Park News

Great Basin National Park
National Park Service
U.S. Department of the Interior

The Midden

The Resource Management Newsletter of Great Basin National Park

Treatment of Snake Creek to Restore Bonneville Cutthroat

By Jonathan Reynolds, Fisheries Biologist

A park employee collects an eDNA sample to determine if any brook trout DNA is still present in Snake Creek following a second rotenone treatment. If none is found, native Bonneville cutthroat trout will be reintroduced in the summer of 2019.

In August of 2016, Great Basin National Park collaborated with the Nevada Department of Wildlife (NDOW) and staff from other National Park Service (NPS) units to conduct a rotenone treatment in Snake Creek. The goal of the treatment was to eradicate all nonnative fish from the section of Snake Creek located within the park boundary. Removing these nonnative fish is a necessary step in restoring Bonneville cutthroat trout (*Oncorhynchus clarkii utah*, BCT) to Snake Creek, which is the largest South Snake Range stream identified as a BCT conservation population by the 2006 *Conservation Agreement and Conservation Strategy for Bonneville Cutthroat Trout in the State of Nevada*.

After a year and a half of intensive electrofishing surveys and environmental DNA (eDNA) analysis, it was revealed that less than 1% of brook trout had survived the 2016 treatment. A total of eight brook trout were captured and killed during electrofishing validation surveys conducted throughout the 2016 and 2017 field seasons. Additionally, eDNA sampling conducted in 2017 produced a positive brook trout result at 1 of the 75 sites sampled. This single site was not associated with any of the locations where brook trout were previously captured during the electrofishing validation surveys. Based on these results, it was determined that a second treatment needed to be conducted in 2018, postponing the reintroduction of BCT into Snake Creek.

In July of 2018, Great Basin National Park once again used both NDOW and NPS staff to conduct a second rotenone treatment in Snake Creek. With brook trout and eDNA results all located above the pipeline inlet, the section of Snake Creek between the pipeline outlet and the park boundary did not have to be retreated. This allowed the park to use less rotenone and fewer people.

Now that the treatment is completed, electrofishing validation surveys have once again commenced and will continue until the stream begins to freeze over. To date, no fish have been encountered in Snake Creek post-treatment. A second round of eDNA sampling was done in October 2018, and the results will be finalized by spring. Pending the outcome of our validation surveys, BCT are expected to be released into Snake Creek during the summer of 2019.

In This Issue

Three New Records of Stone Centipedes in Nevada

By Cedric Lee, Museum Associate, Natural History Museum of Los Angeles County, CA

Worldwide, there are roughly 3,000 described species of centipedes; about 20% of these are recorded in the United States (Mercurio 2010). However, the majority of centipedes are often overlooked, partly due to their small size and uncharismatic appearance.

Lithobiomorpha, commonly known as stone centipedes, are arguably one of the least studied of the common ground-dwelling arthropods in North America. Virtually no research on the taxonomy and distribution of stone centipedes from the Western United States has been conducted since the passing of myriapologist Ralph Vary Chamberlin in 1967. This is unfortunate, considering that centipedes play important roles in ecosystems.

In terms of biomass, centipedes have been found in some soil macrofauna communities to be the dominant predators (Schaefer 1990). Thus, centipedes have the potential to exert top-down control of prey and influence macrofaunal abundance and dynamics of ecosystems. In addition, centipedes are an important food source for vertebrates and other arthropods.

Herein, I report three new records of stone centipedes in Nevada: *Bothropolys permundus* (Chamberlin, 1902), *Lophobius loganus* (Chamberlin, 1925), and *Zygethobius dolichopus* (Chamberlin, 1902). Centipedes were hand collected from leaf litter and under stones and logs along Baker Creek and Lehman Creek on June 13, 2018 during the Beetle BioBlitz at Great Basin National Park. The majority of the collected centipedes (24 individuals; 60% of total) were *L. loganus*. All specimens have been deposited at the Natural History Museum of Los Angeles County in California.

New Nevada stone centipedes: a male *Lophobius loganus*, a female *Bothropolys permundus*, and a female *Zygethobius dolichopus.* These three stone centipedes have been added to the Nevada state list after they were found during the 2018 BioBlitz.

Z. dolichopus was previously recorded from Utah and California while *L. loganus* and *B. permundus* were previously recorded from Idaho and Utah. These new records elevate the Nevada centipede checklist to 16 species (Mercurio 2010) and reveal the potential for discovering unrecorded and undescribed species of centipedes in Nevada.

References:

Mercurio, R.J. 2010. An annotated catalog of the centipedes (Chilopoda) from the United States of America, Canada and Greenland (1758–2008). XLibris Corporation, Bloomington, IN, 560 pp.

Schaefer, M. 1990. The soil fauna of a beech forest on limestone: Trophic structure and energy budget. Oecologia 82(1): 128-136.

Have an interesting wildlife observation? We'd love to know about it. Enter it on the Great Basin National Park iNaturalist page or fill out a Wildlife Observation form at a visitor center.

Introduction to Fungi in Great Basin National Park

By Lisa Johnston, Interpretive Park Ranger

The next time you go for a hike, take a closer look at the trees. You may notice that from almost any vantage point, you can find all stages of growth and decay. You may not see any mushrooms unless there has been a recent rainy period, but the growing fungi that produce them are all around you. Without them, the forest would look quite different.

Fungi provide a major contribution to the availability of nutrients in the forest ecosystem. The most obvious is the decay of lignin and cellulose that allows trees to return to the soil from which they arose. Few other organisms have the ability to digest these tough materials.

Wood decay fungi are saprotrophic, which means they get their nutrients through the process of breaking down dead material. Some examples of saprotrophic fungi in the park include the oyster mushroom, *Pleurotus populinus*, which can be found growing on quaking aspen logs and snags, and the purple-hued *Trichaptum abietinum* found on rotting conifers.

Other species of fungi may contribute to the health of trees and other plants by exchanging nutrients with the roots of the plants. This mutualistic relationship is called mycorrhiza. All fungi that produce mushrooms grow as long filaments called hyphae that permeate the substrate in which they grow. Mycorrhizal fungi wrap hyphal threads around the cells of plant roots or actually penetrate the cells themselves. These hyphae increase the efficiency of water uptake for the plants by increasing the surface area through which water enters the combined hyphae/root system and also provide nutrients that may not be accessible to the plant. In exchange, the fungi receive carbohydrates produced by the plants through photosynthesis. Sometimes the benefits are skewed toward either the plant or the fungus, resulting in a parasitic rather than mutualistic relationship, but most often both species benefit. The aspen bolete, *Leccinum insigne*, is an example of a mycorrhizal fungus associated with quaking aspen in the park.

The aspen bolete, *Leccinum insigne*, is a type of mycorrhizal fungus that grows near quaking aspen.

Fungi belong to their own kingdom of life and are distinct from both plants and animals. Just as plant and animal species have diverse ecological roles, fungal species also vary in their methods of interacting with their environment. Some species are even predatory and produce chemical lures to attract and trap small animals such as nematodes or springtails. Other species are parasites of insects or plants.

Although rarely noticed, fungi are an important part of the ecosystem of Great Basin National Park. Each brief appearance of a mushroom indicates the presence of an extensive living organism that has been growing beneath the surface waiting for the rain to come.

The oyster mushroom, *Pleurotus populinus*, is found on quaking aspen logs and snags, and are a type of wood decay (saprotrophic) fungi.

Air Temperatures in Lehman Caves

By Stanka Šebela (ZRC SAZU, Karst Research Institute, Slovenia)
Gretchen Baker, Ecologist, GBNP
Barbara Luke, University of Nevada, Las Vegas

We recorded and analyzed air temperature year-round in Lehman Caves to explore the impacts of tourism and the external climate on the cave microclimate. Stark conducted an early study (1969) on effects of cave tourism on climate in the cave. After almost 50 years it was time for a new look.

Two Van Essen data loggers were placed in the cave for this study on 6 August 2015 (Stations GBNP 1 and GBNP 2). Accuracy of the measurements was ±0.01 °C. Four other air temperature monitoring stations – Entrance Room, Queen's Bathtub, Cypress Swamp, and Talus Room – had already been established. The sensors were distributed at varying distances from the cave entrance. Two were off of the current cave tour route.

The hourly cave air temperature data were compared with outside mean monthly air temperature values (Fig. 1).

The Talus Room and GBNP 2 (located in the West Room) stations are away from the current cave tour route and from the Caves' natural entrance. At these sites, temperatures are nearly constant throughout the year (Fig. 1). They appear to be unaffected by outside air currents entering the cave, or even in-cave air currents.

Temperatures at the other stations reflect the wintertime ventilation regime of outside air entering the cave through the natural entrance (the "chimney effect"). Temperatures at the Entrance Room station range widely, over about 4°C. Stations GBNP 1 and Queen's Bathtub are close together, about midway along the extent of the cave tour route. Temperature fluctuations are similar for the pair, ranging over about 1°C. At the Cypress Swamp station, which is further from the entrance but also along the cave tour route, seasonal fluctuation is reflected weakly.


Downloading dataloggers in Lehman Caves.

In Lehman Caves the chimney effect is most visible in winter. When outside air temperature is less than cave air temperature we see air temperature decrease at the stations closest to the natural entrance (Fig. 2). During summer, the cave air is warmed by entry of warmer outside air but also by increased visitors (increased human presence and use of lighting). Seasonal fluctuations are not seen at all off the tour route in the Talus Room and West Room (GBNP 2). The stations along the tour route show characteristics of a so-called thermal cave, where the air flow clearly differentiates between summer and winter. Barometric caves, in contrast, show only small differences in air temperature between summer and winter – as applies to the Talus and West Rooms.

Higher daily oscillations in temperature and higher overall temperatures in summer at the four stations along the tour route may also reflect visitors' impact beyond the chimney effect.

At Queen's Bathtub and GBNP 1 stations, cave air temperature remained elevated until October 2015 – two months after visitation declined for the season (Fig. 3) and about 1 to 2 months after outside air temperatures dropped (Fig. 2).

Mean year-long outside air temperature for the period 1 July 2015 to 1 July 2016 is 9.2 °C (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv4514), which is 1.9 °C (~20%) lower than the year-long average cave air temperature at GBNP 1 (computed over a slightly different time period: 7 August 2015 to 7 August 2016). Two factors may be contributing to this difference: (1) natural heat flux from the Earth's interior; and (2) heat emanating from visitors and lighting in the cave. Elevated natural heat flux from the Earth's interior is probably not applicable for Lehman Caves because there are no known hot springs or other signs of active volcanism in the vicinity (radius 20 km). But more research related to this possibility is warranted.

Little Muddy Cave, located near Lehman Caves (0.5 km distant and about 100 m lower elevation), is not a show cave. Its mean air temperature from November 2005 to November 2006 was 9.7 °C. This is 1.5 °C lower than the mean cave air temperature at Lehman Caves (Stations GBNP 1 and Talus Room), closer to the outside air temperature (9.2 °C). This information

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Air Temperatures in Lehman Caves (continued)

further supports the hypothesis that cave air temperature at Lehman Caves is elevated anthropogenically.

The historic dataset allows us to compare temperatures across decades. Stark (1969) measured air temperature in Lehman Caves over 8 hours in November 1968 when lights were off. Values ranged from 10.1 to 11.4 °C with a mean of 10.8 °C. The mean temperature measured 47 years later (November 2015) at station GBNP 1 is overall about 0.6 °C (~6%) higher.

Our findings support the hypothesis that anthropogenic factors are causing a rise in Lehman Caves' air temperature above natural levels. However, further research would be needed to confirm the hypothesis.

Acknowledgments
This study was performed within the project *Climatic monitoring in show caves: comparison of conditions from Slovene karst caves with karst areas of east-central Nevada USA* (GRBA-2015-SCI-0015) and Slovenia-USA bilateral project (BI-US/15-16-054).

References
Stark, N. (1969). Microecosystems in Lehman Cave, Nevada. *NSS Bull. 31(3)*, 73-81

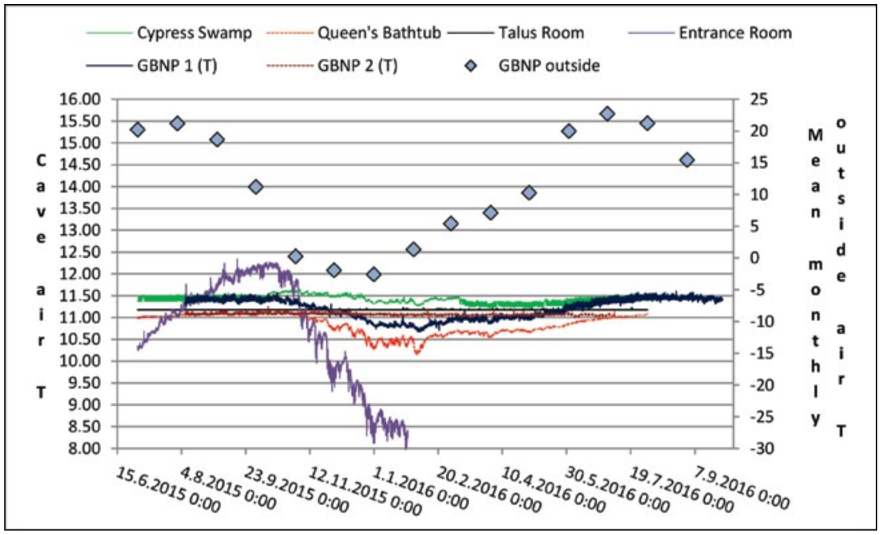

Figure 1. Hourly cave air temperature data (°C) at six locations in Lehman Caves and mean monthly outside temperature from July 2015 to August 2016.

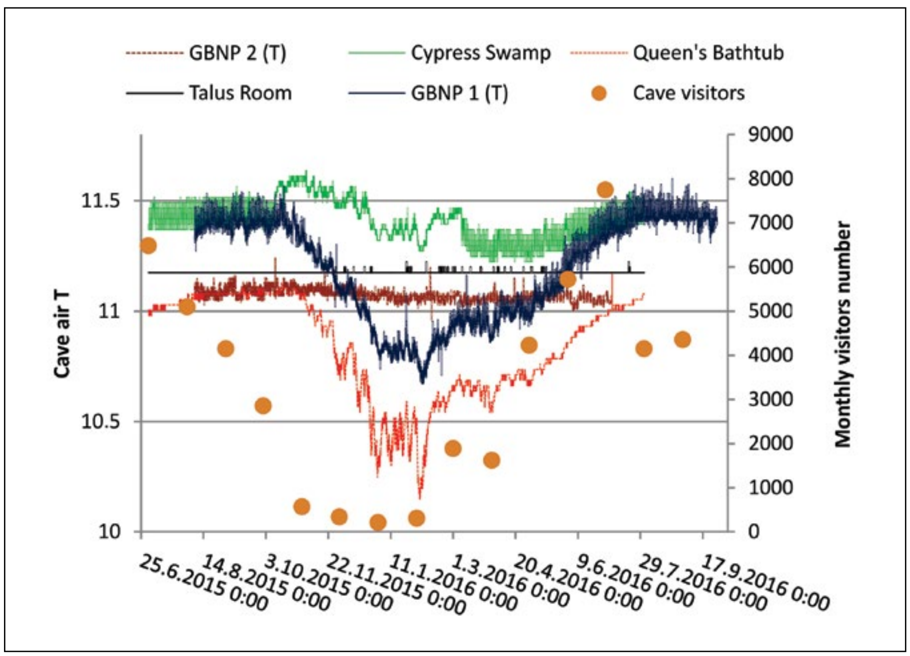

Figure 2. Hourly cave air temperature data (°C) at five locations in Lehman Caves and monthly visitation from July 2015 to August 2016. Dates are formatted by day-month-year-time.

Check out the longest monthly climate dataset we have for the park, from 1937 to 2016 at https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv4514

Find answers to these questions (answers also on page 8):
1. What is the average precipitation total at the Lehman Caves Visitor Center?
2. Which month is snowiest?
3. Which months are coldest/hottest?

Lehman Caves: Little Understood but World Class, Part 2

By Louise D. Hose, retired NPS geologist

The following article is excerpted from a paper I prepared for the Great Basin National Park staff on the Geologic Story of Lehman Caves. Last issue, I wrote about Stage 1, the Sulfide-rich, Hypogenic Speleogenesis time. This note reveals the second of four stages of speleogenesis I have documented in the cave.

The Talus Room is an area of the cave with a lot of boulders on the floor. It is likely they fell millions of years ago when the water drained.

STAGE 2 – SECONDARY DEPOSITS – FINDING STABILITY IN A NEW ENVIRONMENT

Once completely drained of hypogenic waters (more than 2.2 million years ago and likely about 8 Ma), the cave worked to achieve stability in its new environment. Three types of debris covered the cave floor before the dramatic speleothems formed. First, as soon as the water table dropped below the cave passages, gypsum paste fell off the walls and ceiling to cover the floor with gypsum sand and dust. What remained on the walls dried out and formed crystalline gypsum crust.

The second type of debris is mud, silt and sand. Some of this material is the insoluble residue from the dissolved marble which settled to the cave floor as the cave was actively enlarging. Some of it washed in from the surface, particularly near the natural entrance area.

The third type of debris resulted from collapse of boulders and rocks from the ceilings and floor. There were numerous causes of the "breakdown" in the cave.

1. The cave walls and ceilings display a remarkable number of fractures and many appear to have spread further apart since the void first formed. These "flaws" in the bedrock probably constitute the biggest reason for the abundant breakdown in the cave. The joints and faults are weaknesses in the bedrock which are prone to failure, and the faults provide zones of movement along which stresses change and facilitate failures. These faults and fractures probably date back to the movements of the Snake Range Décollement and Basin and Range uplift.

2. Movement along faults both in the cave and nearby during the Basin and Range tectonism resulted in earthquakes. Those events shook the entire area. Breakdown in the cave likely accompanied earthquakes at that time. The area now holds low risk of damaging earthquakes occurring (Fig. 1). As the area has been mostly earthquake-free for the last 8 million years, and the cave is more than 2.2 million years old, the cave ceiling and walls have likely reached a condition of metastability and present no more danger to visitors of spontaneous ceiling and wall collapse than the average cave visit or walk in the mountains anywhere.

3. The ceilings, no longer experiencing the partial buoyance of water, and walls, no longer under pressure from the water-filled passage, probably experienced the most active period of collapse as they moved towards stability right after the cave de-watered (millions of years ago).

4. As the area was uplifted and erosion removed most of the overburden, the release of lithostatic pressure (weight of rocks above) would have resulted in expansion of joints and other fractures in the bedrock, probably facilitating ceiling and wall collapses.

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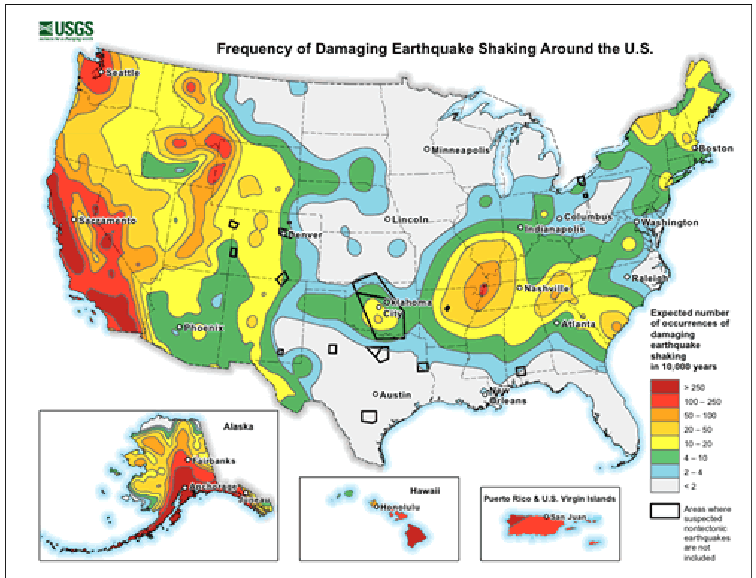
Lehman Caves Geology (continued)

5. Several varieties of gypsum are abundant in the cave and crystal wedging undoubtedly contributed to the accumulation of breakdown on the cave floor. The conversion of limestone ($CaCO_3$) to the much larger gypsum ($CaSO_4 \cdot 2H_2O$) molecule is accompanied by significant expansion within the rock. If the process takes place along joints or other cracks in the bedrock, the forces generated by the conversion pry the bedrock apart and commonly results in breakdown on the floor and forms blocky domes in the ceiling. This is a common process in Mammoth Cave, for example.

In conclusion, there is no reason to believe the cave is now particularly prone to ceiling or wall collapses and plenty of evidence from over 120 years of safe tours that it is as stable as most mountainous recreational sites. Most of the previous collapse occurred millions of years ago.



Map showing the predicted frequency of damaging earthquake shaking (USGS, undated).

Recent Publications about Great Basin National Park

Chen, C., Kalra, A., & Ahmad, S. 2018. Hydrologic responses to climate change using downscaled GCM data on a watershed scale. *Journal of Water and Climate Change*. Link

Hamilton, B. T., Roeder, B. L., & Horner, M. A. 2018. Effects of sagebrush restoration and conifer encroachment on small mammal diversity in sagebrush ecosystem. *Rangeland Ecology & Management*. Link

Leavitt, S. D., Newberry, C. C., Hollinger, J., Wright, B., & St. Clair, L. L. 2018. An integrative perspective into diversity in Acarospora (Acarosporaceae, Ascomycota), including a new species from the Great Basin, USA. *The Bryologist121*(3): 275-285. Link

Pierce, A. M., Gustin, M. S., Christensen, J. N., & Loría-Salazar, S. M. 2018. Use of multiple tools including lead isotopes to decipher sources of ozone and reactive mercury to urban and rural locations in Nevada, USA. *Science of The Total Environment 615*: 1411-1427. Link

Smithers, B. V., North, M. P., Millar, C. I., & Latimer, A. M. 2018. Leap frog in slow motion: Divergent responses of tree species and life stages to climatic warming in Great Basin subalpine forests. *Global change biology 24*(2): e442-e457. Link

The Mojave Desert Network Inventory and Monitoring Program has a new, fresh-faced website www.nps.gov/im/mojn! Find specific information about the work we do within each park on the Parks & Partners page.

Utah Master Naturalists Help with Restoration

By Gretchen Baker, Ecologist

At the end of August, Mark Larese-Casanova brought about ten people to the park as part of the Utah Master Naturalist program from Utah State University. This is a continuing education program open to all ages. During their three-day stay in the park, they hiked to the bristlecones, assisted with bat trapping and data collection at Rose Guano Cave, took a cave tour, and enjoyed the sound of Baker Creek while camping at Grey Cliffs. They also offered to do a service project.

For the service project, I met them at the Gravel Pit along the Scenic Drive and did a talk about sagebrush restoration. I started with a discussion of conifer encroachment. Pinyon pines, a relatively new tree species on the landscape, arriving just 6,000 years ago, have increased over the last 150 years and now occupy 18 million acres in the Great Basin. These trees occupy the thermal belt, above winter inversions but below other conifer species such as ponderosa pine and Englemann spruce. Due to human induced factors such as fire suppression, increased carbon dioxide, and changing climate, pinyon pines are increasing in sagebrush stands. Sagebrush steppe habitat is full of biodiversity, including species that favor it like sage grouse, sage thrasher, sage sparrow, sagebrush lizard, pronghorn, and more. Pinyon-juniper woodlands do not contain as much biodiversity and very few habitat specialists.

Utah Master Naturalists volunteered to help restore sagebrush steppe habitat by removing invading pinyon pines and junipers.

Additionally fuel loads in pinyon juniper woodlands are higher than sagebrush steppe, and can create catastrophic wildlifes leading to cheatgrass monocultures. For these reasons, we have done multiple conifer removal projects in the Park to restore the shrinking sagebrush habitat.

For the service project, each person was provided with gloves and loppers and instructions on how to cut the small pinyon and juniper trees. Then we headed to the historic park road, fanned out, and headed out into the meadow above it. Over the next hour and a half, these volunteers lopped and scattered many small trees. Most trees were growing right in or next to sagebrush, as the pinyon trees prefer a nurse plant such as sagebrush for extra protection. The Utah Master Naturalists covered the entire 15-acres of the meadow and provided 1.5-days worth of work. It was definitely a win-win: the master naturalists got to help out the park and we made progress on our goals for the Wildrye Restoration project.

This type of service project is ideal for groups of 6-12 people, aged teenagers or above, who are looking for about a two-hour long service project. If you have folks who are interested in volunteering, have them contact Bryan_Hamilton@nps.gov or Julie_Long@nps.gov.

Answers to Page 5 climate questions:
1. 13.2 inches
2. March (ave. 16.1 inches)
3. January (average minimum temp 18.4 F) and July (ave. maximum temp 85.5 F)

Townsend's Big-Eared Bat Research

By Kelsey Eckholm, Biological Science Technician

Over the course of this summer, the Great Basin bat crew has been working in collaboration with Christopher Newport University (CNU) researchers and the Nevada Department of Wildlife to collect data on Townsend's big-eared bats (*Corynorhinus townsendii*) in the area.

Trapping primarily occurred at known big-eared bat roosts in and around the park and at other opportunistic locations such as foraging areas. A new cave and big-eared bat roost was discovered in Spring Valley through CNU's radio-telemetry project earlier this summer, so we were able to include this new roost in our trapping effort as well.

In 20 nights of trapping, 204 Townsend's big-eared bats were captured for the study. Of these, 21 were recaptures from previous trapping efforts in the park over the years. A total of 138 individuals received passive integrated transponder (PIT) tags to track movements within and around the park. with the help of PIT tag readers deployed at several caves and mines.

The CNU researchers were collecting data for both masters and PhD projects, including wing punch samples for DNA and hair samples for stable isotope research. From the group's effort, 185 wing punches and 180 hair samples were collected for analysis.

Studying a Townsend's big-eared bat. Over 200 were captured during the 2018 season.

After each Townsend's big-eared bat was studied, it was released. Some were tracked to find where they went, and as a result a new cave and roost were found.

Data from these collaborations will help build an understanding of bat ecology at multiple scales and help develop management plans for mitigating threats to bats, such as White Nose Syndrome.

Want to help learn more about bats? Join us for the 2019 BioBlitz, which focuses on Bats!
August 20-22
Email GRBA_BioBlitz@nps.gov to be added to the mailing list.

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The Midden is the Resource Management newsletter for Great Basin National Park.

A spring/summer and fall/winter issue are printed each year. *The Midden* is also available on the Park's website at www.nps.gov/grba.

We welcome submissions of articles or drawings relating to natural and cultural resource management and research in the park. Please send to:
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Great Basin National Park,
Baker, NV 89311
Or call us at: (775) 234-7331

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What's a midden?

A midden is a fancy name for a pile of trash, often left by pack rats. Pack rats leave middens near their nests, which may be continuously occupied for hundreds, or even thousands, of years. Each layer of trash contains twigs, seeds, animal bones and other material, which is cemented together by urine. Over time, the midden becomes a treasure trove of information for plant ecologists, climate change scientists and others who want to learn about past climatic conditions and vegetation patterns dating back as far as 25,000 years. Great Basin National Park contains numerous middens.

Great Basin National Park

Post-fire Bird Recovery in Strawberry Creek

By Gretchen Baker, Ecologist

What happens to bird populations after a major wildfire? We are starting to see answers in Strawberry Creek watershed, which burned in 2016. Before the fire, in 2005, two breeding bird transects were established in Strawberry Creek watershed, one along the riparian zone from the trailhead down, and one through the mountain shrub community from the trailhead up and into Windy Canyon. The breeding bird transects follow Great Basin Bird Observatory protocols. They consist of ten locations spaced 250 meters apart. A surveyor starts near sunrise and moves along the transect to each point, where she counts birds for ten minutes. The surveys are conducted in June. Before the fire, six riparian and seven mountain shrub surveys were completed. Since the fire, two post-fire surveys along each of the transects have been completed, following the same protocols.

Preliminary data analysis shows dramatic changes in the bird populations, especially in the riparian zone. Bird species showing an increase in numbers after the fire include Broad-tailed hummingbirds (likely due to the amazing flowers this year), Cassin's Finches, Chipping Sparrows, Dark-eyed Juncos, Hairy Woodpeckers, Lazuli Buntings, and Western Wood-Pewees. Spotted Towhees have not been spotted after the fire, and Warbling Vireos (a species that likes aspens a lot) are present in much lower numbers.

Cassin's Finches are one of the bird species that have increased after the Strawberry Creek fire.

Only half the mountain shrub transect burned, but there are still differences pre- and post-fire. With many of the shrubs burned and grasses replacing them, Brewer's Sparrow and Green-tailed Towhee numbers are down. These two species make up the biggest overall numbers, so their decrease is especially notable.

Additional breeding bird surveys and data analysis will continue. Experienced birders are invited to participate.

Upcoming Events:

December 18, 2018 Snake Valley Christmas Bird Count at and near Great Basin National Park. Enjoy a day counting winter birds in a variety of habitats. All experience levels welcome. Contact Gretchen_Baker@nps.gov for more info.

December 20, 2018 Ely Christmas Bird Count. Seek out birds in various habitats. Contact nherms@blm.gov for more info.

January 25-27 and March 5-7, 2019 Lehman Caves Lint Camps Help remove human impacts from the cave. Limited number of spots. To be added to mailing list, email GRBA_Lint_Camp@nps.gov.

August 20-22, 2019 Bat BioBlitz at Great Basin National Park. See the amazing nocturnal flying mammals that call the park home. Learn about their natural history plus how to set up nets, record data, and more. To be added to mailing list, email GRBA_BioBlitz@nps.gov.