Park News

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

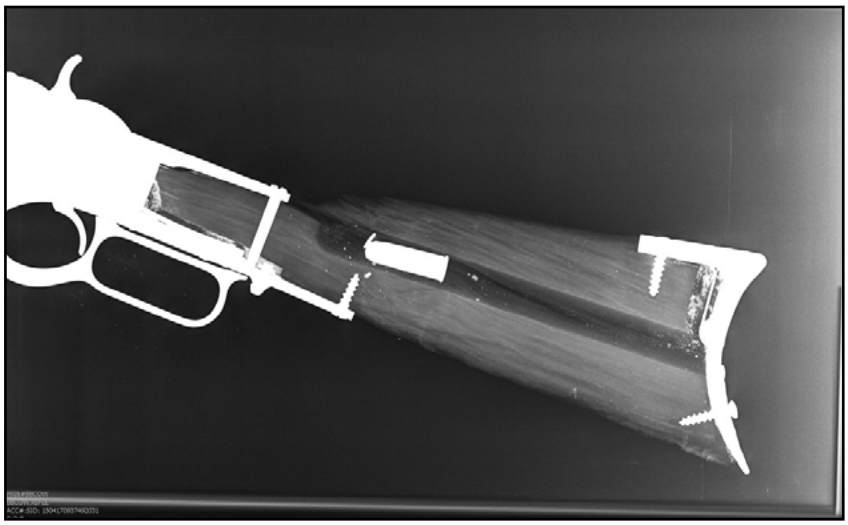
The Midden

The Resource Management Newsletter of Great Basin National Park

Winchester Model 1873 Rifle Found and Preserved

By Eva Jensen, Cultural Resource Program Manager

In November 2014, park archaeologists found a Winchester Model 1873 repeating rifle while conducting a routine archaeological survey for a habitat restoration project. The artifact was collected for research and preservation. Our goals were to keep the rifle in the condition we found it, essentially in a state of 'arrested decay.'



X-ray of Winchester Model 1873 Rifle from Westpark Hospital Radiology, Cody Wyoming, showing a cartridge in the cleaning rod compartment.

This was a standard Model 1873 rifle, which has a 24-inch octagonal barrel in .44-40 caliber with a magazine that held up to 12 cartridges. Winchester Company historic records at the Buffalo Bill Center of the West Firearms Museum in Cody, Wyoming identified the serial number for this rifle with a manufacture and shipping date in 1882. There was no record of who purchased the gun or where it was shipped when it left the Winchester factory warehouse in New Haven, Connecticut.

Condition and conservation

Although still whole, the condition of the rifle was fragile when it was recovered. The objective was to keep the rifle in an arrested state of decay and not try to restore it to collector condition. The wood stock was highly weathered and cracked. Conservators at the firearms museum in Cody examined and performed minimal stabilization and conservation on the most delicate areas of wood. The metal that was uniformly rusted but not deeply pitted was stable. The repeating lever and other moving metal parts had seized and were not forced to move. The springs in the magazine and trigger area were intact.

Part of the assessment included X-ray imaging of the rifle to confirm it was not loaded. Westpark Hospital radiology department in Cody made the images and researchers at the museum identified a cartridge in the cleaning rod compartment in the stock of the rifle. Conservators were able to open the trap door of the compartment and remove the cartridge.

The manufacture stamp on the cartridge "U.M.C. 44 W.C.F." is from Union Metallic Cartridge company indicating the 44 caliber and firing type as Winchester Center Fire. This was a black powder cartridge, and the stamp dates from 1887 to 1911.

The carrier block and lifter lever had been removed making the rifle a single shot that was not capable of firing multiple shots without reloading. Glen Jensen, Winchester Historian at Browning Arms Museum in Ogden, UT, and Cody Museum researcher Dan Brumley confirmed the removal was intentional. More delicate metal

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Winchester Rifle (continued)

parts, springs, and levers were still intact and functional. Metal tacks or nails in the stock visible on the X-ray were likely from a repair for a crack in the stock. This was a common home repair and heads of the nails or tacks were clipped or fell off.

Background

Winchester Model 1873 rifles hold a prominent place in Western history and lore, accessible and popular as "everyman's" rifle. Sometimes referred to as "the gun that won the West", 720,610 were manufactured between 1873 and 1916 when production ended. In 1882, over 25,000 were made.

Research questions included: when was the rifle abandoned, who owned or left the rifle, and why was it abandoned?

Although not definitive, the condition of the rifle and the cartridge are the best indicators of how long the rifle may have been abandoned. Cody researcher Dan Brumley estimated the time of abandonment as roughly between 1900 and 1930 based on these indicators. Research in local area papers of the era did not reveal any known owner losing or abandoning a gun. Measuring the depth of the debris accumulation around the stock in the ground was not productive as the location was on a steep slope and accumulation is variable with weather and slope wash.

Attempts to identify who owned or left the rifle were not productive. Personal sales records did not exist at that time. No records remain from the Winchester company sale to identify where the rifle was shipped. Old newspaper accounts did not identify any potential owner who might have left the rifle. Media stories and local showings turned up potential leads but none proved to be the specific rifle. While some families had stories of "grandpa leaving his rifle" or "robberies" none were positively identified. NPS law enforcement special agents ran checks for the serial number but no leads were found. A few contacts indicated the early Indian Agents sometimes provided single shot rifles to individuals for hunting. Bureau of Indian Affairs records could not be found confirming this was a practice with the Shoshone, Goshute, or Paiute Tribes of the area. The South Snake Range is a traditional pine nut gathering and travel area for local Tribes, but other ethno-historic evidence to identify a connection between the rifle and this activity is not sufficient.

Numerous theories about why the rifle was abandoned have been considered, but none have proven positive. The previous research questions have direct bearing, and with no positive identification of owner or time frame it is unlikely there is an easy answer to cause. The area was used for hunting before and during jurisdiction of the U.S. Forest Service. There were no bones or remains in the area around the rifle to indicate the demise of a hapless hunter. Other activities in the area including mining and cattle and sheep grazing that span a history of over 150 years. Archaeological sites in the Snake Range show evidence of sheep camps at the turn of the 20th century. No associated artifacts indicate this was a sheep camp. Screening soil around the location of the rifle did not recover any additional artifacts to directly identify the activity. Archival and further research will continue.

The rifle is available to view at the Lehman Caves Visitor Center.

NPS Photo

Eva Jensen clearing debris to recover the rifle November 2014.

Land Mollusks of Great Basin National Park

Photo submitted by the author

***Euconulus* species, a land mollusk found in the park.**

By Mark Ports, Biology Professor (emeritus), Great Basin College, Elko, Nevada

Land snails and slugs are important invertebrate inhabitants of woodland litter and soils, boulder and talus slides, riparian meadows, and vegetation around springs throughout the Great Basin. These land-inhabiting invertebrates play critical roles in these mountain habitats such as decomposing dead plant material for use by bacteria and fungi, recycling important biological nutrients such as calcium and nitrogen, passively transporting fungal spores through litter, and providing an essential source of calcium and protein for bird and mammal predators.

Now in the last season of a three-year survey (2014-2016), the species diversity, habitat preferences, and population densities of land snails and slugs are being surveyed throughout the park. To date a total of 17 species of land snails and one species of slug have been recorded. The smallest land snail in the park is the Small Spot at only 1.5 mm in shell diameter, while the largest of the land snails is the Great Basin Mountainsnail which has a shell range of 20 to 30 mm in diameter. The columnar (elongate coiled) land snails such as the Cross Vertigo and Crestless Column range in height from 2 to 5 mm while the heliciform (round coiled) snails such as the Silky Vallonia and Quick Gloss range from 3.5 to 5.6 mm in diameter.

Land mollusk communities range from one species at 2,000 m in a xeric, pinyon-pine and Utah juniper woodland on Lower Lehman Creek to a maximum of nine species at 2,800 m in a mesic, mixed aspen-conifer woodland on upper Strawberry Creek. Both of these localities are dominated by a bedrock and soil of granitic schist which provides little free calcium for land snails to build their shells. However, it has been shown that land snails in such localities obtain their calcium and nutrients from the decomposing leaf material. At two other sites, limestone/dolomite bedrock provide free limestone. This bedrock, along with a mesic understory of shrubs, allows for a community of eight species found below Grey Cliffs on Baker Creek and on the South Fork of Big Wash. The highest elevations for land snails in the park occur at Stella Lake and a nearby bristlecone pine woodland at approximately 3,200 m.

While the land snail communities described above depend primarily on mesic woodland and shrub habitats, some species tend to be habitat specialists. For example, both species of Mountainsnails and the Montane Snaggletooth depend on limestone boulder and talus fields with a shrub and grass cover. Other species, such as the Meadow Slug, the two species of Amber snails, and the Cross Vertigo, are restricted to wet meadows and springs.

The species diversity and habitat preferences found in the park during this survey are similar to those found in other high elevation mountains throughout the eastern Great Basin such as the Deep Creek Range to the north along the Utah border, the Ruby Mountains to the Northwest in northeastern Nevada, and the Schell Creek Range to the west of the Snake Range.

Photo submitted by the author

A sampling of land mollusks found in Great Basin National Park. To date eighteen species have been found in the park.

Great Basin RattlesnakeStudy

By Bryan Hamilton, Wildlife Biologist

NPS Photo

Figure 1. Great Basin Rattlesnakes are among the most variable of rattlesnakes in pattern and color.

In order to effectively protect and conserve biodiversity, wildlife managers and decision makers require detailed information on species population biology and demography. Although experiencing declines worldwide, snakes receive far less attention for conservation than more charismatic species such as large mammals.

The recent discovery and spread of snake fungal disease in the United States has resulted in declines of both rare and common snake species. Snakes are economically valuable and provide a variety of ecological services, such as control of rodents and rodent-borne diseases (i.e., Lyme disease and hanta virus). Snakes often occupy positions in the center of the food chain and are thus vulnerable to both top-down and bottom-up conditions such as predation and prey availability. As secretive and highly cryptic predators, obtaining robust snake population estimates and demographic survival estimates is hampered by their low detectability.

Great Basin rattlesnakes (*Crotalus lutosus*) are endemic to North America's largest desert, the Great Basin. As gape-limited ambush predators, Great Basin rattlesnakes feed primarily on small mammals, lizards, and the occasional bird. Great Basin rattlesnakes hibernate communally in ancestral winter dens and are highly philopatric, with strict fidelity to those sites. Rattlesnakes disperse from their dens to forage, mate, and give birth. Site fidelity is high at communal dens and nearly all individuals return to their hibernaculum in the fall. Like most rattlesnake species, Great Basin rattlesnakes have experienced local declines and extirpations, primarily due to human persecution. We used Capture-Mark-Recapture techniques (CMR) to describe the demographic parameters of *Crotalus lutosus* conducted between 2001 – 2015 in Great Basin National Park.

Snakes were restrained in clear plastic tubes during processing and marked using ventral scale clipping or Passive Integrated Transponder (PIT) tags. Snout to vent length (SVL) and tail length (TL) were measured in a squeeze box to the nearest millimeter. Mass was collected using Pesola spring scales (± 2-5g) or an electronic balance (±0.1g). Sex was determined by probing for the presence of hemipenes. Snakes were released at their exact site of capture and usually retreated into crevices or under rocks.

We captured 401 individuals 799 times (148 females and 253 males). Males were captured in higher numbers than females suggesting a male-biased sex ratio across survey locations ($\chi^2 = 27.5$; $P < 0.0001$). While the male-biased sex ratio held for adult snakes ($\chi^2 = 32.3$; $P < 0.0001$), juvenile sex ratios did not differ from 1:1 ($\chi^2 = 0.3$; $P < 0.588$). The peak capture date occurred on 27 April ± 11.2 days. Mean SVL was 59 ± 13 cm and mean mass was 186 ± 103 g. Males were significantly longer (5.3 cm; $P < 0.0001$) and heavier than females (61.8 g; $P < 0.0001$). Rattlesnake body condition was weakly correlated with the previous year's total precipitation (Body Condition = $0.194(\%_{precip})$ -0.206, df = $F_{1,29} = 7.51$, $P < 0.01040$, $R^2 = 0.295$; Figure 2). Of eleven snakes found dead, we were able to read the PIT tags or ventral clips on six. One snake had died of

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Great Basin Rattlesnakes (continued)

hyperthermia (possibly after disturbance by photographers), three had been decapitated and skinned, one found dead on a road, and one killed at a local residence. We were unable to identify the ventral clips or PIT tags of five mortalities: four decapitated and skinned snakes and a juvenile that died from an apparent rock fall.

Mean detection probability for all sites was 0.28 ± 0.06. Detection probability increased with SVL. Mean annual survival was estimated at 0.76 ± 0.10. Using the survival estimates, average life expectancy across sites was estimated at 3.6 years and median life expectancy at 2.5 years.

Rattlesnakes in many temperate environments are limited by prey availability. This limitation is often correlated with reproduction but can also show in demographic parameters such as survival. We found some evidence that resource limitation mediated by climate affected snake body condition. This relationship was likely a result of the interactions among precipitation, vegetation, and small mammal abundance, which are the primary prey for Great Basin rattlesnakes. Less precipitation reduced primary production and prey availability, which was reflected in the reduced body condition of rattlesnakes. In contrast to the relationship between precipitation and body condition, rattlesnake survival did not track precipitation. Rattlesnakes are ectotherms and can withstand resource limitation and periods of environmental difficulty without starving to death.

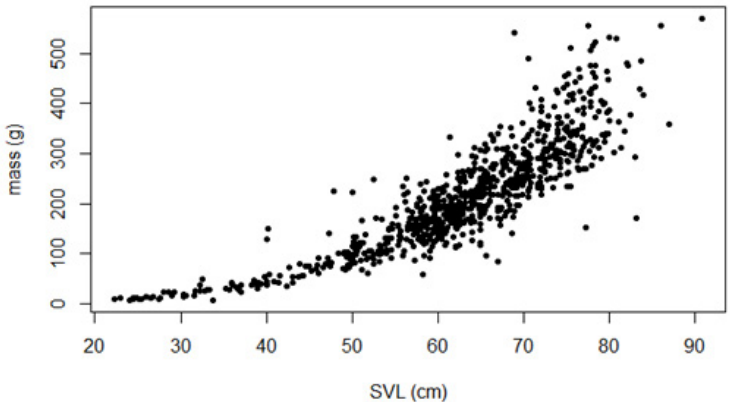

Figure 2. Relationship between snake mass and snout to vent length (SVL) for *Crotalus lutosus* at four sites in eastern Nevada and western Utah. Data consist of 797 measurements of 394 individuals captured between 2001 and 2015.

Empirically, we have data showing that some individuals lived much longer than the average age estimates. Two individuals were captured with 13-year intervals separating their initial and most recent capture dates. A female captured in 2001 was last observed in 2014. She was an adult when initially captured and grew 4 cm over those 13 years. She was found decapitated and skinned in 2014. A male snake, captured initially in 2002 and recaptured in 2015, had grown 20 cm over that interval. Two other individuals were captured with 12 years separating their captures. Another snake's captures were separated by 12 years and she had grown 2 cm. Seven other individuals were captured with at least 10 years intervals, nine with nine years, and five with eight year intervals. These data indicate a skewed age distribution consistent with many wildlife species; mortality is high in neonates and juveniles, then declines with sexual maturity and larger size.

Declining abundance and smaller rattlesnake size could result in the general ecological collapse currently occurring in Great Basin ecosystems due to a simplification of trophic structure. Terry and Rowe (2015) found a dramatic decrease in small mammal diversity and biomass in the Great Basin. Similarly, Jenkins and Peterson (2008) found reduced small mammal abundance and changes in demographic patterns in Great Basin rattlesnakes at grazed or annual grass invaded sites. All told, these changes in vegetation due to conifer encroachment, land use, and annual grasses cascade through food webs. The trophic consequences of vegetation change may translate to reductions in rattlesnake abundance and density over time through reduced reproductive output and recruitment. Only long term data sets such as this can address such questions.

Jenkins, C. L., and C. R. Peterson 2008. A trophic-based approach to the conservation biology of rattlesnakes: Linking landscape disturbance to rattlesnake populations. Pages 265-274 in W. K. Hayes, K. R. Beaman, M. D. Cardwell and S. P. Bush, editors. The Biology of rattlesnakes. Loma Linda University Press.

Terry, R. C., and R. J. Rowe 2015. Energy flow and functional compensation in Great Basin small mammals under natural and anthropogenic environmental change. Proceedings of the National Academy of Sciences 112(31):9656-9661.

Natural Resource Condition Assessments

By Gretchen Baker, Ecologist

The Natural Resource Condition Assessment (NRCA) Program is a nation-wide NPS effort to document important natural resource conditions through a spatially explicit, multi-disciplinary synthesis of existing scientific data and knowledge. In 2012 Great Basin National Park staff sat down with NatureServe scientists, led by Pat Comer and Marion Reid, to determine which natural resource conditions would be evaluated. Information was gathered and then an ecological integrity assessment framework was used to evaluate the conditions. SoundScience and the Pacific West Region also contributed.

Sixteen focal natural resources and ecological stressors were assessed (Table 1). Of these sixteen, seven are considered to be in good condition, seven are of moderate concern, one is of significant concern (bighorn sheep), and not enough data is available to assess one (wild turkeys). The trend is improving for no focal resources, stable for nine, deteriorating for six, and unknown for one. The data available is strong for seven focal resources, weak for five, and barely existent for four.

In addition, two-page briefing statements were written about each of the sixteen areas. These provide a succinct description of what is known, the status of the resource, and discussion. They are found at the very end of the document.

This report will help managers focus on priority areas. To view the whole document, visit https://irma.nps.gov/DataStore/Reference/Profile/2225729

Table 1. Summary of findings from the Great Basin NP natural resource assessment. Condition symbols: green=good condition, yellow=moderate concern, red=significant concern; up arrow=condition improving, sideways arrow=condition unchanging, down arrow=condition deteriorating; heavy circle=high confidence, light circle=medium confidence, dashed circle=low confidence.

Resource or Stressor Name	Overall Condition Status/Trend	Rationale and Uncertainties
Air Quality		The condition of total Nitrogen and total Sulfur deposition is rated moderate and the sensitivity of the park's aquatic ecosystems to acidification effects is of concern. In addition, ozone, haze and mercury deposition are all of moderate concern.
Viewsheds		Vistas from the park into adjacent valleys and across them to other mountain ranges are of moderate concern. Regional haze impedes the long-distance views for which the interior west is known and valued.
Night Skies		Currently night sky condition is among the best found in national parks of the lower 48. Still, there are artificial light domes visible from the park.
Rock Glaciers		Steady decrease in Lehman Glacier causes moderate concern and suggests monitoring for change in remaining rock glaciers to detect effects of climate change.
Fire Regime		Three major concerns are the lack of fire in aspen-dominated systems, encroachment into montane big sagebrush by pinyon and juniper trees, and the potential transition at lower park elevations of montane big sagebrush steppe-upland to a cheatgrass-dominated system.
Aspen-mixed conifer forest		Moderate concern is indicated due to fire regime alteration that has resulted from decades of fire suppression.
Wild Turkeys		Potential for concern for damaging effects of introduced wild turkeys on Park resources. Monitoring needed.
Invasive Annual Grasses		Moderate concern is indicated. Based on a spatial model, risk is high throughout basins surrounding the park, and throughout the lower elevation margin of the park.

Natural Resource Condition Assessments (continued)

Table 1 (continued). Summary of findings from the Great Basin NP natural resource assessment.

Resource or Stressor Name	Overall Condition Status/Trend	Rationale and Uncertainties
Bighorn Sheep		High concern is indicated. The current bighorn sheep herd appears to be stable, but is considered far too small for long-term viability.
Sagebrush Steppe		Moderate concern is indicated. Fire Regime Departure is a consequence of excess of late seral stages, reflecting the lack of fire disturbance. However, this is of less concern than the encroachment of cheatgrass into the low elevation occurrences of the upland subtype.
Water Quality/ Quantity		Park water quality and quantity appear to be in good, stable condition, although potential threats exist from climate change; atmospheric deposition of nitrogen, sulfur, and mercury; and groundwater pumping in the adjacent valleys.
Montane Riparian Woodland		The evidence points to overall good conditions for montane riparian woodlands. There is a lack of recent ground-based, quantitative data on riparian vegetation collected representatively across the park.
Bonneville Cutthroat Trout (BCT)		The park has successfully restored Bonneville cutthroat trout to four creeks. Good water quality, stream flow, stream macroinvertebrate assemblage, and riparian woodland conditions all support BCT viability in the park. Threats include risks of severe fires that could affect their riparian vegetation; intrusions of non-native trout; altered hydrology due to the Snake Creek pipeline and off-Park groundwater pumping; and inconsistent channel habitat quality. Climate change and genetic isolation may also pose threats.
Cave/Karst Processes		The evidence points to overall good conditions, but additional data are needed on the potential impacts of cave visitation by people and use by wildlife.
Springs		All indicators point to overall good conditions for the seeps, springs, and spring complexes in the park. Lack of long-term hydrologic data point to a need for improved long-term monitoring.
Climate Change Effects		Model projections connecting climate change to hydrology indicate a slight decline in annual flow, and suggest shift to earlier snowmelt by up to 30 days, and modest change in snowpack and annual flow by 2060. *Alpine environment faces high likelihood of significant climate exposure.*

Planning grant awarded by the National Science Foundation for a Spring Valley Field Station

The National Science Foundation has awarded the University of Nevada Reno (UNR) a grant to begin strategic planning for a Spring Valley Field Station, which will serve long-term data collection, research projects, and educational activities in the Great Basin. The station will be located on land owned by the Long Now Foundation (http://longnow.org/) and permitted in perpetuity to UNR. A one-week workshop will be held at the end of August near the proposed station to bring together scientists and stakeholders from inside and outside of Nevada to draft a master planning document.

2015 Stream Insects BioBlitz Results

By Riley Nelson, Brigham Young University, Boris Kondratieff, Colorado State University, and Gretchen Baker, Ecologist, GRBA

Great Basin National Park held its seventh annual BioBlitz on May 15-17, 2015. The focus for the BioBlitz was Stream Insects, including the orders that indicate good water quality: Ephemeroptera (Mayflies), Plecoptera (Stoneflies), and Trichoptera (Caddisflies).

Dr. Boris Kondratieff from Colorado State University served as the lead entomologist, with assistance from Dr. Riley Nelson of Brigham Young University. Dave Ruiter, the leading expert on caddisflies in the American West also attended, as well as the Nevada State Entomologist and his crew and eleven park employees. Citizen scientists from several states participated in the event, and in total more than 35 people spent over 500 hours helping find and identify stream insects.

Twenty three first 100 samples were collected by using a kick net in the habitat and moving the raw unsorted mass into white trays for sorting. Participants were trained to place 100 specimens of macroinvertebrates in a vial containing 70% ethanol as a preservative. They were instructed to collect the specimens without regards to size or speed so that the sample would be representative of the ratios of the taxa found in the stream.

In those 23 samples we identified 2366 specimens in 99 different taxa for a mean of 103 specimens per sample. Additional species were found by sampling more broadly and qualitatively, for a total of 107 species (Table 1).

Photo by Riley Nelson

The 2015 Stream Insects BioBlitz collected insects from nearly every stream in the park. Over 2,400 specimens were counted, with 107 species identified.

This information supplements park knowledge about the presence and distribution of stream insects in the park. Overall, the diversity indicate a very healthy stream ecosystem.

Photo by Riley Nelson

An adult stonefly

Table 1. Stream Insect taxa found during the 2015 BioBlitz.

Order	# Taxa
Coleoptera (Beetles)	11
Diptera (Flies)	31
Ephemeroptera (Mayflies)	13
Odonata (Dragonflies And Damselflies)	2
Plecoptera (Stoneflies)	15
Trichoptera (Caddisflies)	26
Acari (Aquatic Mites)	2
Amphipoda (Scuds)	1
Nematoda (Nematodes)	1
Tricladida (Flat Worms)	1
Oligochaeta (Aquatic Worms)	2
Mollusca (Mollusks)	2

The 2016 Centennial Bird BioBlitz was very successful, with over 150 participants, 18 field trips, 11 presentations, 2 bird illustrating workshops, 2 live bird demonstrations, 1 live reptile demonstrations, over 70 bird species found, and lots learned!
More details in the next issue of *The Midden*.

Introducing Sister Park: Toubkal National Park in Morocco

By Ben Roberts, Chief of Natural Resource Management

Great Basin National Park was contacted this January by the Department of Interior International Technical Assistance Program (ITAP), to partner with Toubkal National Park in Morocco as a Sister Park.

ITAP is funding the travel for this sister park arrangement, which includes technical assistance and international travel for both NPS and Toubkal staff. Beyond the agreement and funding for travel this year, there is no long-term commitment of funding or staff time. Ongoing communications beyond the exchanges, however, are encouraged. Toubkal staff need support for management of tourist use, management for and with the local community, infrastructure and facilities management, management of specific programs of conservation and restoration of habitats and key species of the park, and communication and partnership with the various stakeholders involved in the peripheral area of the Park.

Toubkal National Park is located in central-western Morocco.


Mouflon, a subspecies of wild sheep


Village in Toubkal National Park

Toubkal NP is located in the High Atlas mountains in central-western Morocco. Established in 1942, it was the first national park in Morocco. It covers an area of about 93,900 acres and visitation is estimated to be about 40,000 per year. Most visitors come for the hiking, including summiting Jbel Toubkal, the highest peak in North Africa, at 13,671 feet. The park contains rare Barbary sheep, leopards, macaques, and an alpine lake. Morocco has had people since the Paleolithic era and the park has over 5,000 years of documented human history. Something different about Moroccan parks is that there are many villages and agricultural uses allowed in them, due to their long history of use before the parks were created. Water from snowmelt feeds numerous streams used for farming and livestock in the area.

Recent Publications about Great Basin National Park

Baker, G. M. (2015). Quantifying wildlife use of cave entrances using remote camera traps. Journal of Cave and Karst Studies, 77(3), 200. Link

Comer, P. J., D. P. Braun, M. S. Reid, R. S. Unnasch, J. P. Hak, K. A. Schulz, G. Baker, B. Roberts, and J. Rocchio. 2016. Great Basin National Park: Natural resource condition assessment. Natural Resource Report NPS/GRBA/NRR—2016/1105. National Park Service, Fort Collins, Colorado. 540 p. Link

Prudic, D. E., Sweetkind, D. S., Jackson, T. L., Dotson, K. E., Plume, R. W., Hatch, C. E., & Halford, K. J. 2015. Evaluating connection of aquifers to springs and streams, Great Basin National Park and vicinity, Nevada. US Geological Survey. Professional Paper 1819, 188 p. Link

National Park Service
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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. They can be sent 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

Quantifying Wildlife at Cave Entrances

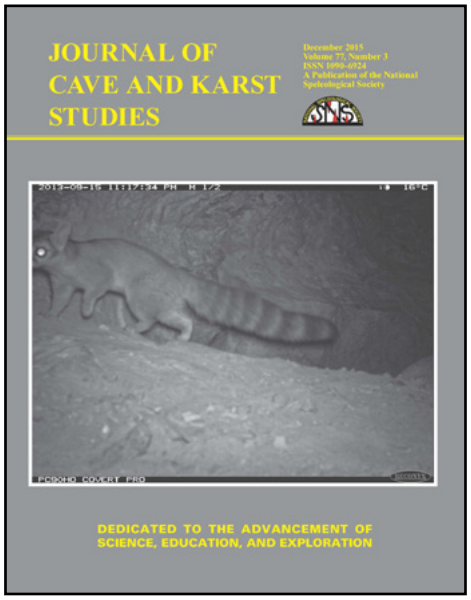
By Gretchen Baker, Ecologist

What animals use cave entrances in Great Basin National Park? Remote cameras were deployed to answer that question during the summer of 2013. The cameras took photos when movement triggered them and were active 24 hours a day. Data from eight caves was analyzed. Cameras were deployed for a total of 372 trap days, with an average of 46.5 days per cave (range 28-62).

The cameras captured 632 trap events, with separate events defined as more than an hour apart for the same species. Of the seventeen taxa documented, the most abundant species photographed were mice, chipmunks, humans, woodrats, and squirrels. Other species observed in cave entrances included cottontail rabbits, bats, skunks, foxes, insects, birds, and domestic dogs.

Wildlife entered and exited caves most frequently between 1800 and 0600. The most common nocturnal animals were bats, mice, skunks, and ringtails. Animals most active during the day were chipmunks, humans, birds, and squirrels.

Species accumulation curves were increasing for most of the caves even after fifty days of deployment,



The Journal of Cave and Karst Studies cover featured a ringtail cat caught on camera in one of the park caves.

indicating that it can take a long time to capture all the animal species that use a cave entrance.

Very little information has previously been documented about fauna using cave entrances. This non-invasive, repeatable technique can help managers learn more about the dominant and secretive species using the entrance and twilight areas of caves. This method also documents peak use times.

You can read more about what wildlife uses cave entrances in the entire article, found in the Journal of Cave and Karst Studies, Volume 77, number 3.

Upcoming Events:

Throughout year, Winchester Rifle Exhibit See the Winchester rifle that was found leaning against a tree and add your idea to the stories of how it was left there; check at visitor center for more information or call 775-234-7331.

July 19, August 18, September 16, Full Moon Hikes Experience the park at night without flashlights. Call for more information.

July 16-23, National Speleological Society Convention, Ely Learn about caves in and near the park and also throughout the world.

August 25, National Park Service Centennial Celebration Help celebrate the 100th birthday of the NPS! Special events will be held, call for more information.

September 29-October 1, Astronomy Festival Discover the celestial wonders in the dark skies above the park.