## ACCOMPLISHMENTS AND MANAGEMENT IMPLICATIONS

The water quality values observed during this project were similar to previous nutrient and metals analysis that were conducted from 2000-2005. The cave continues to experience elevated chloride, nitrate, *E. coli*, and total coliform levels. Logan Cave is home to a small maternity colony of endangered gray bats which roost in the cave during the summer months, and the presence of gray bats may explain the high values of *E. coli* and total coliform that occurred in the summer months. This observation seems to be supported by the above average values for total coliform from 2012 May-August. While elevated chloride and nitrate continue to be observed, the potential impact to groundwater organisms such as the endangered Benton Cave Crayfish (*Cambarus aculabrum*) and the threatened Ozark Cavefish (*Amblyopsis rosae*) is unclear. Benton Cave Crayfish counts were similar in number from 1999-2006, and the number of Ozark Cavefish has been significantly increasing.

This project provides an initial set of monthly water quality measurements for Logan Cave NWR, and it begins to establish a baseline of existing groundwater conditions over a one year period. However, a clearer picture of conditions would be gained through a multi-year effort to monitor water quality. Patterns such as elevated *E. coli* and total coliform during the summer months could be more strongly associated with

the presence of colonial bats if several years of groundwater observations were available. Therefore, a recommendation is made to continue water quality monitoring at Logan Cave NWR.

## **PARTNERS**

The Nature Conservancy – Ozark Highlands  
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## **MORE INFORMATION**

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