

New Technology Allows Counting Of Cave Visitors

By Steve W. Chaney

Somewhere in the depths of Arkansas' longest cave system an eye awaits, silent and motionless, peering down the cold stone and mud corridor, waiting for the approach of an unsuspecting cave visitor. The creature to which this eye belongs is not really an unfriendly chap. The eye is made of black rubber silicon and printed circuitry and is attached by a small cord to the creature's body. The creature is a creation called "Spelogger."

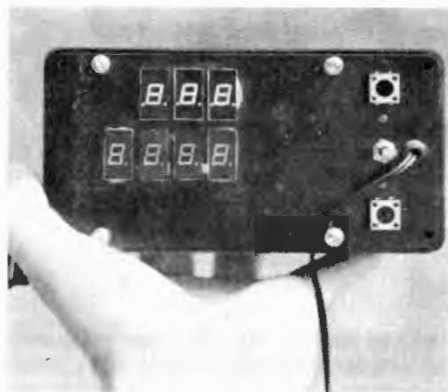
The Spelogger is a recent innovation, developed by a volunteer cave researcher at Buffalo National River. Its sole purpose is to lie in wait, in remote and often inhospitable cave passages, for the approach of a light source — usually from a caver's helmet. This light triggers the photoelectric "eye" sending an impulse to the Spelogger which records the time and date in its electronic memory. Once triggered, the photocell does not reset itself until several minutes after the light source(s) has passed, which, in effect, creates a record of the time and date that any individual or group of cavers pass the device.

This may sound like a simple concept; however, several unsuccessful and costly attempts have been made to develop a method to obtain just such data. While the market for such a device may be limited by the number of organizations responsible for cave management, the applications within this circle are almost limitless.

Several million dollars have been spent in recent years by agencies such as the National Park Service, U.S. Fish and Wildlife Service and the Bureau of Land Management to protect habitat utilized by endangered bat species. This protection often consists of fencing or gating caves, or sometimes simply purchasing the property and implementing a voluntary permit system, prohibiting cave visitation during periods when bats use the cave. Bat caves are notoriously remote and difficult to access, therefore, little more than a guess can be made as to the effectiveness of these protective measures. This huge investment with no means to measure the action's effect is of great concern to managers of such caves.

Using the Spelogger, absolute data may be obtained showing if and when any violations of cave closures have occurred. Managers may then react in a reasonable and more effective, cost and manpower efficient manner to correct any problem. With the time and date information, investigative action may be taken which at best is likely to identify violators or at least will allow determination of periods in which enforcement activities should be concentrated. Such data might also provide information necessary to determine whether or not more drastic and expensive measures such as cave fences or gates are necessary.

Use of the Spelogger to solve problems related to endangered bat caves may be only scratching the



The Spelogger, compact, light and durable, was developed by D.R. Russell, Volunteer Cave Researcher at Buffalo National River. It promises to be a valuable tool in cave resource management.

surface of its overall potential. Many caves or internal portions of caves are gated simply due to a lack of information concerning use levels. Additionally, many use limits placed on caves are somewhat arbitrary due to the impossibility of obtaining accurate data as to numbers of cave users in specific areas or passages. The possibilities for further uses include cave search and rescue operations — the tracking of a group or an individual through use of the time and date information.

You may say, "all this sounds well and good but nobody is willing to lug a monitoring device miles into a cave and then be faced with its constant maintenance and service." This is one of the real values of the Spelogger. It was developed by a caver, familiar with the cave environment and the logistical problems of cave travel. The Spelogger is about the size of a small box of Velveeta cheese, weighs 15.5 ounces including its four AA alkaline batteries, which will power the device for over 200 days and enable it to record up to 2,048 events (triggering of the photocell). The photodetector has a minimum sensitivity of .0001 foot-candle which amounts to the light from a flashlight on the far side of a large cave room and the clock is a crystal-controlled oscillator, accurate to $\pm 0.005\%$ (14 minutes in 200 days).

But perhaps the most attractive thing about the Spelogger is that it was developed entirely through volunteer efforts. The researcher, Rod Russell, who works as an engineer at an Arkansas Power and Light nuclear power station, was attracted to Buffalo National River by his boyhood love for Fitton Cave and by the availability of data from a National Park Service-administered permit system, which could be used to check the device's accuracy during field testing. Another attraction was the Buffalo National River's volunteer research program, which grants volunteer researchers special privileges such as use of a backcountry cabin for an overnight facility, and use of some access roads otherwise used for administrative purposes only.

We are pleased to have participated in the development of this technology. The Spelogger, an exciting new development in the realm of cave use monitoring, promises to be a building block for future cave management programs.

Chaney is Resource Management Specialist at Buffalo National River.