

Canyons & Caves

A Newsletter from the Resource Stewardship & Science Division
Carlsbad Caverns National Park

Issue No. 23

Winter 2001



Awesome Clouds Darken the Sky near Carlsbad Cavern during a November Afternoon Rain Shower. (NPS Photo by Tom Bemis)

Edited by Dale L. Pate

Thanks to Paula Bauer, Bill Bentley, Kelly Thomas and Bridget Eisfeldt.

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Look for Issues of *Canyons & Caves* at the following websites:
<http://www.caver.net/> Once there, go to the Canyons & Caves icon. Bill Bentley has placed all issues on his personal website.
<http://www.nps.gov/cave/> Thanks to Kelly Thomas and Bridget Eisfeldt all issues can be downloaded as a PDF file from the park website.

RESOURCE NEWS

CONGRATULATIONS TO DIANA NORTHUP who recently received her Doctorate studying corrosion residues found in Spider and Lechuguilla Caves. The title of her study was "Geomicrobiological Investigations of a Cave Deep Substrate Environment".

NCKRI WEBSITE - The National Cave & Karst Research Institute has established a website. Once Department of Interior internet access is back on line, it can be found at: <http://www2.nature.nps.gov/nckri>

VISITING SCIENTISTS - Art & Peg Palmer accompanied by French scientists Richard Maire, Yves Punier & Jean Francois Pernette were in the park in November to continue their long-term research project titled "The Geology of Lechuguilla Cave and Related Caves". This study is to determine the geologic and geochemical controls on the

origin and pattern of Lechuguilla Cave and other caves of the Guadalupe Mountains.



From Left to Right Peg Palmer, Art Palmer, Richard Maire, Yves Punier & Jean Francois Pernette. (NPS Photo by Dale Pate)

BAT SKULLS RETURNED - Pat Jablonsky's study to identify bat skeletons found in Lechuguilla Cave is now completed. As part of the stipulations for her research, the skulls that were collected from the cave (except for 2 specimens of each species) have now been returned to their original places.

SURVEY RESUMES IN LECHUGUILLA CAVE - With the culvert/airlock project completed, a sense of normalcy has returned to the management of Lechuguilla Cave. The last few months of the year has seen three survey expeditions in the cave. The cave's length stood at 105.79 miles at the beginning of these expeditions. The Cave Resources Office led an expedition to the Southwest Branch the week of November 7-11 surveying an additional 512 feet of new survey, resketching or resurveying 1,561 feet and inventorying 76 stations. This brought the length to 105.89 miles. Ray Keeler and Peter Bosted led a survey expedition the week of December 1-8 to the Western Branch adding 5,016 feet of new survey and inventorying 347 stations. This brought the length of the cave to 106.84 miles. The last expedition was a Lechuguilla Exploration and Research Network (LEARN) trip the week of December 15-22. This issue of the newsletter was published before the survey data was added up so an up-to-date length will be provided at a later time.

GAVIN RETURNS - Former Biological Technician and SCA Gavin Emmons returned to the park on November 19-20 to assist in GPS mapping backcountry trails in the upper Walnut Canyon area. Gavin will be spending the winter in southeastern Colorado doing radio-telemetry on kit fox and other mammals.

HOUSING AREA CHANGES - With most permanent employees moved out of the park headquarters area, small changes are occurring. The most recent changes are the removal of the playground and chain-link fencing and yard walls from around the western end of Mission 66 3-bedroom apartments.



GOING! The playground in the housing area in the process of being removed. (NPS Photo by Mark Bremer)



GOING! Playground equipment almost removed. (NPS Photo by Mark Bremer)



GONE! Open space where the playground use to be. (NPS Photo by Renée West)

COUNTING COUGARS

by Myra Barnes

Cougars *Puma concolor* are one of the most difficult large mammals to census. They are shy, cryptic and wide-ranging. During a three-year study using radio telemetry in the southern Guadalupe Mountains including Carlsbad Caverns National Park and Guadalupe Mountains National Park, the average home range was 207 km² for males and 59 km² for females. With only 189 km², Carlsbad Caverns NP may include portions of the home ranges of 1-2 males and 4-5 females. The 1982-1985 radio telemetry study estimated there were 2 adult males and 4 adult females using the park plus offspring and dispersing sub-adults. A 76 km transect route was established within Carlsbad Caverns NP to search for signs (tracks, scats or scrapes) of cougars at the end of the radio telemetry study. Transect surveys have been conducted each spring and fall since 1987. Only signs of adult cougars are recorded to eliminate any overlap with bobcats or coyotes. Sex, reproductive success and other demographic characteristics cannot be determined in a sign survey. No significant increase or decrease has been detected in the cougar population at Carlsbad Caverns NP since the beginning of the study.



A Mountain Lion (*Puma concolor*). NPS Photo borrowed from Whiskeytown NRA website.

Studies with radio-collared cougars allow individual identification, tracking of movement and activity patterns, and home-range estimation. Cougar dispersal over large areas has been documented in studies using radio telemetry and DNA analysis. Two radio-collared males from the San

Andres Mountains were located in the Guadalupe Mountains, after migrating more than 200 km. However, tracking radio-collared cougars can be expensive and labor intensive. With recent advances in DNA analysis and the development of primers for cougars, DNA analysis has emerged as a cost-effective method to identify individuals, estimate genetic diversity, infer population structure, and estimate gene flow. Amplification of DNA from cougars is more efficient from tissue samples. However, hair and scat samples can be collected non-invasively, without capturing the cougar. DNA from scat is more difficult to amplify because of the bulk and prey DNA in the sample. DNA from hair samples is easier to amplify than scat but more difficult than tissue.

Carlsbad Caverns NP is one of six parks that received funding from the Rick Flory Foundation and National Park Foundation for the project 'Mountain Lion-Human Interactions at Intermountain Region National Parks: The Effects of Human Use Areas on Mountain Lion Movements, Behavior, and Activity Patterns- A Cooperative Approach'. Preliminary cougar DNA studies at Grand Canyon NP have demonstrated that DNA sampling and analysis is an effective, low-cost method for detecting and identifying individual cougars, kinship, and minimum population estimates. Our participation in this project will allow us to gather population and demographic information on the resident and transient cougars at Carlsbad Caverns NP.

Carlsbad Caverns NP and Guadalupe Mountains NP set up their first hair snare sampling stations in mid December. Each sampling site has five scent stations with hair snares placed about 100 yards apart. Areas at Carlsbad Caverns with the highest number of scat and other cougar sign have been identified over 14 years of walking transects during sign surveys. Sampling will be concentrated in areas where cougars are most likely to travel and leave sign, but areas of good and marginal habitat should be sampled to detect population changes. To attract a cougar, an aluminum pie-pan is suspended from a tree branch or other tall plant with wire and fishing line. A carpet square soaked with an attractant (a combination of bobcat or coyote urine, deer or other musk, and other territorial animal scents) is placed on the wire above the pie-pan. The visual attraction of the pie-pan moving in the wind with the scent wafting through air should arouse the curiosity of any cat. The hair snare is made from a square of carpet with about twenty special wire-barbed nails stuck through it. After the carpet is soaked in the scent and sprinkled with catnip, it is fastened to a tree or other solid surface where a cougar might rub and leave some hairs behind. A remote camera will also be set at some of the sampling sites. The samples are collected and the scent/hair snare stations moved every two weeks. If you see any of the hair snares while you are out hiking, avoid touching the hair snare to prevent contamination with your DNA.

Gene flow studies demonstrate that cougar population estimates and demographic parameters must be addressed on a very large scale that crosses agency and state boundaries. Cougar populations in southern New Mexico exhibit a metapopulation structure. The cougars in our area are not

part of one large continuous population but represent a subpopulation linked to other small populations by dispersing animals. Some females remain in the area where they are born. Males disperse significantly farther than females and are probably responsible for gene flow between habitat patches and populations. When cougars are removed from a population by natural mortality or hunting, females are replaced by residents and immigrants, but males are only replaced by immigrants. Cougars utilize corridors and have been known to disperse across large areas of non-cougar habitat in New Mexico. A minimum of 2,000 km² is needed to support a cougar population without immigration; however, smaller areas may support a population with immigration through corridors. At 189 km², Carlsbad Caverns can only protect a small portion of a population linked to other small populations of cougars on BLM, Forest Service or private land.

The multiple park study will allow us to assess gene flow between six parks in Arizona, New Mexico, Texas, and Colorado. Depending on the segments of DNA used for analysis, it may be possible to compare our results to published studies in California and Utah. Most researchers recommend an integrated approach to cougar conservation with management involving agencies across states rather than individual units within states. DNA analysis of cougars from hair and scat at Carlsbad Caverns will provide more population and demographic information than transects for cougar sign and allow us to examine gene flow within a larger regional context.

LOWER CAVE WALKWAYS UPDATE

by Jason M. Richards

The first sections of the Lower Cave walkways have been successfully completed. These walkways are needed to protect the floor resources from visitors walking through shallow pools that are along the only logical route through Lower Cave. The trail crosses fragile flowstone that is pockmarked with delicate cave pearl nests. As people walk along the trail, mud and outside contaminants are tracked into the pools and cave pearl areas. Presently, the pools and flowstone areas are severely impacted with this mud. Once these walkways are finished, the impacted areas will be restored. Lower Cave tours are offered Monday through Friday every week throughout the year and are very popular.

The walkway across the first section of "Rookery Pool" spans ten feet and eliminates the stepping-stones that were placed for visitors to use while crossing the pool. The photos show the before and after pictures.

The first phase of walkway construction began with the placement of six sections of polyethylene decking totaling 52 feet in length. Each walkway is elevated above the wet flowstone floor using polyethylene shims that are attached to each section using stainless steel bolts. Originally, it was thought the walkways would need to be bolted directly to the floor for stability, however, this proved not to be the case and each individual section is quite stable.



Before and after photos of the pool with stepping-stones and with the recently placed polyethylene plastic walkway. (NPS Photos)



Completed sections of the Lower Cave walkway in place. (NPS Photos)

The project to this point has mostly utilized materials left over from other projects. There is 50 feet of walkway still to install to complete the project. We hope to complete this project in the near future.

MALTA STARThISTLE IS NOT YELLOW STARThISTLE!

by Renée West

"Its beauty is best appreciated from afar." from Ronald J. Taylor, speaking of yellow starthistle, in *Northwest Weeds, The Ugly and Beautiful Villains of Fields, Gardens, and Roadsides*

As ugly as yellow starthistle is, its cousin Malta starthistle that grows in Eddy County and Carlsbad Caverns National Park has even less to recommend it aesthetically: small, spine-covered yellow flowers that barely open from the bud. And what makes it even uglier – from a weed management point of view – is that so little is known about it. As near as anyone can tell, *Centaurea melitensis* (or MST, for short) has not even had one single scientific study done about it. These two plants look similar, so people just assume that they have similar characteristics in the environment.

But that's not true, and it can be a bad assumption when you're planning a strategy to fight one of them. A primary rule of all pest management is to understand your pest and its life cycle or you'll never be successful. You have to "think" like the pest in order to defeat it.



Malta starthistle seedlings growing at 3,800 feet elevation on the roadside in Walnut Canyon, fall of 2001. (NPS Photo by Renée West)

So, when I was invited to give a talk on Malta starthistle at the Southwest Vegetation Management Association annual meeting in November, I thought the talk should be called, "Malta starthistle is NOT yellow starthistle!" The session, one of three concurrent sessions at the Tucson meeting, was well attended. It seems that both starthistles are spreading rapidly in Arizona, and people are realizing how much they really don't know about MST. I've worked with both these charmers now: with yellow starthistle (or YST) at Nez Perce National Historical Park in northern Idaho and with MST here at CAVE. (YST does occur in New Mexico, and is even listed for Eddy County.)

In searching for additional information for the talk, I found reference to MST in some plant books, a few weed books, and fewer newspapers. One article in a newspaper said it was introduced to California in 1869. A website from the Natural Resources Conservation Service shows that MST is currently present in 16 states. But New Mexico is one of only two states where it is actually listed as a state noxious weed. California is the other, which is not too surprising when you learn that another of its common names is "Napa thistle". (Yet another of its common names is the mysterious "tocalote", which no one seems to be able to translate for me.)

One thing I learned in Idaho is that the unbeautiful YST fools mowers by flowering below the level of the mower blades. This seems a pretty 'clever' strategy for a plant – actually adapting to conditions as they occur. Our truly ugly MST has a very different strategy. It has a built-in, practically foolproof way to reproduce before being detected: it puts out two small flowers in the rosette of basal leaves before the flowering stalk grows up. These low, early flowers seem to mature and go to seed before the other flowers even appear. So, if you are monitoring for MST by watching for the tall flowering stalks, and you do your treatment after that, the MST plants are still able to fool you and reproduce.

This important characteristic has not appeared in any of the weed books or newspaper articles about MST. And if the weed fighters don't know about it, then they aren't getting as much weed control done as they think they are. That is one

reason for sharing information at these types of weed meetings around the West. YST has been extensively studied. Researchers have determined that it is intolerant of shade, so weed fighters try to use shade in their strategy when possible. Researchers have also found that its seeds remain viable (able to germinate) for as many as 20 years. It would be quite useful for us in planning strategies to know if MST has the same capability.



Closer view of Malta starthistle seedlings. (NPS Photo by Renée West)

Another important MST feature that I hadn't seen until this year is that it can germinate in the fall. Fred Armstrong had already noted this at Guadalupe Mountains NP, but I didn't see it here until the day before I left for the Tucson conference. Not all the seeds germinate in the fall, or we would already be seeing them on the ground around the buildings here in the park. But there is a large stand of green rosettes near milepost 3 along the Walnut Canyon entrance road. (Or, at least there was when I took these pictures on December 7. They may already be killed by NPS weed fighters by the time you read this!)

SEARCH AND RESCUE TRAINING 2001

by Tom Bemis

Thirteen people from Carlsbad Caverns National Park and Guadalupe Mountains National Park attended vertical rescue training at Carlsbad Caverns during the last week of November. A week of very unpleasant weather made the course especially challenging, but the training continued with only minor modifications.

This 40 hour course included one and a half days of classroom study, a half day of litter transport and haul system rigging practice, a day of personal vertical skills refresher and two days of in-cave rescue practice. The mock cave rescues included raising and lowering an injured patient through the first rappel in the Bat Cave entrance at Carlsbad Cavern and extrication practice through the culvert and entrance at Lechuguilla Cave.

The practice at Lechuguilla Cave was used to develop a rescue pre-plan for use in any future accidents in that cave.

This training was the second held in recent years including employees of GUMO, and will help to build up a larger trained reserve of people to call in the event of a major rescue. The more diverse group helped in providing a broader base of experience to draw upon during this class. The final day of training was concluded with a critique of the rescue and the class, which will be used to fine tune the training for 2002.

Thanks are extended to Kale Bowling-Schaff for taking time out of her busy schedule to teach the section on patient assessment. Special thanks is given to all supervisors for allowing their employees to attend and to other employees who covered for those attending.

This year's attendees included:

Stan Allison	CAVE
Tom Bemis	CAVE
Frosty Bennett	GUMO
Dianne Dobos-Bubno	CAVE
Paul Burger	CAVE
John Cwiklik	GUMO
Ted Firkins	CAVE
Jason Richards	CAVE
Alison Van Dusen	GUMO
Greg Litton	CAVE
Vance Noles	YELL/CAVE
Clarence Wadkins	CAVE
David Wyrick	CAVE

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