

Caves, trails mix up summer learning

By Susan Riddell

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Shane Coffey tosses a dye receptor into the 54-degree water near one of the entrances to Mammoth Cave. Broderick Davis collects a water sample in a small vial. Rachael Jones and Tim Baker record the data. And this all happened shortly after a hike of more than three miles in which the teachers collected data pertaining to trail erosion.

The four teachers have been working this summer at Mammoth Cave National Park in a 200-hour professional development program called "Geoscience Teachers in the Park."

Sponsored by the National Association of Geoscience Teachers, Mammoth Cave National Park and the Mammoth Cave International Center for Science and Learning, the program strives to give elementary, middle and high school teachers learning experiences they can modify and share in their classrooms.

Davis is a 5th-grade science teacher at Caverna Elementary School (Caverna Independent) while Baker taught biology, chemistry and environmental science at Hart County High School. Jones teaches biology, zoology and environmental science at Greenwood High School (Warren County) while Coffey teaches science at Metcalfe County Middle School.

Selection in this program was hard to come by. More than 40 Kentucky teachers applied for the program, but only four spots were available. Mammoth Cave National Park is the only national park in the country to offer this opportunity to teachers.

The teachers worked with Mammoth Cave personnel and interns on a wide variety of research and monitoring experiences. Among the projects were hydrology work, trail monitoring, lesser caves inventories, radon and E-coli sampling in the caves and cave mapping. All of the projects supplied important information that the park will be using to manage its natural resources.

"The program focuses on giving the teachers first-hand experiences working with scientists and assisting with geoscience-related research and monitoring activities at the park," Shannon Trimboli, an education program specialist for the Mammoth Cave International Center for Science and Learning, said. "I know my students learn better by hands-on activities, so why shouldn't I learn by hands-on?" Coffey said. "We get to go where tourists don't always get to, so it's a great opportunity for all of us."

Trimboli said offering the teachers a wide array of research experiences is one of the program's main goals.

"This is our fourth year offering the Geoscience Teacher in the Park



Photos by Amy Wallot

Shane Coffey, far left; Broderick Davis, left, a 5th-grade science teacher at Caverna Elementary School (Caverna Independent); Tim Baker, biology, chemistry and environmental science teacher at Hart County High School; Rachael Jones, biology, zoology and environmental science teacher at Greenwood High; and Mammoth Cave National Park Ranger Larry Johnson review a trail map before hiking it to measure and monitor its quality.

internships. And almost all teachers have told us that they never realized how much research goes on here or how much diversity there is in the research," Trimboli said. "We try to give the teachers a taste of everything and then help them focus on the projects they enjoy the most."

Along with the 200 hours, teachers must create an educational product for Mammoth Cave or use in their classrooms and give two public presentations. Collaboration is allowed.

Some examples past products include lesson plans, documentaries and learning exercises for the trails.

Jones will be creating her curriculum as her product.

"I have learned something new every day," said Jones "The things I am learning here will be a major portion of my curriculum for my environmental science students. I also wanted to see what local resources are available to help me with this, and we are getting to see things most people don't get to see."

MORE INFO...

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Jones, Coffey, Baker and Davis demonstrate dye tracing at Echo River Springs in Mammoth Cave. Among the projects the four science teachers worked on were hydrology work, trail monitoring, lesser caves inventories, radon and E-coli sampling in the caves and cave mapping.



Greenwood High School (Warren County) science teacher Rachael Jones stakes the ground along a trail as the group prepares to take measurements during the "Geoscience Teachers in the Park" professional development program at Mammoth Cave National Park.



Coffey, an 8th-grade science teacher at Metcalfe County Middle School, takes pictures of Echo River Springs, which she planned to share with her students.



Student Conservation Association intern Mary Newton, left, and science teachers Tim Baker (standing), Shane Coffey and Broderick Davis measure the muddiness and erosion of a trail to monitor its quality on July 20. This data will play an important role in determining the location and types of trail maintenance that is needed

ABOUT SOME OF THE ACTIVITIES

All of the data gathered by the teachers is entered into the park's research database -- information that is essential to park managers and will be used in science-based decision making at the park.

Trail monitoring – Teachers measured the width of trails at various points while taking depth measurements of mud in an effort to monitor the quality of the trail in terms of excessive muddiness, erosion and side trails. This data will play an important role in determining the location and types of trail maintenance that is needed.

Lesser caves inventory – Mammoth Cave National Park has approximately 300 caves. Most of these do not connect to Mammoth Cave and are classified as "lesser caves" because they are shorter (in length) than Mammoth Cave, the longest cave in the world. The teachers obtained GPS coordinates for several of these caves and installed a small brass cap or button in the wall of the cave entrance. The brass button contains a unique number that is correlated with the GPS coordinates and allows park officials to produce a map showing the location of all the caves in the park.

Dye tracing– Hydrology projects trace the flow of water by using special dyes that are placed in a water source or sinkhole. Dye receptors are placed in the water at springs or other places where the dye may appear. The dyes quickly dilute out to a level that is invisible to the human eye; however, even extremely tiny amounts of dye will chemically bind to the dye receptors' charcoal packets and can be detected in the lab.

Cave mapping –Cave maps help people navigate through caves and mark the location of important natural and cultural resources. Since GPS units don't work in the cave, all mapping has to be done with compasses, tape measurers and inclinometers. The teachers learned how to map a cave passage and how they can use mapping exercises to teach important mathematical skills.