Resource Management

Wind Cave National Park
National Park Service

Resource Ramblings

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Wind Cave National Park Resource Management News

This issue edited by Beth Burkhart, Botanist

Caption: *Views of Wind Cave Canyon vegetation past and present – clockwise from upper left: 1) Wind Cave hotel and house in Wind Cave Canyon 1880-1890s; 2) Wind Cave Canyon in 2011 behind Visitor Center; 3) Wind Cave entry building in 1890; 4) sidewalk in Wind Cave Canyon between natural entrance and Visitor Center in 2011.*
Wind Cave NP begins a pilot project in 2011 to restore native vegetation in Wind Cave Canyon (see article p. 2).
Historical photos from WICA Digital Library; all other photos by WICA staff unless noted.

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First Steps in Wind Cave Canyon Restoration

by Beth Burkhart, WICA botanist

Wind Cave Canyon is a very important area of Wind Cave NP where natural resources, cultural resources, park maintenance, and visitor use/protection all intersect. The Black Hills Community Inventory Report (Marriott et al. 1999) rated Wind Cave National Park as exemplary for large amounts of high quality habitat with natural processes in place. Woody draws in the prairie are one area of high plant species biodiversity. However, management successful in sustaining them is elusive due to balances needed between natural processes such as fire and drought, as well as factors including intensity of herbivory and habitat use by wildlife.

Human uses also complicate the situation! The WICA Cultural Landscape Report (May 2005) highlights Wind Cave Canyon as the focal point for several prehistoric and historic eras of the park (from native American origin site to Civilian Conservation Corps structures to cultural landscape). Present day visitor use (i.e. more than 1,000 visitors a day on busy July days) and visitor protection services are also concentrated in the developed area of Wind Cave Canyon.

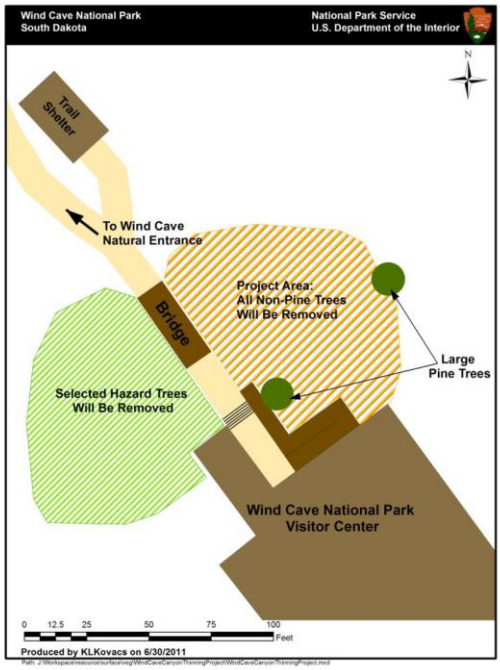
Figure 1. Overview of pilot project location where Rocky Mountain juniper trees will be removed.

At Wind Cave NP, Wind Cave Canyon is the primary part of the park that visitors experience on foot (rather than by car). It is increasingly difficult to provide park visitors an opportunity to understand and experience a natural prairie/woody draw ecosystem in Wind Cave Canyon because roughly half its vegetation is composed of non-native, invasive plant species. This is an ecosystem-based problem resulting from fire suppression and ongoing human-made disturbances where invasive species find ideal habitat. Because of this, treatment focused solely on invasive species removal is not successful and constitutes cosmetic, expensive, and unsuccessful treatment of a systemic problem. Integrated Pest Management activities to date have only been implemented on a small scale due to: 1) the lack of a process to determine a clear desired condition for Wind Cave Canyon, and 2) the lack of a comprehensive plan based on that vision which fully investigates invasive species management in the context of a larger restoration effort to restore natural processes.

The WICA Cultural Landscape Report (May 2005) highlights the need for action in Wind Cave Canyon to restore natural process and vegetation. Treatment recommendations in the WICA Cultural Landscape Report 2005 for the Headquarters Area includes: "Rehabilitate riparian plant communities along the drainageways in Wind Cave Canyon in the Headquarters Area to approximate their healthy pre-development character and condition ... The current condition of these areas of vegetation is a result of changes in hydrology owing to landform changes from construction of roads and buildings; introduction of ornamental plantings; and long term management practices spanning decades. Pre-development historic period photographs show fewer dense clusters of trees, shrubs, and other riparian plants than are evident today. Though native plants were installed during the CCC and Mission 66 periods, these plants in addition to invasive species, have changed over time resulting in new vegetation conditions that lack historic integrity."

As a first step in restoration, WICA-Resource Management staff has developed a pilot project to begin investigating the effects of tree thinning. The Wind Cave Canyon Restoration pilot project involves cutting down Rocky Mountain juniper trees (*Juniperus scopulorum*) from an area approximately 20m by 30m - from the wooden bridge directly north of the Visitor Center to the northeastern corner of the Visitor Center in Wind Cave Canyon (Figure 1 and Map 1). Any non-native buckthorn (*Rhamnus cathartica*) will also be cut. Native shrubs [such as chokecherry (*Prunus virginiana*) and wild rose (*Rosa arkansana*)] are desirable but are numerous enough that some individuals may also be removed to reduce canopy cover. Trees and shrubs will be cut by chainsaw as close to the ground as possible so stumps are not easily visible. Cut biomass will be removed from the area. It

may be cut into chunks and removed or ground into chips and removed.



Map 1. Location of Wind Cave Canyon Restoration pilot project area north of Visitor Center.

After the trees and shrubs are removed, WICA botanist and vegetation crew will continue mechanical treatments to stress existing non-native plants and reduce their seed production. Lastly, WICA botanist will follow up the project with handwork to leave the site in as natural aesthetic condition as possible following the disturbance.

Wind Cave Canyon pilot restoration project will be implemented when cultural resource and NEPA compliances have been completed – late summer or early fall 2011. WICA-Resource Management also submitted a Technical Assistance Request to NPS Biological Resource Management Division in Ft. Collins, Colorado to consult with a Restoration Ecologist. Greg Eckert will make a visit to WICA this year to review Wind Cave Canyon conditions and possible restoration tools with WICA staff. The expectation is that we will learn from our pilot project and consultations so we can develop a more comprehensive restoration project to implement in the coming years that will benefit a much larger area of Wind Cave Canyon.

Horehound in Wind Cave NP - Still

by Beth Burkhart, WICA botanist

Resource Ramblings Winter 2009 (Vol 7, Number 1) included an article on white horehound (*Marrubium vulgare*) and its presence in Wind Cave National Park. It's time for an update!

As a brief review, white horehound is a non-native, perennial member of the mint family that increased dramatically at Wind Cave NP during the years 2004-2007. Large occurrences are found on prairie dog towns and likely became established due to the combined effects of drought, intense wildlife grazing, and ground disturbance that is characteristic of prairie dog activities. Horehound has a very bitter taste so grazing animals avoid it. They feed on surrounding plants which reduces palatable species competing with horehound, aiding in horehound persistence and spread. Horehound spread is also accomplished by seeds surrounded by bur-like structures that catch in wildlife fur and people's clothing and can travel short or long distances.

Treatment of horehound is not simple. Mechanical treatment (mowing) invigorates the plant, although mowing has been used in some areas at Wind Cave NP to reduce seed set and may be used in preparation for chemical treatment. Fire has been successfully used to reduce horehound in Australia, but broadcast fire treatment attempted in September 2009 in Wind Cave NP was not successful (horehound would not carry fire) (Figure 1). The use of a Flamer (an array of propane torches) was also tried but deemed impractical after figuring out the costs of application and time required.

Figure 1. Horehound won't carry fire on the West Bison Flats burn in 2009.

Horehound in Wind Cave NP was mapped at approximately 650 acres in 2010. Since development of a Horehound Action Plan in 2010, including parallel development of Pesticide Application Zones for

Sensitive Areas in Wind Cave NP (special consideration for land above cave, karst, and near riparian areas), activities have been underway to learn more about chemical treatment for horehound.

Limited areas were selectively treated in 2010 by WICA veg crew using backpack sprayers (Figure 2).

Figure 2. Horehound area treated with Escort herbicide at Pringle Cut-off prairie dog town – success at killing horehound and little horehound germination but what vegetation will move onto the bare ground?

Escort herbicide (forb-focused herbicide) and Roundup (general herbicide with greatest ability to bind to soil and therefore least leaching potential belowground) were applied in different areas. Results observed in 2011 are that chemical treatments were effective in killing horehound – however, not much surviving plant life is observed in some treated areas. Given time, seed rain and rhizomatous growth from plants in surrounding areas will repopulate the treated areas – nature doesn't like bare ground or a vacuum! The desire is that native plants will reestablish (rather than non-natives), but time will tell.

In 2011, we are planning to put more stress on horehound and continue learning about effective treatments for Wind Cave NP. At the park's request, the Northern Great Plains Exotic Plant Management Team will be visiting Wind Cave NP from Aug 15-19. With their extra person-power and equipment, we will treat a larger area of horehound infestations in Sanctuary, Research Reserve, and Southeast prairie dog towns. The NGP EPMT also developed a contract for Wind Cave NP for truck-mounted treatment of herbicide on horehound on the most extensive infestation of horehound in the park on East Bison Flats. NGP EPMT staff and Wind Cave NP Resource Management staff will closely monitor the contract (i.e. ride in the truck with the contractor) to ensure proper implementation when it occurs in early September.

Monitoring results of 2011 treatments in 2012 will lead to more insights on effective treatment of horehound at Wind Cave NP. Wind Cave competed for and received extra funding ($20,000) for horehound treatment in 2012 that will cover additional seasonal personnel, equipment, and herbicides to continue the effort started in 2011.

Horehound expanded in Wind Cave NP over a period of time (ca 5 years) so while immediate reduction might be hoped for, it really isn't possible to achieve and may not even be the best approach. Ecological communities of plants, animals, soil, water, etc. are impacted by changes in any component. Quickly removing or altering large pieces of the whole can cause unexpected results. It may be difficult to be patient as Wind Cave NP vegetation management crews works to reduce horehound and support reestablishment of native species over a multi-year period, but we are hoping that the end result will be more successful in meeting long-term ecosystem management goals as well as reducing horehound.

Where are All the Prairie Dogs?

by Barbara Muenchau, WICA BioTech (Wildlife)

Figure 1. Prairie dogs in Wind Cave NP.

Visitors and employees have noticed and commented that there are areas in Wind Cave National Park that used to have numerous prairie dogs that are now completely covered in vegetation with very few, if any, prairie dogs. So what is going on? Well, I believe for the most part we are seeing the result of natural processes.

Prairie dogs do not like to be in tall vegetation and are known to clip the vegetation to allow maximum viewing for possible predators. Clipping vegetation expends a lot of energy so prairie dogs will first move into preferred areas that have shorter vegetation, such as areas already "clipped" by foraging bison or other ungulates, or into areas that have less vegetation due to low precipitation. During 2002-2007, the Park experienced five years of below average precipitation (using the Water Forage Year, measured from October-September) resulting in shorter and less vegetation. This allowed prairie dogs to expand more easily and also to keep a better eye out for diurnal (daytime) predators.

Since 2007, the Park has received above average precipitation resulting in an increase in the amount and height of vegetation. Prairie dogs have not been able to keep up with this increase in vegetation resulting in a contraction and fragmentation of many prairie dog colonies. I am also seeing movement into areas that have been grazed by bison, further fragmenting colonies. This contraction and fragmentation with surrounding tall vegetation also decreases the ability of prairie dogs to see predators. Diurnal predators may have a bigger impact on the prairie dog populations during these wet years.

Another factor that may be coming into play with the decrease in prairie dog colony size is the cumulative impacts from the reintroduction of black-footed ferrets. It seems logical to me that if a ferret eats one prairie dog approximately every three days (~ 120 per year), and the Park has a minimum of 50 ferrets (as of Dec. 2010), that equals ~ 6,000 prairie dogs. Wow! If you consider Bison Flats colony alone (~ 850-900 acres/~ 15 prairie dogs/ac) with a minimum of 23 ferrets (as of fall 2010), that would mean 2,760 prairie dogs consumed. This would lead to approximately a 20% decrease in prairie dog numbers in a colony of that size.

Horehound is an additional factor that has most likely caused a decrease in prairie dog colony acreage. Horehound is a non-native member of the mint family that is unpalatable and difficult for the prairie dogs to keep clipped. Prairie dogs have completely moved out of unclipped horehound areas. Horehound has contributed to the fragmentation of the colonies as well as decreased the ability of prairie dogs to see predators resulting in a possible increase in predation.

The last factor I will touch on is the possibility we are seeing decreased prairie dog acres/numbers due to underlying plague. While researchers have found DNA of the plague bacteria in some fleas collected within the Park, we have never observed an active plague epizootic. I am more hesitant to say plague is a factor due to the following. We still have prairie dog activity in all colonies within the Park. There are a few colonies that actually have increased in acreage over the past years due to high ungulate activity. Bison Flats is one of the colonies where we have noticed a decrease in size and activity; but this is the colony that has been dusted to kill fleas during the past three years. Yes, we did not dust the "salamander refuge" area (~ 75-100 acres), but even in that area we are seeing active prairie dogs. Of course, this could change in the blink of an eye if plague were to become active.
It has been interesting to observe the changes that have taken place in the Park's prairie dog colonies over the past 14 growing seasons. I am grateful to work for an agency that tries to allow natural processes as much as possible in a small, enclosed park.

Mobile Technology for the Field Scientist

by Kevin Kovacs, WICA BioTech (Plants)

What do you carry in the field with you? Do you carry a notebook, a camera, field guides, a GPS unit and any number of other things that are necessary for field work? Do you feel torn between getting work done in the field and managing what's going on with field data in the office? Let's take a look at some technology that has come of age that can help with this split personality common in field scientists.
The computer used to be an anchor chaining scientists to their desk for data entry, analysis and reference. It was too large and power hungry to be at all useful outside of the office, but too powerful of a tool to be omitted entirely. But in the last few years, there have been a huge number of devices released that are giving desktop computers a run for their money. A prime example is the Apple iPad, a $500-700 dollar device that can handle spreadsheets, word processors, advanced photo and video editing, email, GPS and much more.

What sorts of things could a scientist accomplish in the field with such a device? Here are a few scenarios that will just scratch the surface of what is possible. Imagine having a whole bookshelf of reference

materials at your fingertips while trodding along in the field. Also try and imagine that the bookshelf only weighs two lbs. Many mobile devices today are capable of displaying many different formats like PDFs, word documents, eBooks and can even play back audio and video recordings. Some references may need to be user-created like a group of photos to help identify noxious weeds threatening a park. Other references like books are already offered for sale. With all needed reference materials on one small device, accessing them in quick succession would be rather seamless. While in the field, one could identify a plant using a PDF version of T. Van Bruggen's Vascular Plants of South Dakota and then use Peterson's iPhone/iPod app iBirds to reference photos, descriptions and audio recordings of a nearby bird (Figure 1). It is conceivable that the amount of reference materials available in the field would be limited only by the amount of storage space on the mobile device.

Figure 1. Screen captures of iBirds app.

Information management can consume huge amounts of time for complex notes and datasets. There's recording the data/notes in the field, transferring them to a spreadsheet, database or report back in the office, verifying their integrity and conducting analysis. What if part of this process could be eliminated altogether? Many mobile devices have compatible productivity software (sometimes included in the operating system). Using a word processor or spreadsheet application on a mobile device can often times be indistinguishable from using the full version on a desktop computer today. Complex spreadsheets can be created on the desktop computer and transferred to the mobile device for data collection and then transferred back for analysis once data collection is finished. Similarly, notes can be taken in a word processor and transferred back to the computer to be edited or copied into reports.

Can one device really do everything? Well, probably not, but a single device can do almost everything that needs to be done in the field. We already know that mobile devices can be great for storing reference materials, taking notes and collecting data, so what else do they need to do? Do you need to know where you are in the field (or where you're going)? Many mobile devices have integrated GPS antennas and even if they don't, there is often a way to connect one. Some mobile devices can even use advanced mapping software for spatial data collection. How about a camera? Do you need to take a picture of that flower/bird/really-cool-rock? Do you want the GPS location imprinted the picture? Many devices have built in cameras that will take very good photos and will also make use of the integrated/attached GPS to record location information. There is a never ending array of peripherals that can be attached to many mobile devices to augment almost any type of field work. Just think of attaching a barcode scanner, an RFID tag reader, or a Geiger counter (??). These technologies just scratch the surface of what is possible. So, the next time you say to yourself "There's got to be a better way", think of how some these technologies might be able to help.

Black Hills Area NPS Herbaria – Working Toward Online Access

by Beth Burkhart, WICA Botanist

A project covered by task agreement with Cooperative Ecosystems Studies Unit partner University of Wyoming is underway that will increase park and public access to herbarium specimens managed by the National Park Service by creating a virtual herbarium of northern Great Plains area NPS specimens – starting with herbarium specimens housed at Mt. Rushmore NM (Mt. Rushmore NM, Jewel Cave NM, and Devils Tower NM specimens) and Wind Cave NP (Wind Cave NP specimens). The professional standard for herbaria is to provide web-based access to specimen data and images. Most herbaria are just now developing this capability and few NPS units provide such access. Herbaria are collaborating to provide unified access to data about their collections on regional online interfaces such as:

1. SEINet (Southwestern Environmental Information Network) for the desert southwest at http://swbiodiversity.org/seinet/index.php

2. Pacific Northwest Portal at http://www.pnwherbaria.org/portal/search.php

3. Rocky Mountain Herbarium at http://www.rmh.uwyo.edu/data.php

4. From the University of Wyoming Libraries - Digital Herbaria: Grand Teton National Park at http://www.rmh.uwyo.edu/digitalherbaria/search.php (Figure 1.)

Figure 1. *Athyrium felix-femina* (ladyfern) specimen from Grand Teton NP herbarium available for viewing online; specimens are searchable using any of the label data (family, genus, species, location, catalog number, collector, elevation, etc.).

A common goal of Black Hills area NPS units and the University of Wyoming (Rocky Mountain Herbarium and University of Wyoming Libraries) is to make scientifically collected and documented NPS plant specimens available to public users from botanical researchers to amateur native plant enthusiasts in an accessible, non-destructive manner. Phase I of this project includes high-resolution imaging of plant specimens in the co-located herbaria at Mt Rushmore NM and the herbarium at Wind Cave NP. The total number of plant specimens imaged is approximately 3,500. The images will be processed at the Digital Collections Lab, University of Wyoming Libraries and served through their Digital Research Collections website and that of the Rocky Mountain Herbarium. A set of images will also be provided to the National Park Service.

Phase II of this project will include high-resolution imaging of plant specimens at herbaria at 9 remaining NPS units in the Northern Great Plains I&M Network in future years as funding is available (Agate Fossil Beds NM, Badlands NP, Fort Laramie NHS, Fort Union Trading Post NHS, Knife River Indian Villages, Missouri National Recreation River, Niobrara National Scenic River, Scotts Bluff NM, Theodore Roosevelt NP).

University of Wyoming Science Librarian Larry Schmidt and an intern traveled to MORU and WICA herbarium sites in mid July 2011, set up University of Wyoming imaging equipment, and worked with NPS personnel to create an imaging workflow. Specimen images were taken on location at the two parks and simultaneously saved on camera flash drive, computer hard drive, and on portable hard drives. An image of each specimen was captured in raw image format and saved as a RAW image file (camera specific) and as a TIFF file created from the original camera software at its highest resolution. The raw images were transported back to the University of Wyoming for processing.

An outline of project steps/products:

1. Determine relevant data fields for NPS units and the UW Libraries – Digital Herbaria.
2. Create spreadsheet to hold required metadata.
3. Image collection process on site.
4. Create TIFF files and associated metadata.
5. Attach unique specimen identifiers to the TIFFs.
6. UW Libraries photography team will process the images, attaching the metadata to the TIFF and JPEG images (blurring the locality on the label for sensitive species locations, if requested by NPS units).
7. UW Libraries will utilize its Digital Resources Librarian and the Digital Collections Lab as the quality control consultant experienced in evaluating images and metadata like those produced by this project. Based on previous experience, UW Libraries anticipates an error rate of approximately +/- 0.1%.
8. UW Libraries will post data and images of the NPS unit herbaria through the UW Libraries Herbarium website at http://www.rmh.uwyo.edu/digitalherbaria/search.php

9. When images and data have been posted, RAW files and TIFFs will be provided to the NPS units and NPS Park Museum Management Program through the NPS Technical Expert Beth Burkhart.

We are scheduled to receive progress reports in December 2011 and December 2012, with project completion date by July 31, 2013. Watch for updates on the project in future Resource Ramblings!

Many people contributed to getting this project off the ground. Special thanks to Dr. Ron Hartman Curator at Rocky Mountain Herbarium/UWy, Larry Schmidt UWy Libraries, Bruce Weisman MORU Curator, Tom Farrell WICA Curator, Kara Paintner NGP I&M Coordinator, NPS and Rocky Mountains CESU staff, Beth Burkhart WICA Botanist, Zane Martin MORU Museum Technician, and Randy Weiss WICA Museum Technician.

The Wind Cave Survey Project During 2010

by Rod Horrocks, WICA Physical Science Specialist, and MaryBeth Wells, WICA BioTech (Physical Science)

The Wind Cave survey project continued to document portions of Wind Cave during 2010, with trips scattered throughout the cave system. During the year, 2.05 miles were surveyed and inventoried during 37 survey trips. The new survey footage increased the official length of Wind Cave from 133.34 to 135.39 miles. The average survey length per trip was 295 feet, up 40 feet from the previous year's average of 252 feet. As of the end of 2010, the Wind Cave survey had maintained its placement as the fourth longest cave survey in the world. In addition to the survey trips, there were 22 work trips which include 11 resurvey trips, where 2,380 feet, or 0.45 miles of old problem surveys were resurveyed.

We continue to write a synopsis of each off-trail trip into Wind Cave (published in the Wind Cave Happenings), which is posted on the park's web site. Those reports and a list of all the place names in Wind Cave documented to date on those trips can be found at the following web address:

http://www.nps.gov/wica/historyculture/wind-cave-trip-reports.htm

As is typically the case, the vast majority of the off-trail trips in Wind Cave during 2010 took place in the Historic Section of the cave. There were a total of 70 off-trail trips during the year which include survey, management, and recreation trips. In descending order by number of trips, the off-trail trips were to the following sections of the cave:

Historic Section	38 trips
Club Room Section	15 trips
Lakes Section	8 trips
North Section	4 trips
Southern Comfort Section	3 trips
Half Mile Hall Section	2 trips

There were no trips to the Colorado Grotto, Silent Expressway, and Western Fringe Sections of the cave.

Volunteers continue to play an important role in the effort to better document Wind Cave. During the year, trips led by volunteers surveyed 0.70 miles out of the total 2.5 miles that was surveyed or resurveyed in the cave. A total of 49 different cavers, 44 of them volunteers, participated in 48 survey trips conducted during 2010, including 23 in-state cavers and 26 out-of-state cavers.

Although there weren't any major discoveries in Wind Cave during 2010, there were some interesting trips which included, in chronological order:

Camp Trip:
Carl Bern led his third four-day camp trip to Camp Cosmos in the Southern Comfort Section of Wind Cave. Andrew Blackstock, Evan Blackstock, & Marc Ohms joined Carl between January 29 and February 1, 2010 (Figure 1). After pushing the area past the Gas Chamber fairly hard on the 2009 expedition, they chose to push a breezy area just past the end of the Skinner on this trip. On the way to camp the first day, they stopped and surveyed 287 feet in a couple of leads near the start of the Skinner. Proceeding on to camp, they then spent the next two days pushing leads just past the end of the Skinner, surveying over 500 feet each day. Although they didn't make a big breakout, they completed numerous leads and added a complex of new crawlways underneath the Skinner that they named Flour Box North. In the end, they eliminated more leads than they generated. A total of 1,447 feet was surveyed on this expedition.

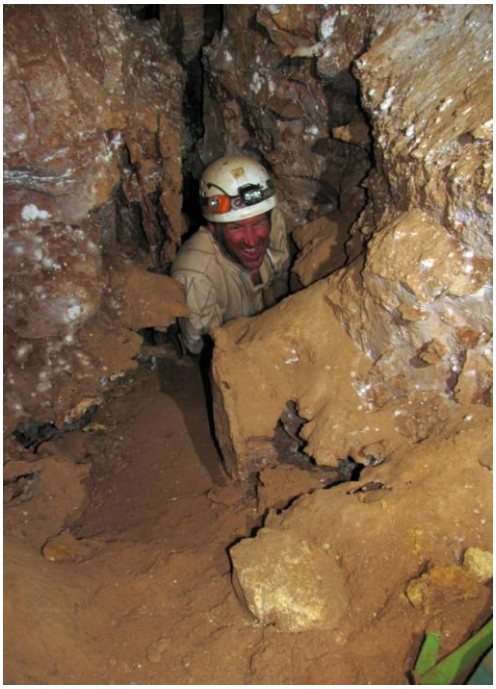


Figure 1. Marc Ohms pushing through the Skinner on the way back to Camp Cosmos after a day of surveying. Photo by Evan Blackstock.

Fudge Alley:
On December 3, 2010, Marc Ohms led a survey trip back to the Phantom Lake area in the Historic Section to survey the fissure passages exposed after the lake had drained out. Kelly Mathis and Maike Norpoth joined Marc in an extremely muddy area that they named Fudge Alley and Wonkey Way. They surveyed 296 feet and left some leads for a future trip.

Busy Times Ahead for Wildlife Management (August – October)

by Dan Roddy, WICA Biologist (Wildlife Management)

Managing or monitoring wildlife is a year-round job - there is always something going on regardless of the month! It could be an elk capture in Jan/Feb, the March/April black-footed ferret surveys, May/June bird surveys, a bison capture in October, or the Christmas Bird Count in December.

The months of August-September-October seem to be one of the busiest times for Barb, Duane and I working with wildlife in the park. First off, we are trying to keep plague from getting established in our prairie dog colonies. We plan to begin "dusting" (to reduce flea load) from ATV's in early August and finish sometime in October. We have already been treating small areas of prairie dog burrows on foot but the larger colonies can only be completed using ATV's. Squeezed in between the dusting effort will be our black-footed ferret surveys in September and October. We try to locate, capture and mark all ferrets in the park (Figure 1). These surveys provide information on how many of the endangered ferrets there are in the park. Once ferret surveys are completed, we go back to dusting.

Figure 1. Black-footed ferret in prairie dog burrow.

Between black-footed ferret surveys and the dusting effort, we also plan to conduct a parkwide pronghorn survey. This will be completed either the week before or the week after the ferret surveys scheduled for September 12-16th. We will be counting pronghorn as well as bison this year if we are not able to get a good count of our bison herd during the bison rut (mid-July thru mid-August).

We will be sending out emails with dates and requests for help over the next few weeks. In the meantime, if you will be around this fall and want to help, stop by and speak with Barb, Duane or Dan. We are always looking for helpers, especially in August, September and October.

Natural Resource Condition Assessment for Wind Cave NP in 2011

by Beth Burkhart, WICA Botanist

As a unit in the National Park system, Wind Cave NP is responsible for the management and conservation of its natural resources. This mandate is supported by the National Park Service Organic Act of 1916, which directs the Park Service to:

"conserve the scenery and natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations".

In 2003, the National Park Service (NPS) Water Resources Division received funding through the Natural Resource Challenge program to systematically assess watershed resource conditions in NPS units, establishing the Watershed Condition Assessment Program. This program, now titled the Natural Resource Condition Assessment (NRCA) Program, aims to provide documentation about the current conditions of important park resources through a spatially explicit, multi-disciplinary synthesis of existing scientific data and knowledge.

In 2009, WICA was funded for a Natural Resource Condition Assessment to be completed through a Cooperative Ecosystem Studies Unit (CESU) task agreement between NPS and Saint Mary's University of Minnesota. The final NRCA is expected to be released at the end of July 2011. Findings from the NRCA, including the report and accompanying map products, will help WICA managers to:

- develop near-term management priorities,
- engage in watershed or landscape scale partnership and education efforts,
- conduct park planning (e.g., Resource Stewardship Strategy),
- report program performance.

For the purpose of this NRCA, NPS staff identified key resources (referred to as components in the project framework and throughout the assessment). The components selected include natural resources and processes that are currently of the greatest concern to park management at WICA. The final project framework contains resource components along with measures, stressors, and reference conditions for each (Figure 1).

The NRCA assessment involved reviewing existing literature and data for each of the components in the framework and analyzing the information/data in order to provide summaries or to create new spatial or statistical representations. After gathering data regarding current condition of component measures, those data were compared to reference conditions, when possible, and a qualitative statement of condition was developed. The discussions in the NRCA represent a comprehensive summary of available information regarding the current condition of these resources. These discussions represent not only the most current published literature, but also unpublished park information and, most importantly, the perspectives of park experts.

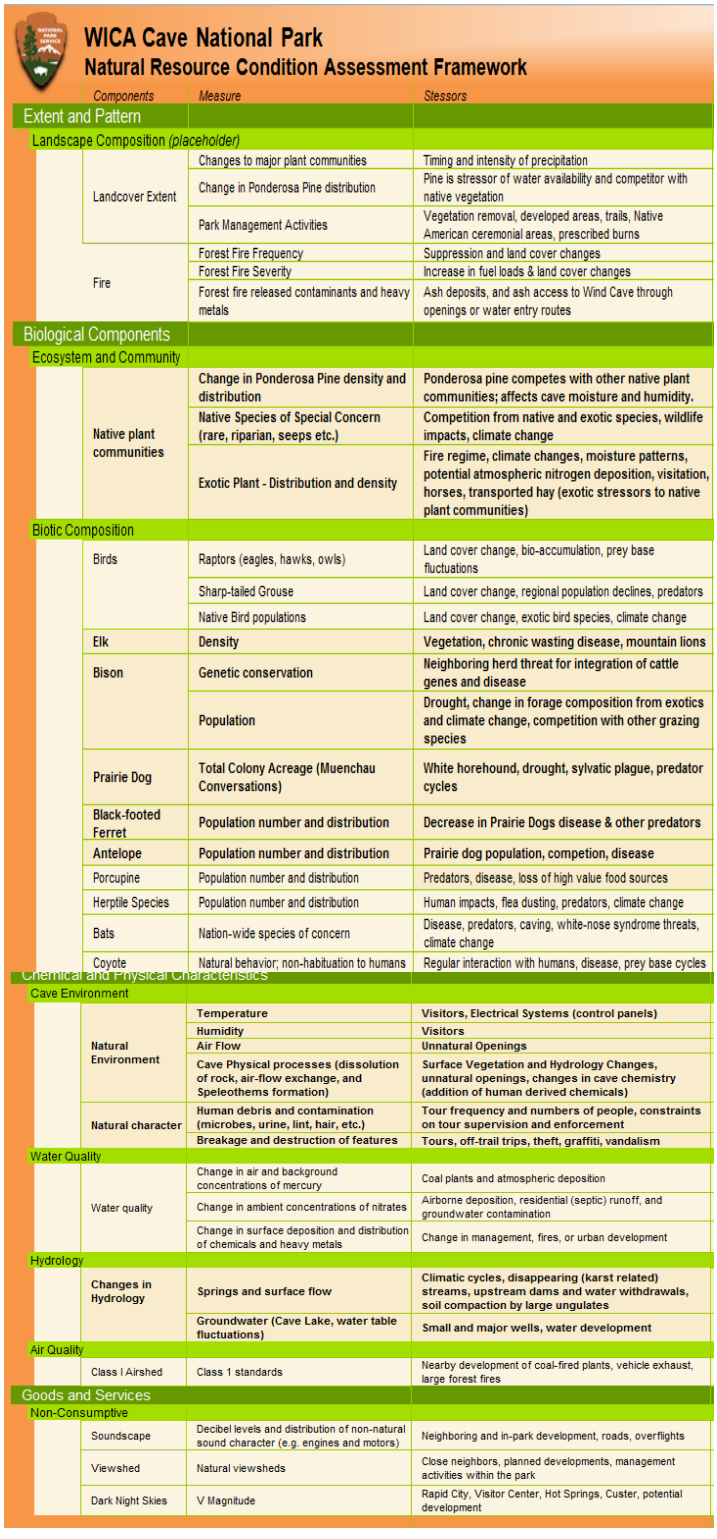
WICA Resource Management staff has been providing data and information, discussing conclusions, and reviewing draft NRCA documents in 2010 and 2011. The final NRCA is expected to be published as a Natural Resource Condition Technical Report near the end of July 2011.

In the final document, we are looking forward to an assessment of park natural resources, as indicated by the measures defined in the project framework. One outcome may be a statement about WICA natural resource condition as a whole based on a sum of these parts. This may or may not be possible, given the strength of data/information supporting conclusions on condition and trend of the many individual resources and measures. However, important data gaps will be determined that the park can work toward filling in coming years.

A park-wide announcement will be made when the final WICA Natural Resource Condition Assessment is available. If you are interested in WICA natural resources, please take some time to peruse the document – to get a good snapshot of current condition and best available scientific view of where WICA natural resources may be going!

If you have questions, contact Beth Burkhart or Greg Schroeder, WICA Chief of Resource Management.

Figure 1. Part of the WICA NRCA Framework (components, measures, and stressors) that was finalized in April 2010.



WICA Cave National Park
Natural Resource Condition Assessment Framework

Components		Measure	Stressors
Extent and Pattern			
Landscape Composition *(placeholder)*			
	Landcover Extent	Changes to major plant communities	Timing and intensity of precipitation
		Change in Ponderosa Pine distribution	Pine is stressor of water availability and competitor with native vegetation
		Park Management Activities	Vegetation removal, developed areas, trails, Native American ceremonial areas, prescribed burns
	Fire	Forest Fire Frequency	Suppression and land cover changes
		Forest Fire Severity	Increase in fuel loads & land cover changes
		Forest fire released contaminants and heavy metals	Ash deposits, and ash access to Wind Cave through openings or water entry routes
Biological Components			
Ecosystem and Community			
	Native plant communities	**Change in Ponderosa Pine density and distribution**	**Ponderosa pine competes with other native plant communities; affects cave moisture and humidity.**
		Native Species of Special Concern (rare, riparian, seeps etc.)	**Competition from native and exotic species, wildlife impacts, climate change**
		Exotic Plant - Distribution and density	**Fire regime, climate changes, moisture patterns, potential atmospheric nitrogen deposition, visitation, horses, transported hay (exotic stressors to native plant communities)**
Biotic Composition			
	Birds	Raptors (eagles, hawks, owls)	Land cover change, bio-accumulation, prey base fluctuations
		Sharp-tailed Grouse	Land cover change, regional population declines, predators
		Native Bird populations	Land cover change, exotic bird species, climate change
	Elk	**Density**	**Vegetation, chronic wasting disease, mountain lions**
	Bison	**Genetic conservation**	**Neighboring herd threat for integration of cattle genes and disease**
		Population	**Drought, change in forage composition from exotics and climate change, competition with other grazing species**
	Prairie Dog	**Total Colony Acreage (Muenchau Conversations)**	**White horehound, drought, sylvatic plague, predator cycles**
	Black-footed Ferret	**Population number and distribution**	**Decrease in Prairie Dogs disease & other predators**
	Antelope	**Population number and distribution**	**Prairie dog population, competion, disease**
	Porcupine	Population number and distribution	Predators, disease, loss of high value food sources
	Herptile Species	Population number and distribution	Human impacts, flea dusting, predators, climate change
	Bats	Nation-wide species of concern	Disease, predators, caving, white-nose syndrome threats, climate change
	Coyote	Natural behavior; non-habituation to humans	Regular interaction with humans, disease, prey base cycles
Chemical and Physical Characteristics			
Cave Environment			
	Natural Environment	**Temperature**	**Visitors, Electrical Systems (control panels)**
		Humidity	**Visitors**
		Air Flow	**Unnatural Openings**
		Cave Physical processes (dissolution of rock, air-flow exchange, and Speleothems formation)	**Surface Vegetation and Hydrology Changes, unnatural openings, changes in cave chemistry (addition of human derived chemicals)**
	Natural character	**Human debris and contamination (microbes, urine, lint, hair, etc.)**	**Tour frequency and numbers of people, constraints on tour supervision and enforcement**
		Breakage and destruction of features	**Tours, off-trail trips, theft, graffiti, vandalism**
Water Quality			
	Water quality	Change in air and background concentrations of mercury	Coal plants and atmospheric deposition
		Change in ambient concentrations of nitrates	Airborne deposition, residential (septic) runoff, and groundwater contamination
		Change in surface deposition and distribution of chemicals and heavy metals	Change in management, fires, or urban development
Hydrology			
	Changes in Hydrology	**Springs and surface flow**	**Climatic cycles, disappearing (karst related) streams, upstream dams and water withdrawals, soil compaction by large ungulates**
		Groundwater (Cave Lake, water table fluctuations)	**Small and major wells, water development**
Air Quality			
	Class I Airshed	Class 1 standards	Nearby development of coal-fired plants, vehicle exhaust, large forest fires
Goods and Services			
Non-Consumptive			
	Soundscape	Decibel levels and distribution of non-natural sound character (e.g. engines and motors)	Neighboring and in-park development, roads, overflights
	Viewshed	Natural viewsheds	Close neighbors, planned developments, management activities within the park
	Dark Night Skies	V Magnitude	Rapid City, Visitor Center, Hot Springs, Custer, potential development