# COLLABORATIVE EFFORTS BETWEEN UNIVERSITY AND NON-PROFIT GROUPS IN THE EVALUATION OF CAVE AND KARST RESOURCES.

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## Abstract

The Hoffman Environmental Research Institute participates in ongoing interactions with non-profit groups needing cave and karst property evaluated for purposes of resource protection. These projects demonstrate techniques for evaluating cave and karst properties. A work plan was formulated in collaboration with The Nature Conservancy. Field methods involved in the project included cave survey and inventory, biologic specimen collection, a dye trace, water quality sampling, and photo documentation. GIS methods were then employed to present the findings of the field methods. The results of the study were used for The Nature Conservancy to help evaluate the resources they have. In Monin Cave, the survey and inventory has been completed, with a dye trace performed to understand the hydrology between two sections of cave on the property. Several cave adapted specimens were found at both sites, these are being classified by The Nature Conservancy biologists.

## Introduction

The Hoffman Environmental Research Institute has been steadily building a relationship with the Kentucky chapter of The Nature Conservancy. The Hoffman Institute studies best management practices and other resource protection methodologies in karst and other rural areas in order to enhance environmental quality. The Institute is involved in developing specialized GIS tools to support the projects involved with resource management, particularly with regard to karst. The Nature Conservancy is a leading international, nonprofit organization dedicated to preserving the diversity of life on Earth. They strive to preserve plants, animals, and natural communities by protecting the lands and waters they need to survive. The organization is sectioned into chapters, representing the state they are located in; the specific section for this project area is the Green River Watershed.

The Hoffman Institute was originally introduced to The Nature Conservancy through a grant to buy 130 acres of rural land for Western Kentucky University. The relationship was built through ensuing work done in Metcalf County, Kentucky, on the caves of the Dry Fork area. The Nature Conser-

vancy invited the Hoffman Institute to pay an initial visit to two sites to evaluate the potential for the caves, one located in Green County and the other in Adair County, Kentucky.

## Project Areas

Monin Cave is located in Green County, Kentucky, near the town of Crailhope. Garnett Cave is located outside of Columbia, Kentucky, in Adair County. Monin Cave is located in the St. Louis Limestone, where Garnett Cave is in the Fort Payne Formation.

## Field Methods

A work plan was developed with The Nature Conservancy to evaluate the two cave systems. A cave survey was conducted following standards set by the Hoffman Institute. The GPS data was taken by a Garmin Legend with accuracy of up to 10 meters. Along with the cave survey, a resource inventory was completed. Water chemistry measurements including temperature, pH, and conductivity were taken at both locations. Photo documentation was performed on all trips. A dye trace was performed at Monin Cave. The Nature Conservancy also asked the Hoffman Institute to perform a biologic collection of stygobites from both caves. The samples were then forwarded to scientists at The Nature Conservancy for identification.

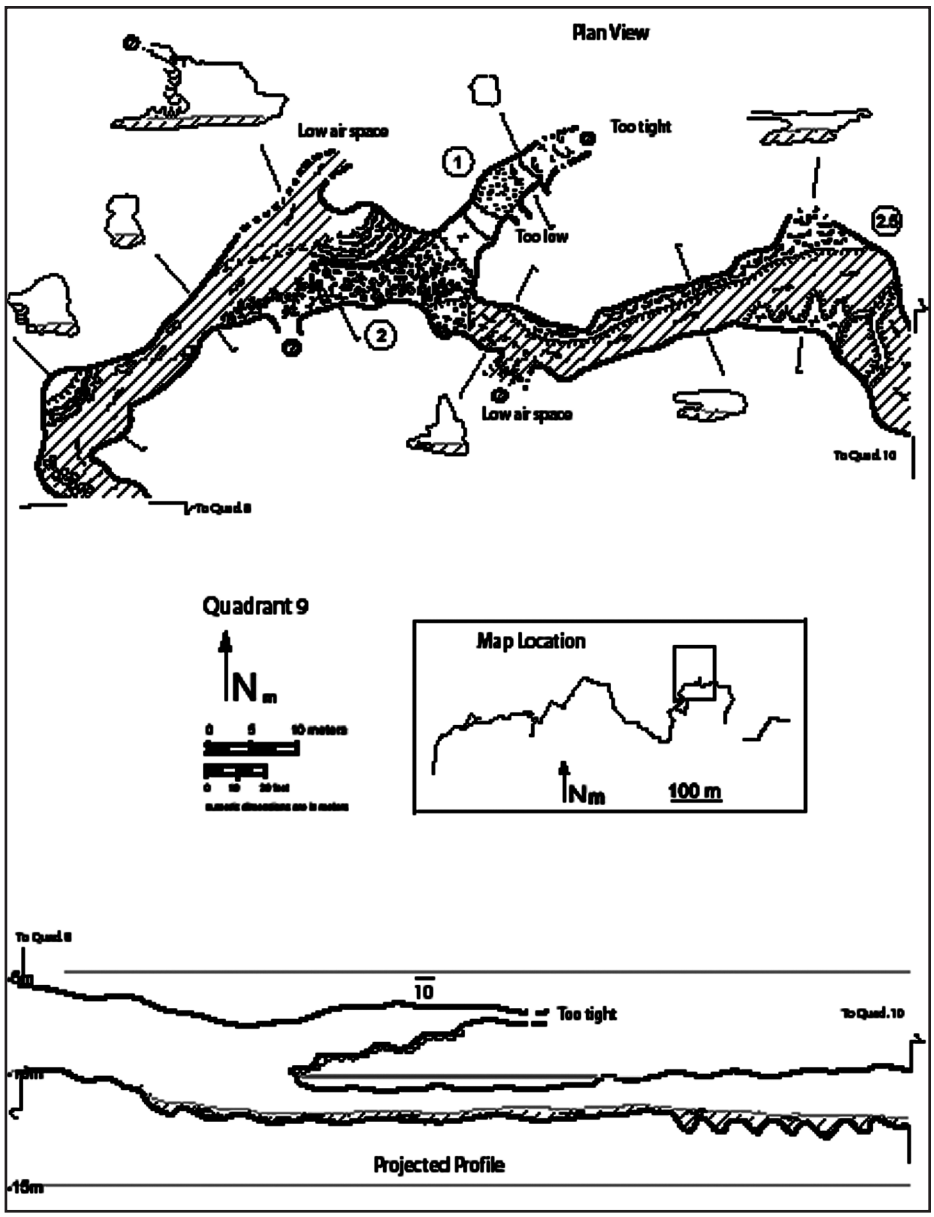


*Figure 1: Finished Quadrant 9.*

## Results

After the completion of the cave survey, the information was compiled into the Compass cave survey program. It was georeferenced using the GPS locations acquired in the field. This data was used to complete the cartography of each of the caves. Due to the size of Monin Cave, a quadrant map format was used. The Compass data was also exported as a shapefile. One shapefile was used to import the line plot onto a topographic map of the region in ArcGIS. Other shapefiles were modified to be used as a catalog for the resource inventory. These files were then added as layers in ArcGIS. An interactive map was created in ArcGIS displaying different inventory layers, such as locations of

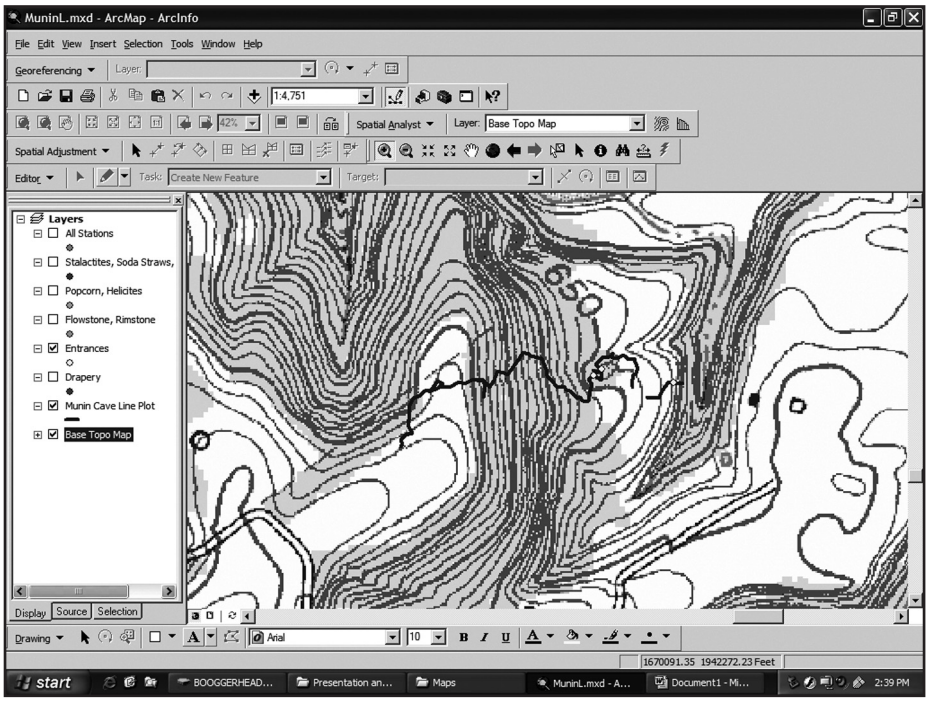


*Figure 2: Inventory line plot in ArcGIS.*

different speleothems in the cave. The results from the dye trace at Monin Cave provided a positive conclusion that the stream in Monin Cave was the stream that came out at Monin Spring. This was added as another layer to the interactive GIS map.

## Future Work

The above details the preliminary work done at Garnett and Monin Caves, future work will directly correlate with the needs of The Nature Conservancy. It has been planned to try survey pushing the hydrologic connection between Monin Cave and Monin Spring. When the dye trace was performed, a visual hit was expected, due to the locations on the topographic map. A positive hit was obtained, but not in the time frame expected. Investigation of the passage in between might answer the time question. An overland survey needs to be conducted to determine the accuracy of the GPS placed points.

More information about Garnett Cave also needs to be obtained. There is a local rumor that there is another entrance to the cave, which was not found during survey. The topographic map shows an old homestead with a possible spring source in the direction of the survey. A clean-up project for this cave will be coordinated with the local grotto to take out glass and other debris that has washed into the cave.

## Conclusions

The Hoffman Institute worked with The Nature Conservancy to develop and conduct a work plan for the evaluation of Monin Cave and Garnett Cave. The collaboration in this project is beneficial to both parties. Field methods and technical skills are built by students and associates of the Hoffman Institute that are transferable to other projects. It also builds a relationship with other agencies and the Institute is involved in providing services to the Commonwealth of Kentucky. The Nature Conservancy benefits by gaining knowledge about the systems they are seeing to protect. It helps drive the conservation-decision process for where they should work and what is required to conserve certain systems.

## Acknowledgements

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