



Registry News

From the Oklahoma Natural Areas Registry Program

Research on Registry Sites

Counting Mexican Free-Tailed Bats in Western Oklahoma

In the afternoon heat of 100° F in June, Kyle Ganow aims an infrared video camera at a large gypsum cave entrance in western Oklahoma. The camera angle needs to be just right to pick up the warm bodies of animals and not the radiating heat of the canyon wall. When all the equipment is arranged to his satisfaction, Ganow and the other biologists from West Texas A&M sit back in the shade and wait for night to fall. On this overly hot summer night, Ganow is anticipating the speculator flight of tens of thousands of Mexican Free-Tailed Bats from the cave opening.



Kyle Ganow, West Texas A&M graduate student, sets up video equipment to record a bat flight out of a gypsum cave in western Oklahoma.

Mexican Free-Tailed Bats are migratory bats whose summer's range includes Oklahoma. From May to September, they form immense maternity colonies in the larger gypsum caves in western Oklahoma (*read more about these bats on page 3*).

Using an infrared camera that will reveal the bats' images from their body heat as they emerge from underground at dusk, Ganow records the flight of thousands of these tiny flying mammals. This technology is not new – biologists have been using infrared cameras for decades. In fact, anyone can buy them at most outdoor stores! What is innovative about Ganow's work is the computer software used to count the bats as they pass across the viewfinder of the video camera.

Developed by the Department of Defense, the program used to analyze the bats' emergence was applied originally to the tracking of missiles. The concept of the program is to follow and count individual projectiles as they travel across the view of the camera. However in this application, the software counts not rockets, but bats. In the past, biologists counted bats manually, frame by frame—an extremely time-consuming task when thousands of bats zip out of the cave for an

Oklahoma Natural Areas Registry



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1000s of these bats crowd into large gypsum caves each summer to raise their young.

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About Us: The Natural Areas Registry was formed by the Oklahoma Legislature in 1984 to identify areas with unique natural features and to encourage their voluntary protection by Oklahoma's citizens.

Oklahoma Biological Survey

111 East Chesapeake St.
Norman, OK 73019-5112
Phone: (405) 325-7658
okregistry@ou.edu

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Ganow shows the infrared image of the cave opening as he sets up the recorder prior to the bats' emergence. The dark area is the relatively cool cave opening and the lighter area surrounding it are the warm canyon walls.

hour or longer. Ganow and his advisers, Dr. Ray Matlack and Dr. William Caire (University of Central Oklahoma), hope this novel use of missile-tracking technology will improve the accuracy of bat population counts across their study area of Texas, Oklahoma, and New Mexico.

Ganow and his team have pointed their camera at seven caves harboring large colonies of bats; four of the caves are in Oklahoma and two are registered Oklahoma Natural Heritage Areas. Using their new methods of counting, they have found fewer bats in the caves than previously estimated. This may be due to the counting technique, or due to a real decrease in the number of Mexican Free-Tailed Bats in maternity caves. Continued research should help to



Mexican Free-Tailed Bats spend their summers in Oklahoma, eating tons of nighttime insects, including moths.

clarify this discrepancy.

This research could not have been undertaken without the support of the Oklahoma Department of Wildlife Conservation who granted Dr. Caire funds for bat surveys. Also, the generous cooperation of the landowners was

especially important in gaining access to these remote caves. The Registry program is excited to aid researchers to better understand Oklahoma's bat population, and we hope their work will improve our understanding of the population and help to develop suitable conservation measures for these bats across their range. ■



A West Texas A&M student watches the sinuous flow of Mexican Free-Tailed Bats as they emerge by the thousands at dusk from a gypsum cave in mid-June.

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Bat Conservation International, www.batcon.org



Focus on Oklahoma's Rare Animals: Mexican Free-Tailed Bats, *Tadarida brasiliensis*

A master of long-distance travel, the Mexican Free-Tailed Bat is one of the few bat species able to travel hundreds of miles during their seasonal migration. Spending their winters in Mexico and south Texas, these bats travel north to spend the summer in the southwestern United States, including western Oklahoma. Here, they form the world's most dense aggregation of mammals in the world — gathering in caves to form maternity colonies of thousands of bats to gestate and raise their pups.

In Oklahoma, Mexican Free-Tailed Bats are concentrated where the large maternity colonies are located in gypsum caves of Greer, Major, Woods, and Woodward counties. Large nursery colonies develop in these caves which have the optimum conditions —warm and dry — for raising the tiny young bats. Adult male bats are not found in the maternity caves; they occupy smaller caves, sometimes buildings, or may remain in the south on their winter range.

The number of bats in maternity colonies has, unfortunately, been decreasing across their range. Having such a large concentration of animals in a single cave makes a species vulnerable to disasters. A single act of vandalism may wipe out an entire maternity colony, or a contagious disease can decimate a population by causing an epidemic throughout a cave. If a cave population falls below 20,000, the bats may abandon the cave and merge with a larger group. Even simply lighting a cave for tourism can cause the bats to abandon a formerly suitable cave, as was the case when Alabaster Caverns State Park was opened to the public. Although caves are a limited resource, bats also can colonize abandoned mines, giving them another location for raising young. ■



This gypsum cave in northwestern Oklahoma was surveyed for Mexican Free-Tailed Bats in the 1980s and found to have several thousand. However, in 2011 biologists returned to study the bat population and found that the cave had been abandoned. Human disturbance is a likely cause for the bats' desertion of this maternity cave.

Witnessing the Bat Flight

The emergence of Mexican Free-Tailed Bats every summer night is a spectacular natural wonder. Hundreds of people congregate nightly to watch the bats streak out of the caves of Carlsbad Caverns National Park and soar from the Congress Avenue bridge in Austin, Texas.

But you do not need to leave Oklahoma to witness this dramatic phenomenon. The Oklahoma Department of Wildlife Conservation offers summer bat watch nights at the Selman Bat Cave in northwestern Oklahoma. Registration for the program begins May 28. Contact Melynda Hickman for more information at (405) 424-0099 or go to the link on our website: www.oknaturalheritage.ou.edu/registry_about.htm



Focus on Oklahoma's Rare Habitats: Gypsum Caves

On a baking hot summer day in western Oklahoma, looking out over low hills covered in short grass, scrubby oaks, scattered mesquite, and invading cedars, you might never guess that a cool oasis is hidden underground. Dotting the western third of Oklahoma, caves have eroded from the soft gypsum rock over thousands of years. The gypsum caves are relatively young compared to the limestone caves found in eastern Oklahoma. Because these western caves had less time to evolve, there are fewer animals found in them and few cave-obligated species.

with caves in western Oklahoma.

Salamanders are common inhabitants of eastern caves, but only the tiger salamander is found in caves of western Oklahoma.

Invertebrates take advantage of the cooler temperatures and increased moisture found in gypsum caves. Biologists have found several species of terrestrial snails, crickets, flies, beetles, and spiders in Oklahoma's gypsum caves.

The diversity of a gypsum cave climbs when you start counting species that live on other organisms. Dr. William Caire, mammalogist at the University of Central Oklahoma, and his students have been studying the parasites and other organisms living on the surface bats — they have found 19 species of bacteria and 20 parasites on the cave myotis (*Myotis velifer*) alone.

Few of the animals in gypsum caves live solely underground. Most venture out into the open or at least to the cave entrance. The zone around the cave opening is influenced by the interior cave climate — cooler temperatures, higher humidity, and lower light. Consequently, a different group of plants grow here than on the adjacent mixed grass prairie — such as liverworts, ferns, and algae.

Five species of bats find a home in the gypsum caves. Although bats are what come to mind when most people think of cave dwellers, many animals take advantage of the habitat available in an underground passage. Other mammals, including the raccoon, red fox, and southern plains woodrat, have all been found to take refuge in gypsum caves.

Birds may utilize gypsum caves too — not surprisingly, both the barn owl and great horned owl have been associated



Caves form as the soft and soluble gypsum is dissolved by water underground. For a cave to form, there must be a moderate amount of rainfall and an insoluble rock layer above.

Oklahoma's gypsum caves may not possess spectacular formations, but their unique habitat in the arid grasslands of western Oklahoma makes them important conservation targets. ■

© Jim Arterburn



The tiger salamander is one of the few species of salamander found in western Oklahoma and the only one associated with caves.



© Carl W. Dick

Bat flies are tiny parasites that live exclusively on bats' fur and wings and feed on bat blood. Many bat flies are specific to certain bat species. This is a female nycteriid bat fly (*Basilia antrozoi*) collected from the Pallid Bat (*Antrozous pallidus*), Cimarron County, Okla.

To learn more about caves in Oklahoma, follow the links on our website: www.oknaturalheritage.ou.edu/registry_about.htm

Our Aim:

Oklahoma Natural Areas Registry encourages citizen-based conservation of Oklahoma's natural diversity through a voluntary land-preservation program that promotes awareness of rare species, natural communities, and important geologic features.

Why do we keep caves a secret?

Caves are non-renewable resources, fragile, and easily impacted by our exploration.

The single most important factor to cave conservation is limiting human disturbance of the underground habitat. Humans can impact cave and cave life without even entering a cave. Pollution of groundwater can affect the water that flows through a cave. Underground streams become contaminated and aquatic cave animals are negatively impacted. People also have dumped trash and debris into cave entrances and sinkholes. Inside a cave, humans have vandalized formations, littered with garbage, covered walls with graffiti, agitated aquatic habitats, and harassed cave-dwelling creatures. Even simple exploration of a fragile cave can interrupt bat hibernation or spread a disease, such as white nose syndrome (a disease that has been responsible for the death of over 5.5 million bats since 2006 — *read more by following the links on our website*).



State and federal biologists prepare to enter a gated mine in southeastern Oklahoma to survey for bats. The white suits and rubber boots are part of the measures taken to reduce the spread of White Nose Syndrome, a fungal disease that has killed millions of North American bats.

species — Ozark big-eared bat (*Corynorhinus townsendii ingens*), gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), and Ozark cavefish (*Amblyopsis rosae*). The Registry Program is one small conservation step for these unique and fragile systems. We hope more Oklahoma caves will be better safeguarded in the future.

Because humans are the biggest threat to caves, conservation efforts center on reducing human visitation and impact. Therefore, you will rarely find specific locations of caves disclosed. In fact, it is illegal to publish location information for caves on federal property, according to the Federal Cave Protection Act of 1988. The Registry Program never gives out site locations of any property without owner permission, but we are especially secretive about our cave sites — only state or federal biologists are given any information.

Some Registry Program caves have garnered greater protection in the past few decades by becoming incorporated into the Ozark Plateau National Wildlife Refuge in eastern Oklahoma. Protecting more than 4,200 acres in Adair, Cherokee, Delaware, and Ottawa counties, the refuge's goal is to help assure the continued existence and recovery of endangered Ozark cave

Pisalla

The National Speleological Society, and most other caving organizations, promote cave conservation and responsible cave exploration. Yet, not all people adhere to their guidelines. Consequently the NSS offers a monetary reward for information leading to the conviction of anyone who causes cave vandalism — including breaking formations, selling formations, littering in a cave, killing any organism in a cave, damaging fencing or gates, or tampering with any historic or archaeological sites.

Oklahoma Biological Survey
111 East Chesapeake St.
Norman, OK 73019-5112
Phone: (405) 325-7658
okregistry@ou.edu

Writer & Editor

Priscilla H. C. Crawford
Conservation Specialist
Registry Representative

Contributors

Jim Arterburn
photographer

Carl W. Dick
photographer
Assistant Professor, biology
Western Kentucky University

Merlin D. Tuttle
photographer
Bat Conservation International
www.batcon.org

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111 East Chesapeake St.
Norman, OK 73019-5112

Caves in Oklahoma & the Registry Program

Caves in Oklahoma are unique geologic features that harbor a variety of rare and interesting wildlife species.



Number of caves in the Registry Program: **11**

Longest cave in the Registry Program: **6.2 miles**

Longest cave in Oklahoma: **8.9 miles**

Shortest cave in the Registry Program: **6 feet**

Number of caves in Oklahoma over 1 mile long: **14**

Number of miles that separate Oklahoma's eastern limestone caves and western gypsum caves: **250**

Age of western gypsum caves: **less than 1 million years**

Age of eastern limestone caves: **550 million years**

Number of bat species found in Oklahoma: **23**

Number of bat species in the world: **over 1000**

Number of federally or state listed threatened or endangered animals found in Oklahoma's caves: **5**

To learn more about caves in Oklahoma, follow the links on our website: www.oknaturalheritage.ou.edu/registry_about.htm