

CANYONS & CAVES

A Newsletter from the Natural Resources Offices
Carlsbad Caverns National Park

Edited by Dale L. Pate

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"Wilderness is an anchor to windward. Knowing it is there we can also know that we are still a rich nation, tending to our resources as we should. Not a people in despair searching every nook and cranny of our land for a board of lumber, a barrel of oil, a blade of grass or a tank of water."

From Senator Clinton P. Anderson of New Mexico

REMINDER

For those giving bat flight programs, please remember to turn the microphone off as the bat flight begins. This includes for the question and answer portion of your talk. Please only use the microphone for crowd control after the flight has begun.

RESOURCE NEWS

RINGTAIL REMOVAL - A very smelly ringtail was caught in a live-trap in the Pump Room of Carlsbad Cavern. He was captured on the night of Tuesday, May 27 and removed the next morning. Though ringtails will commonly be found far into caves, the lure of food would keep the ringtail in the cave for a much longer period than would be normal. The ringtail was also removed to help prevent a repeat of a serious raccoon problem that occurred in the cave a few years ago.

RATTLESNAKE SPRINGS HYDROLOGY STUDY- Erika Bowen, a student from New Mexico Tech., is in the park for the summer doing her Masters Thesis project. Erika is collecting water samples from irrigation wells, domestic water wells, stock wells, the Black River, and at Rattlesnake Springs itself to help understand the local groundwater hydrology. After doing a thorough chemical analysis at each point, studying well logs, analyzing water levels, and summarizing historical records for precipitation, she will then complete a ground water model and risk assessment for the aquifer that feeds Rattlesnake Springs. This information will help resource managers understand the potential effects of development up-aquifer from the springs and in turn help us maintain a clean water supply for the park. Erika's project is being funded by the Park through a grant from the NPS Water Resources Division in Fort Collins, Colorado.

HERPETOLOGY AT RATTLESNAKE SPRINGS - Dr. Jim Krupa and assistant Kristin Haskins from the University of Kentucky were in the park for nine days doing an inventory of amphibians and reptiles at Rattlesnake Springs. The riparian area at Rattlesnake Springs is an oasis for native herps, but unfortunately it is also under attack by some aggressive exotic species. A sizable population of the exotic Green sunfish remain in the lower sections of the drainage. These fish gobble up large numbers of state-listed greenthroat darters. Bullfrogs are also numerous and pose a threat to several species which are rare or sensitive (see Jim Krupa's feature article).

IPM NEWS - Jimmy Sillas and Bill Route have been working with Carlsbad Pest Control to get the attic of the Visitor Center sealed off from entry by rodents. They are sealing entry points and snap trapping as they go. It will be a long time before the entire Visitor Center is rodent proof, but we will attack it one room at a time.

FIRE EFFECTS MONITORING - A three-person crew was in the park briefly this spring helping us better define and go forward with our efforts to monitor the effects of prescribed fire on the park's vegetation. Nineteen plots are currently being monitored and up to 12 more plots will be added over the next couple of years. In each plot, the density and composition of vegetation is monitored one year before a prescribed fire and then again one year post, two years post, five years post, and ten years post fire. The information helps us fine-tune our prescriptions to meet the objectives of reducing brush and increasing native grasses with out increasing the frequency of exotic plants.

UPCOMING CAVE RESEARCH

Diana Northup, Clifford Dahm, & Laura Crossey - (1) These University of New Mexico researchers will do intensive studies of corrosion residues found in Lechuguilla Cave. The objectives are to determine how microorganisms participate in the dissolution of limestone and sandstone walls in the cave and to identify the microbiota associated with corrosion residues. It is anticipated that many of the organisms will be new. This research will also be the basis for Diana's Ph.D. dissertation. (2) Additionally, Diana is looking at Pool Fingers and Chenille Spar in both Carlsbad Cavern and Lechuguilla Cave to determine if microorganisms play a role in their formation.

Penny Boston - This study is investigating fundamental properties of the microbial communities found in Lechuguilla Cave. Corrosion residues, sulfur masses, and microbes that may be moved through the cave by air currents are the targets of this study.

Chris McKay, Carol Stoker, and Larry Lemke - These NASA researchers will be looking for evidence of chemosynthetic ecosystems that might have existed when H₂S flowed through Lechuguilla Cave. Do these ecosystems exist today in the cave and have past ecosystems left fossil records of their existence? The discovery of possible microbe fossils found in a meteorite determined to be from Mars spurs this research. The ultimate goal of this research is to determine if life exists today or has existed in the past on Mars.

Pat Jablonsky - Will continue her research to document and identify bat species that have utilized Carlsbad Cavern from skeletal remains. She will also be studying the remains of the bat roost found in the Big Room.

CAVE SWALLOWS - Steve West reports that Cave Swallow banding in 1996 netted 788 new birds and 1,180 birds that had been captured and banded from previous years. In 1995 830 new birds and 756 birds from previous years were netted.

THANKS to Viv Sartori for noticing water running below Devil's Spring in the Main Corridor. Upon investigation, it was found that water with debris from trail washing was running off the trail and carrying silt and organic materials into the Signature Pool making it a cloudy, muddy color. This pool contains the flatworms that are being studied. Because of Viv's observations, we are able to divert runoff from the trail away from the pool.

RESTORATION PROJECTS IN CARLSBAD CAVERN

Longfellow's Bathtub - The bridge over Longfellow's Bathtub looks great and has helped returned a small piece of the cave back closer to its original condition. Thanks to Gary Vequist, all the volunteers, and maintenance for making this happen.

Lower Cave Ladders - The replacement of the ladders leading into Lower Cave has been completed. An excellent job of design, placement, and protection of the resources was done. Special thanks to Reuben Castillo, Nick Loes, Jason Richards, Harry Burgess, and the others who helped on this project.

New Mexico Room - An ongoing restoration project led by Lois Bergthold has been completed in the New Mexico Room. The Chocolate Drop, an area of dark brown flowstone has had pounds of mud removed and is now a "aquasox only" area. To cross this area, muddy boots must be removed and replaced with clean, white-soled shoes. Crossing barefoot is not an option. As this project neared completion, the large steel and chainlink bridge and the rickety, dangerous ladder that gave access to the room were removed. A traverse line replaces the steel bridge and a 20-foot rappel is required to enter the New Mexico Room now. This removal project was led by John Lyles. Many thanks to all the volunteers who participated.

INFILTRATION STUDY - This study which was awarded to the Colorado School of Mines and funded by the National Park Service nears completion. The park has received copies of a Master Thesis by Mark Brooke titled "Infiltration Pathways at Carlsbad Caverns National Park Determined by Hydrogeologic and Hydrochemical Characterization and Analysis." Draft copies of the final report for the study have also been received. A final report is due in the next few months and will include recommendations for mitigation of infiltrants. A more detailed account of the report will be in the next *Canyons & Caves*.

THE "CHINESE WALL" IN SLAUGHTER CANYON CAVE - There is no controversy surrounding the rimstone dams in the cave. Though they are somewhat unique, they form under slow flowing conditions on a flat surface area. Scientists are not arguing over how they formed. The mechanism is well understood. For an excellent description of rimstone dams, including the "Chinese Wall" please refer to pages 55-56 in "Cave Minerals of the World" by Carol Hill and Paolo Forti. There are several copies of this book in the park library.

LECHUGUILLA CAVE - In May, on a LEARN survey expedition, a soda straw in the Western Borehole near Oasis Pool was measured by Donald Davis and others and found to be 17.0 feet long. That same expedition added 1.84 miles of new survey bringing the length of the cave to 91.19 miles.

THANKS to Jeff Butt, a Tasmanian caver who volunteered in the Cave Resources Office for a few weeks.

WELCOME BACK to John Kibler. John has been busy eradicating exotic weeds. He has dug up three trashcans full of Malta-starthistles found in and around the housing area and maintenance complex. John also cut and treated over 130 stems of Tree-of-Heaven, an exotic ornamental that escaped from the housing area. With John's efforts we are trying to stay out in front of some of the more aggressive exotic plants.

WELCOME to Travis Greig, a volunteer from Austin, Texas in the Cave Resources Office. He will be here until August 16.

BAT RABIES - This information comes from a pamphlet distributed by Bat Conservation International. " Since 1980, in the United States there have been 16 human cases of rabies attributed to bats. While all human mortality is significant, these figures should be viewed in context of other national mortality statistics. For example, in 1988 alone, 16 people were killed by their pet dogs, 34 people died from bee stings, and 82 people were killed by lightning. All these factors are much more threatening than exposure to rabies from bats. Each year, more than 30,000 human deaths occur worldwide from rabies, with 99% of these cases attributed to contact with rabid dogs."

MEXICAN WOLVES - A Record of Decision (ROD) on the Final EIS for the "Reintroduction of the Mexican Wolf Within Its Historic Range" has been signed. The ROD selects the preferred alternative which calls for the reintroduction of Mexican wolves into the Blue Range Recovery Area of Arizona & New Mexico. Wolf releases in eastern Arizona are expected to occur within one year.

RESOURCE MANAGEMENT FROM THE (UNDER)GROUND UP by Frank Deckert

Not long after I had accepted the job of superintendent at Carlsbad Caverns National Park, another superintendent gave me the following advice: "Always remember that you are not the superintendent of a CAVE park; you are the superintendent of a NATIONAL PARK that contains caves." That was his gentle reminder that I was responsible for ALL the resources in the park.

For years, Carlsbad Caverns has had an excellent Cave Resource Program. Unfortunately, for many years surface resource management was a collateral duty of one employee. Additionally, professional science positions were nonexistent within the park and with downsizing of our regional office our scientific support was greatly diminished. By 1995 it was obvious we needed to develop our own science capabilities to manage park natural resources in an ecologically sound manner.

Personnel from all park divisions agreed that improving our resources management program should be the park's highest priority. Hiring a Chief of Resources Management and Visitor Protection with a strong resources management background was the first step. The next step was to integrate a core of natural resource and cave specialists dedicated full-time to resource program direction, development and evaluation. Six natural resource professionals were assembled as a team to function as technical specialists bridging the gap between research and park management.

The biggest challenge facing this new interdisciplinary team was to determine where to concentrate our efforts of information gathering, resource monitoring, and scientific research. In many instances we lacked the basic knowledge of what resources occur in the park, not to mention the ability to determine if resource degradation was occurring.

Monitoring of Mexican-Free-tailed bats and determining the effects of fire on desert plants are just two of the many critical issues important to park management.

Mexican Free-tailed bats have roosted on the ceiling in Carlsbad Cavern for more than 5,000 years. Data suggests that within the past 50 years their numbers have declined from a high of several million. Park resource managers and cooperators are developing a method for consistently monitoring population trends. In 1996 we estimated the spring population at 192,000 increasing to 350,000 by the fall after the young were born. Bat numbers seem to have started a slow rebound after their dramatic decline in the 1950's; monitoring will help document the extent and rate of the recovery.

UPDATING THE RATTLESNAKE SPRINGS MANAGEMENT PLAN by Diane Dobos-Bubno

The planning process to amend the Rattlesnake Springs management plan begins this summer. The present plan, which includes a Memorandum of Understanding with The Nature Conservancy, is outdated and needs revising. Both these documents are important to preserving the wonderful natural and cultural treasures of Rattlesnake Springs for the future.

The planning process is a three-step participatory process, drawing on expertise and input from within and outside of the Service. The process includes both formal and informal sessions with park staff, neighbors, and outside professionals.

The first session includes 9-10 park staff from all disciplines and levels. These participants will set the tone for the management plan by:

- * establishing long-term goals and objectives for Rattlesnake Springs
- * describing issues and conflicts for attaining these goals
- * identifying inconsistencies with our current managing practices
- * evaluating the effect of international, national and regional policies and trends on the unit

The new General Management Plan for Carlsbad Caverns endorses an interdisciplinary approach when amending the Rattlesnake Springs management plan. Therefore, two additional groups will consist of participants from outside our immediate park. The second session is informal and invites our neighbors and other interested parties to contribute their concerns and ideas in a more comfortable atmosphere.

Finally, the third group—specialists in various fields--provides us with their professional perspective and knowledge. This group considers all of the previous work to provide us with options for managing Rattlesnake Springs, and clarify the inventory, monitoring and research needs. The composition of this group depends on our needs and includes specialists in both the natural and historical resources.

The unique blend of natural and cultural features of the Springs presents us with the opportunity to creatively answer some challenging questions when integrating these two disciplines. The final result of this process will be a top-notch management plan which protects the magical qualities of Rattlesnake Springs and generates specific guidelines for retaining that quality.

SCIENCE FACT OR BAT FICTION by Gary Vequist

Misunderstanding flourishes about these secretive and mysterious creatures we call bats. Let's face it, creatures that hide in caves, come out at night and dart around in the dark would be perplexing to understand. Some myths about bats persist even today in the information age. We all have heard, "blind as a bat", when in actuality anyone who could see as well as a bat could pass their pilot's eye exam. And then there are those unfair depictions of bats, you have all heard, "bats in the belfry", "dingbat", or "old bat".

Erroneous assumptions about Mexican Free-tailed (MF) bats flourish among our own ranks. Incorrect interpretations of scientific research are harder to squash than a speeding scorpion, not that any of us would try to squash one. Below are a few of these assumptions that have been heard at bat flight talks.

1. Bats weigh the same as a nickel. A MF female bat weighs on the average 12.9 grams (approximately 1 gram more than the males). Since 28 grams is equivalent to an ounce, then these bats weigh about 1/2 ounce. A nickel weighs about 5 grams, so about 2 1/2 nickels weigh the same as these bats.

2. Bats give birth while hanging upside down. Early research in the 1930's suggested that pups were born while the mother hung head-down. More recent studies suggest that the bats hang on with their thumbs and one foot giving birth in a slightly downward-lateral position. The pup is not caught by the flight membrane/tail, rather clings on with their adult-sized claws. They **DON'T** start feeding "right off the bat", actually it takes them about 15 minutes before they start nursing. They hang on with the help of two hooked teeth (temporary baby teeth). No wonder the mothers only nurse their young twice a day and then spend the remainder of the day resting nearby.

3. Female bats nurse each other's young in the cave. Adult females correctly identify and nurse their young 83% of the time. Correct identification is facilitated by mothers' practice of locating the young in specific spots within the nursery colony.

4. Bats are weak flyers. Bat wings are designed for long enduring flights. The narrow wing shape requires them to maintain considerable speed (18mph) to stay airborne. They are strong enough to stay aloft during the night, although they can't fly at a steep angle of ascent out of the cave and can't maneuver or glide like a bird. They likely travel up to 30 miles to feed on moths that make up 90% of their diet.

5. The bat colony is exclusively females. Sexually mature male bats (over two years old) are present in the cave although they don't stay at the same roost sites as females. In addition 50% of the pups are male. The females become sexually mature in 9 months. Mating takes place in the spring in Mexico with gestation lasting 11-12 weeks resulting in births occurring over a two-week period starting in late June. There is no delayed fertilization in MF bats. That occurs in hibernating species.

6. Bats are rodents. No, bats are bats (family Chiroptera). Although bats may have evolved from shrews. They are the only true flying animals besides birds. Flying squirrels, flying fish, flying lizards, flying aliens are only gliders.

We are only beginning to discover the secrets of these truly amazing creatures. Their precise short-range echolocation with high frequency sound (20,000-40,000 kHz) exceeds any sonar that man has developed. Bats have inhabited bat cave for at least 5,000 years and hopefully we can preserve the habitat here and elsewhere to protect them forever.

RATTLESNAKE SPRINGS COWBIRD STUDY UPDATE by David Roemer

Nest searches are again underway at Rattlesnake Springs to examine breeding success of songbirds, and the extent of parasitism by brown-headed cowbirds (see Update on brood parasitism in *Canyons & Caves No. 4*). We have already located 32 nests in the study area. As is normally the case, many of these nests are too high to look into, such as most orioles and vermilion flycatchers, or belong to species that cowbirds won't parasitize, like hummingbirds and cooper's hawks. However, the results so far are eye opening to say the least.

Bell's vireo, a state-endangered species, is being hit hard by cowbirds. Cowbirds have parasitized 8 of 9 (89%) vireo nests, causing nest abandonment in one in which cowbirds laid three eggs and destroyed the vireo eggs. For good measure, cowbirds even laid an egg in one of last year's vireo nests! Resource managers have crawled through hackberry thickets, climbed trees, and gone out on limbs to addle 12 cowbird eggs in this year's vireo nests (Table 1).

Table 1. Bell's vireo nests at Rattlesnake Springs, 1997.

Nest No.	Tree Species	Cowbird Eggs	Status
1A	Hackberry	1	4 vireos fledged
5A	Plum	0	Failed - weather
HC1	Desert Sumac	3	Abandoned - cowbirds
HC2	Hackberry	2	Failed - predation
HC3	Desert Sumac	1	Failed - predation
HC4	Soapberry	1*	1 host egg - still laying
241	Apple	2	3 vireos fledged - 1 nestling
2A	Russian Olive	3	1 host egg - possibly abandoned
W1	Unk.	1*	Incubating 3 host eggs

* Not addled

The 89% parasitism rate on Bell's vireo is alarmingly high. In an analysis by Laymon (1987) of eight studies on the breeding success of Bell's vireos, it was calculated that cowbird parasitism rates higher than 30% would lead to an unstable population susceptible to chance extinction. Parasitism rates of 48% and 69% upon a small Bell's vireo population (10 breeding pairs) would lead to extinction in 18 and 8 years, respectively (Laymon 1987). These numbers caution us that the continued presence of Bell's vireo at Rattlesnake Springs may be at risk.

Cowbirds have also parasitized a blue grosbeak nest. Other nests under observation, which include 2 house finch nests and a northern (Bullock's) oriole nest, have not been parasitized.

Literature cited

Laymon, S.A. 1987. Brown-headed cowbirds in California: historical perspectives and management opportunities in riparian habitats. Western birds 18:63-70.

Miscellaneous Bird Notes

* If you observe birds nesting in the housing area or in the backcountry, please complete a wildlife observation card and call David Roemer or Martha Wehling (ext. 373). We would like to check nests for brood parasitism. Cowbirds are active in Walnut Canyon and the housing area (5 individuals counted during the Spring Breeding Bird Survey) and Slaughter Canyon.

* If you visit Rattlesnake Springs you might see a wild turkey with 10 chicks following close behind (observed June 1). Also, a cooper's hawk is very active near the springs.

* Nests can become a haven for dangerous avian parasites and diseases, so keeping the nest clean is an important task for parent birds to perform. Towards this end, most parent birds consume or remove the fecal sacs of their nestlings. However, it has come to our attention that black-chinned hummingbird young - which remain in the nest for 21 days - do not always require parental assistance in this task. The one that hit me cleared the nest by about three feet.

NEW DISCOVERIES IN CARLSBAD CAVERNS by Harry Burgess

There have been many questions lately concerning the area just beyond the "Jumping Off Place". Why is this rope hanging there? Where does it go? The answer lies in a strong flashlight and a bit of looking around...

If you are standing on the Big Room trail at the place where this rope leads upward, take your flashlight and shine it at the ceiling of the room, almost directly above the Jumping Off Place. What you will see is another rope suspended from a balcony leading into a drapery-lined hole in the ceiling. If you look even harder, you will see another rope extending upwards in this hole and out of sight.

This area has been the recent focus of a team of cavers/climbers led by Don Doucette and Harvey Miller. Don and Harvey have worked in the Caverns before, discovering new areas accessible only through the use of free/aid climbing techniques, including the Chocolate High area out of the New Mexico Room. Chocolate High produced over two miles of new, highly decorated passages during the first part of this decade, and without the efforts of volunteer teams these "high leads" would remain a mystery, nothing but a dark hole in the ceiling.

As for the rope hanging near the Jumping Off Place, this climb was begun in February of this year and was the subject of a CNN filming project showcasing "extreme sports". The filming was done from the trail below and showed nothing more than the climbers disappearing into a crack in the ceiling. During that trip a fissure was discovered trending in one direction towards Spirit World and in the other direction towards Jumping Off Place. During that and three subsequent trips, this fissure was explored and found to pinch out as it headed toward Spirit World, yet in the other direction it led to a balcony overlooking Lower Cave. This balcony is the one from which the rope emerges above the Jumping Off Place, and the distance from it to the floor in Lower Cave is approximately two hundred feet, offering a breathtaking view of Lower Cave and allowing the person suspended on rope to see all the way to Bottomless Pit!

From the balcony, it is necessary to descend the rope to its low point and then ascend the other side into the hole above. At this point, there is yet another rope leading upwards through a vertical tube to what is currently the farthest extent of surveyed passage. This station is 125 feet above the beginning of the climb in the Big Room, and almost 400 feet of passage must be traversed to get there. Unfortunately, all leads in this area contain delicate cave features, and so the cavers involved in this passage's survey have decided to not attempt any further exploration.

Does this mean it was a wasted effort? Certainly not. Through the efforts of cavers such as these we are constantly learning more about Carlsbad Caverns, and the more we know about the cave the better prepared we are to protect it. When Don, Harvey, and crew next visit the Caverns they plan to remove all ropes, equipment, and signs of their exploration efforts, leaving this part of the cave as it originally was. So, if you have the opportunity, take a walk down to the Jumping Off Place to see where the ropes are before they are taken down. Seeing where this climb goes will present you with an excellent idea of what cave exploration often entails in the Guadalupe Mountains.

SCORPIONS AT CCNP by Dale Pate

Just the name alone evokes fear and perhaps the memory of a painful sting in most people. Scorpions from the Order Scorpiones are arachnids. Other arachnids are spiders, harvestmen, mites, and seven other lesser-known types of invertebrates. There are over 1,200 species of scorpions known in the world and there are approximately 30 species found in the U.S. There are at least three and possibly four species known from Carlsbad Caverns National Park. Scorpions feed at night on insects and spiders that are caught with their pincers.

Once they have their prey in their pincers, they will then usually sting them with their stinger, which is located at the tip of the tail. By holding the prey they know exactly where to hit with their stinger.

The most common species you will see in the park is from the family Buthidae. There are over 600 species known in this family. This scorpion is named *Centruroides vivatus* (this species is similar to the one illustrated below). If you live in the park, you will probably find these in your living quarters from time to time. They are a light brown or cream in color. During wetter periods, they will usually be easy to spot as they climb up the walls. Many people's first reaction is to kill them when they are found in the house. I find it just as easy to catch them in a glass, observe them, and then release outdoors. Scorpions will sting people in self-defense. Though stings are painful, most will not be serious or life threatening. There are species from the genus *Centruroides* that are dangerous (the species found here is not one of them). One species from Arizona, *Centruroides sculpturatus*, has a poison that affects the nerves, causing severe pain. There are species of this genus in the southwestern areas of Mexico that have caused deaths, particularly in infants.

The other two identified species from the park are from the Family Vaejovidae. They are named *Uroctonus mordax* and *Vaejovis coahuilae*. Adult members of these species should be slightly larger than those of the *Centruroides* species. A third species *Vaejovis spinigeris* may be found in the park, but it is unknown as to who has made the identifications of the specimens of this species that are in the park museum. A species in Central Texas, *Vaejovis reddelli* is mostly found only in caves. It is black in color and does not display any traits that would suggest that it has become adapted to only living in caves.

Of all the scorpion species in the world, there are approximately 14 that are known to be troglobitic, or adapted to the extremes of living in cave environments. All these species are found in caves in eastern or southern Mexico. One species may be found in California. These troglobitic scorpions have no eyes, most have lost all pigments, and they display other features such as elongated pincers that indicate that they are adapted to the darkness of caves. There have been several sightings of scorpions in the caves of Carlsbad Caverns National Park. Most have been pigmented and near entrances and are thought to be a *Vaejovis* species. Of interest, there have been a few sightings of what may be a troglobitic scorpion from Carlsbad Cavern and Chimney Cave. Everyone is requested to report their observations of scorpions seen in any caves of the park.

An interesting reference for scorpions and other arachnids is the Golden Guide book, *Spiders and Their Kin* by Herbert and Lorna Levi. A reference for invertebrates including scorpions in Carlsbad Caverns National Park is the paper, "Invertebrates at CaCa - Trogllobites, Surface Dwellers, Past & Present" by John Roth in 1985.

BULLFROGS: FRIENDS OR FOE? by James J. Krupa

It is thought that during the last 600 million years 30 billion species have existed. Generous estimates suggest 10 million species exist today. That means 99.99% of all species on this planet have gone extinct! Over this 600 million year period numerous mass extinctions have occurred. Each of these mass extinctions opened up the way for a rapid evolution of new species and new groups. For example, the asteroid that slammed into Mexico 65 million years ago ended the age of dinosaurs, but made it possible for the adaptive radiation of mammals. Thus our very existence in this age of mammals is due to a single event. [You ask: "what does this have to do with bullfrogs?" You will see.]. It is generally considered that five great mass extinctions have occurred. The asteroid caused the last of these. The worst ever ended the Permian and 95% of the existing species of that period. Many authorities such as Richard Leakey and E. O. Wilson feel that we are now at the beginning of the sixth great mass extinction. Some estimates suggest 100 species go extinct each day. If this is true and it continues, the sixth extinction may rival that of the Permian. What is causing the current mass extinction? Humans. How are we causing this event? Well direct extermination of species, habitat destruction, and pollution are usually listed as the causes. Yet exotic species [AKA introduced species, non-native species, invader species] introduced by humans have had a major impact on species extinctions as well.

Thousands of exotic species of plants, herbivores, predators have been introduced all over the world. Exotics eat the natives or out-compete the natives or spread parasites and diseases into native populations. Frequently the end result is extinction. The single worst exotic species that we have unleashed on this planet is a friend to many of us. Care to guess? Well it is the domestic cat. About 30 of the last 65 species of birds to go extinct did so because of cats. The last nine species of birds to go extinct in Australia did so because of cats. Surprised? Good! Cats are not the only bad exotic. Rats and goats and pigs have all done great damage. Despite the fact that we know exotics cause problems and that they are part of the sixth extinction, we still insist on introducing species where they do not belong. In New Mexico, bullfrogs are one of several good examples. [Finally the guy is going to talk about bullfrogs!]

In this area around 10 years ago, someone had the great idea of bringing bullfrogs from the east and introducing them into the Black River system. Why? Bullfrogs are considered a game animal and quite good to eat. Seems reasonable. The problem is bullfrogs are eating machines. The bullfrog's view of life is simply if it moves and fits into your mouth eat it. If it moves and is too big to fit into your mouth try and mate with it. [OK, I admit the latter part is a male bullfrog thing]. This can be a problem. In many areas of the southwest US, bullfrogs have been introduced as a game animal and end up eating every native vertebrate that lives along the stream or river (such a habitat is referred to as a riparian community). They eat snakes, turtles, birds, rodents, and especially other frogs. As a result, some populations of frogs have been completely wiped out when bullfrogs are introduced.

At this point you may be saying "fine he finally got to bullfrogs, but why is the guy at CCNP and what do bullfrogs have to do with the park?" I shall tell you. In 1985 bullfrogs were a recent introduction that made their way into the riparian community of Rattlesnake Springs and have become the dominant amphibian there. Is this a problem? Well no one knows. Thus during the first two weeks of June Kristin Haskins and I have been at Rattlesnake Springs trying to get a feel for the amount of damage, if any, bullfrogs are causing. This has been very interesting work. We do know the bullfrogs down there are eating other frogs, mice, lots of crayfish, snails, giant predatory diving beetles, wood, leaves, and anything else that moves. We feel that one of the native frogs (the Chihuahua leopard frog) is less abundant than it should be and another (the cricket frog) seems to be missing all together. We found no snapping turtles at Rattlesnake Springs that eat bullfrogs. Thus a major bullfrog predator is missing (no explanation for this). Furthermore, no leeches are present. These are major predators of bullfrog eggs. Basically, nothing exists at Rattlesnake Springs to keep the bullfrogs in check. This could lead the way for bullfrogs to wipe out several native species. Thus a very small part of the sixth extinction could be unfolding before us. What to do? The best things that can be done are to actively remove bullfrogs so that they will not have as big an impact on the native species. I think bullfrogs are here to stay, but they need not rule Rattlesnake Springs.

Bullfrogs: friend or foe? In the eastern US where bullfrogs belong, I consider them a friend. In fact there I consider them my close personal friends, because I have done research on their behavior and admire their tenacity. In the western US, bullfrogs are an exotic and my foe. This is the sad reality!

If you have any questions or comments, please feel free to contact me. Cheers.

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STUDYING BATS IN THE PARK by Jason Richards

Western Pipistrelle

You may have seen them, fluttering similar to a butterfly just before dusk. The little Western Pipistrelles (*Pipistrellus hesperus*) are the first flyers of the night and they begin their foraging journey just before it gets dark. The Western Pipistrelle, has an average wingspan of 7.5 to 8.5 inches and a body length of 1.5 to 2.5 inches. Pipistrelles are the smallest bat found in the park. This attractive little bat has a beautiful blond, to light brown coat, black mask on their face, and black wings. These fascinating little creatures are found throughout most of the southwestern states, from southeastern Colorado to the Pacific Ocean and from extreme southern Washington to Mexico. In Carlsbad Caverns National Park, they can usually be found roosting in small rock crevices on cliff faces, in caves, and have even been found under rocks.

Little pipistrelles have a voracious appetite, they dine on such gourmet delights as leaf hoppers, flying ants, moths and any other insect that may end up in it's path. Approximately 30 minutes after foraging for insects, pipistrelles take a siesta until they are ready to hunt for insects again.

Pipistrelles mate from September through early March. Females give birth to one pup and may be found in maternity colonies of up to a dozen individuals, or alone among the rocks and canyon walls. For a week the pup travels with the mother while she forages and after that is left alone at the day roost. By the fourth week the pup is able to fly alone and forage for itself.

Western Red Bat

The Western Red Bat is definitely one of the most attractive bats of the park, with color ranges from bright orange to yellow-brown with white tipped hair. The red bat is a medium sized bat with a wingspan of 11 to 13 inches.

Out of all the American species of bats, the red bat has the broadest distribution. Red bats range from extreme southern Canada, through the East and west of the Great Plains and south to Panama and South America. In the park, red bats roost in the dense foliage found in the bottom of canyons and have been observed roosting in a pear tree at Rattlesnake Springs.

Red bats start their forage one or two hours after sunset and may hunt well into the morning. They feed mainly on insects and have been observed foraging around streetlights.

Although the red bat is mainly solitary, it sometimes migrates in groups and may forage in close association with others. Red bats mate from August through October, and get this, copulation may be initiated in flight (do not try this unless you are a bat). There may be up to five pups per litter, however, the average litter is 2.3 pups.

Methods of trapping bats

Recently, I had the privilege of attending Bat Conservation International's weeklong workshop in Portal, Arizona. During the week, we mist netted fourteen different species of bats, and among them were pipistrelle and red bats. During the week, we used three different means to trap bats, mist nets, harp traps and trip lines.

Mist nets resemble a very fine version of a wide volleyball net. When using a mist net, the location is critical. A long stretch of open water (not too wide), with trees and brush on either side is ideal. In the park, seeps in the canyon bottoms that form pools would be ideal for mist nets. It is good to have the mist net set up and ready at least 30 minutes before the bats start flying. When a good location is found, there is plenty of action on in to the night. Bats caught in mist nets are removed as soon as possible to prevent stress and injury. The bats are then weighed, sexed, measured for size, identified and bagged for later release. Larger, more aggressive bats, such as Hoary or Big Browns are put in separate bags from the smaller bats. Harp traps are two large square aluminum frames bolted together and approximately six inches apart. Each frame is strung with six-pound test monofilament line, vertically from top to bottom, three inches apart. Harp traps are set usually at either end of a water hole as described for mist nets, however, there should be dense foliage on either side and on top of the harp trap. The bat will echo locate and see the trap at the last minute, turn side ways to fly between the lines, and when it straightens too late, it's caught by the other frame. The bat then slides down into the holding area of the trap where it remains until the trap is checked.

Trip lines are most ingenious and perhaps the easiest to use. Two to three monofilament lines are strung across an open water hole that bats use for drinking. The lines are strung tight and about three inches above the water. When the bat swoops down for a drink, it is tripped by the line and tumbles into the water. I found out that bats are really good swimmers. The disadvantage of trip lines is that each bat must be thoroughly dried before you can release them.

All the bat researchers and participants in the workshop had pre-exposure rabies shots. Each time we handled a bat by taking them out of traps, water, or mist nets, we would be bitten, and needless to say we all wore gloves.

THE PORTAGE VOYAGE OF THE SS MUNYAN ON THE BLACK RIVER

by David Roemer

"Few will have the greatness to bend history itself, but each of us can work to change a small portion of events. It is from numberless acts of courage and belief that human history is shaped."

Robert F. Kennedy

What is it within us that compel men and women to commit these sometimes-senseless acts of courage? Is it fame or fortune? To boldly go where no one has gone before? Perhaps it is the southwestern equivalent of cabin fever that causes two people to relentlessly carry a canoe across the desert.

My strange journey began in the late morning hours of Sunday, April 20. I was still in bed when Chief Ranger Gary Vequist showed up on my porch and began shouting through my bedroom window for me to wake up. After several attempts of ignoring him, it was agreed that we would borrow Barry Munyan's canoe for the day, and launch it upon the formidable waters of the Black River.

The Black River is the largest stream within the Black River watershed, a system that encompasses 102,160 hectares (252,434 acres). All of Carlsbad Caverns National Park south of the Guadalupe Ridge contributes water to this system. On the Black River, water is backed up from a small dam for nearly two kilometers, close to the headwaters. Judging from maps and some field reconnaissance by Gary, it appeared possible to navigate a canoe for most of this distance. To the best of our knowledge, this feat had never been attempted, perhaps never even thought of.

Access turned out to be a little tricky, involving a half-kilometer walk across BLM land from the truck to the launch site, near Bottomless Lakes (off Hwy. 62-180). Gary's intrepid dog Cody was along for the expedition, and spent most of the long walk from the truck to the river trying to trip those carrying the canoe. After lowering the canoe down the steep embankment to the river, we launched into the channel and began to paddle downstream.

This portion of the Black River was mostly free of aquatic vegetation, and paddling was easy. We never scraped bottom in the channel, although there was a section in the beginning that required another lengthy portage through desert scrub. Cody swam behind the boat the entire trip, in a constant state of panic that she might be left behind. Gary did most of the paddling in front, while keeping a keen eye on the water ahead for hazards. The author was mostly concerned with conducting a rough biological inventory of the area, to see how it compares to similar riparian habitat at Rattlesnake Springs.

Unlike the relatively dense riparian vegetation at Rattlesnake Springs, the banks of the Black River have patches of cottonwood and willow, but are predominantly desert scrub species. Yellow-headed blackbirds, rarely seen at Rattlesnake Springs, were numerous in the sedges and cattails. Yellow-headed blackbirds tend to breed in deeper waters than red-winged blackbirds, which nest at Rattlesnake Springs in May. Surprisingly, a Bell's vireo was heard, and a nest from the previous year was seen overhanging the river. Bell's vireos are listed as endangered by the New Mexico Department of Game and Fish, and commonly nest at Rattlesnake Springs. Apparently we aren't the only game in town for Bell's vireo! Turtles (species unknown) were barely glimpsed sliding into the water from where they basked on cottonwood snags. Other notable wildlife seen included Great blue heron, Spotted sandpiper, and Cooper's hawk.

Upon reaching the dam, we paused for some cold refreshment and a moment to savor our accomplishment. Lewis and Clark must have had moments like this, I thought. It was decided to make the dog ride in the canoe for the paddle back upstream, a decision which Cody reluctantly agreed to. The journey upstream was a little slower, owing mostly to the lack of enthusiasm for carrying the canoe back to the truck.

Nonetheless, the Black River expedition was a success, seen both from a biological perspective, and from the viewpoint that there was little else to do that day anyway. However, upon careful reconsideration, here are a few observations which future expeditions may wish to consider: 1) Canoes are heavy. Long portages are easier with lighter craft, i.e., air mattresses, inner tubes, inflatable alligators, etc. These are commonly available at stores and are also much easier to tie to the roof of your truck. 2) Start earlier in the day when birds are more active. 3) Leave the dog at home.

Wildlife observations

Yellow-headed blackbird	Bell's vireo
Great-blue heron	Cooper's hawk
Gary's dog	Spotted sandpiper
White-crowned sparrow	American coot
Mourning dove	Wilson's warbler
Yellow-rumped warbler	Northern mockingbird
Common nighthawk	Unidentified turtles

CALENDAR OF EVENTS

June 16 - 20	NSS-CRF Restoration in Carlsbad Cavern
June 23 - 27	NSS Convention
July 8 - 18	Troy Best-Mexican Free-tailed Study
July 19 - 26	LEARN Exploration & Survey - Lechuguilla
Aug. 16 - 23	Seiser/Holcomb Exploration & Survey - Carlsbad Cavern
Aug. 30 - Sept. 1	CRF - Carlsbad Cavern

WILDLIFE OBSERVATIONS

March-May 1997

Compiled by Martha Wehling

BIRDS:

	MARCH	APRIL	MAY
FAMILY ARDEIDAE			
Great Blue Heron		Yes	Yes
Snowy Egret		Yes	
Green-backed Heron		Yes	
FAMILY ANATIDAE			
Snow Geese	Yes		
Northern Shoveler	Yes		
FAMILY CATHARTIDAE			
Turkey Vulture	Yes	Yes	Yes
FAMILY ACCIPITERIDAE			
Northern Harrier	Yes		
Cooper's Hawk		Yes	Yes
Red-tailed Hawk	Yes	Yes	
Golden Eagle		Yes	
FAMILY FALCONIDAE			
American Kestrel	Yes	Yes	
Merlin	Yes		
FAMILY PHASIANIDAE			
Wild Turkey	Yes	Yes	Yes
Northern Bobwhite			Yes
Scaled Quail	Yes	Yes	Yes
FAMILY RALLIDAE			
American Coot		Yes	
FAMILY CHARADRIIDAE			
Killdeer			Yes
FAMILY SCOLOPACIDAE			
Spotted Sandpiper			Yes
FAMILY COLUMBIDAE			
White-winged Dove			Yes
Mourning Dove	Yes	Yes	Yes
Inca Dove			Yes
FAMILY CUCULIDAE			
Greater Roadrunner		Yes	
FAMILY STRIGIDAE			
Great Horned Owl		Yes	Yes
FAMILY APODIDAE			
White-throated Swift	Yes		
FAMILY TROCHILIDAE			
Black-chinned Hummingbird		Yes	Yes
Broad-tailed Hummingbird			Yes
FAMILY TROGONIDAE			
Belted Kingfisher	Yes	Yes	Yes
FAMILY PICIDAE			
Ladder-backed Woodpecker	Yes	Yes	Yes
Red-shafted Northern Flicker	Yes		
FAMILY TYRANNIDAE			
Olive-sided Flycatcher			Yes
Western Wood-Pewee			Yes
Black Phoebe	Yes	Yes	Yes
Eastern Phoebe			Yes
Say's Phoebe	Yes	Yes	
Vermillion Flycatcher	Yes	Yes	Yes
Ash-throated Flycatcher		Yes	Yes
Cassin's Kingbird		Yes	Yes

Western Kingbird	Yes	Yes	Yes
FAMILY HIRUNDINIDAE			
Northern Rough-winged Swallow			Yes
Cliff Swallow			Yes
Cave Swallow	Yes	Yes	Yes
Barn Swallow		Yes	Yes
FAMILY CORVIDAE			
Chihuahuan Raven	Yes		
FAMILY SITTIDAE			
White-breasted Nuthatch	Yes		
FAMILY TROGLODYTIDAE			
Cactus Wren		Yes	
Rock Wren	Yes	Yes	Yes
Canyon Wren	Yes	Yes	Yes
Bewick's Wren		Yes	
House Wren			Yes
Marsh Wren	Yes	Yes	
FAMILY MUSCICAPIDAE			
Ruby-crowned Kinglet	Yes	Yes	Yes
Blue-gray Gnatcatcher		Yes	
Townsend's Solitaire			Yes
Hermit Thrush	Yes	Yes	
American Robin	Yes	Yes	
FAMILY MIMIDAE			
Northern Mockingbird	Yes	Yes	Yes
Sage Thrasher		Yes	
Brown Thrasher		Yes	
Long-billed Thrasher	Yes		
FAMILY BOMBYCILLIDAE			
Cedar Waxwing		Yes	
FAMILY LANIINAE			
Loggerhead Shrike		Yes	
FAMILY PTILOGONATIDAE			
Phainopepla		Yes	Yes
FAMILY STURNIDAE			
European Starling			Yes
FAMILY VIREONIDAE			
Bell's Vireo		Yes	Yes
Solitary Vireo			Yes
FAMILY EMBERIZIDAE			
Virginia's Warbler			Yes
Yellow Warbler		Yes	Yes
Yellow-rumped Warbler	Yes	Yes	Yes
Mac Gillivray's Warbler			Yes
Wilson's Warbler		Yes	Yes
Yellow-breasted Chat			Yes
Northern Cardinal	Yes	Yes	Yes
Pyrrhuloxia	Yes	Yes	
Blue Grosbeak			Yes
Indigo Bunting			Yes
Green-tailed Towhee		Yes	Yes
Rufous-sided Towhee	Yes	Yes	Yes
Canyon Towhee	Yes		
Spotted Towhee	Yes		Yes
Rufous-crowned Sparrow	Yes	Yes	Yes
Chipping Sparrow	Yes	Yes	
Brewer's Sparrow	Yes		
Black-chinned Sparrow	Yes		
Lark Sparrow			Yes
Black-throated Sparrow	Yes	Yes	
Song Sparrow	Yes	Yes	
White-crowned Sparrow	Yes	Yes	Yes
Red-winged Blackbird	Yes	Yes	Yes

Meadowlark	Yes	
Brown-headed Cowbird	Yes	Yes
Orchard Oriole		Yes
Hooded Oriole	Yes	Yes
Bullock's Oriole	Yes	Yes
Scott's Oriole	Yes	Yes
Hepatic Tanager	Yes	
Summer Tanager	Yes	Yes
Western Tanager		Yes
FAMILY FRINGILLIDAE		
House Finch	Yes	Yes
Pine Siskin		Yes
Lesser Goldfinch	Yes	Yes
American Goldfinch	Yes	Yes
FAMILY PASSERIDAE		
House Sparrow	Yes	Yes

MAMMALS:

	MARCH	APRIL	MAY
ORDER CHIROPTERA			
Mexican Free-tailed Bat		Yes	Yes
ORDER LAGOMORPHA			
Black-tailed Jackrabbit		Yes	
ORDER RODENTIA			
Rock Squirrel			Yes
ORDER CARNIVORA			
Gray Fox		Yes	Yes
Ringtail		Yes	Yes
Raccoon		Yes	
Striped Skunk		Yes	
ORDER ARTIODACTYLA			
Elk			Yes
Mule Deer	Yes	Yes	Yes
Barbary Sheep		Yes	

AMPHIBIANS & REPTILES:

	MARCH	APRIL	MAY
ORDER ANURA			
Red-Spotted Toad		Yes	
ORDER SQUAMATA			
SUBORDER SAURIA			
Greater (Southwest) Earless Lizard			Yes
Collared Lizard		Yes	
Checkered Whiptail		Yes	
Great Plains Skink			Yes
Western Fence Lizard		Yes	
SUBORDER SERPENTES			
Western Diamondback Rattlesnake			Yes
Dusty Hognose Snake	Yes		
Sonoran Gopher Snake		Yes	
Ground Snake			Yes
Texas Night Snake			Yes

CONTRIBUTORS:

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Please report your wildlife observations, including date, location, species and number of individuals to: David Roemer (dave_roemer@nps.gov), Carlsbad Caverns National Park, 3225 National Parks Highway, Carlsbad, NM 88220.