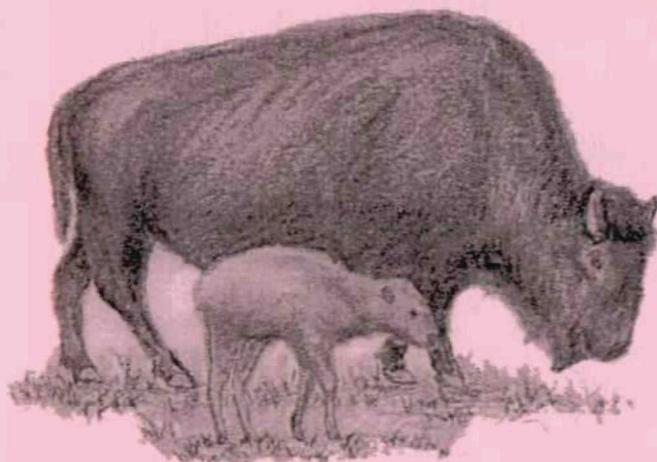


# The Buffalo Chip

Resource Management Newsletter  
Yellowstone National Park  
Late summer 2003



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## WHAT'S UP AT NORRIS NOW?

by Alice Wondrak Biel

By now, many of you probably know that the Back Basin trail at Norris Geyser Basin has been closed to travel due to concerns for the safety of visitors and employees. Rumors have abounded about this closure; we hope that the following information will clear up some questions that people have.

### Just the Facts

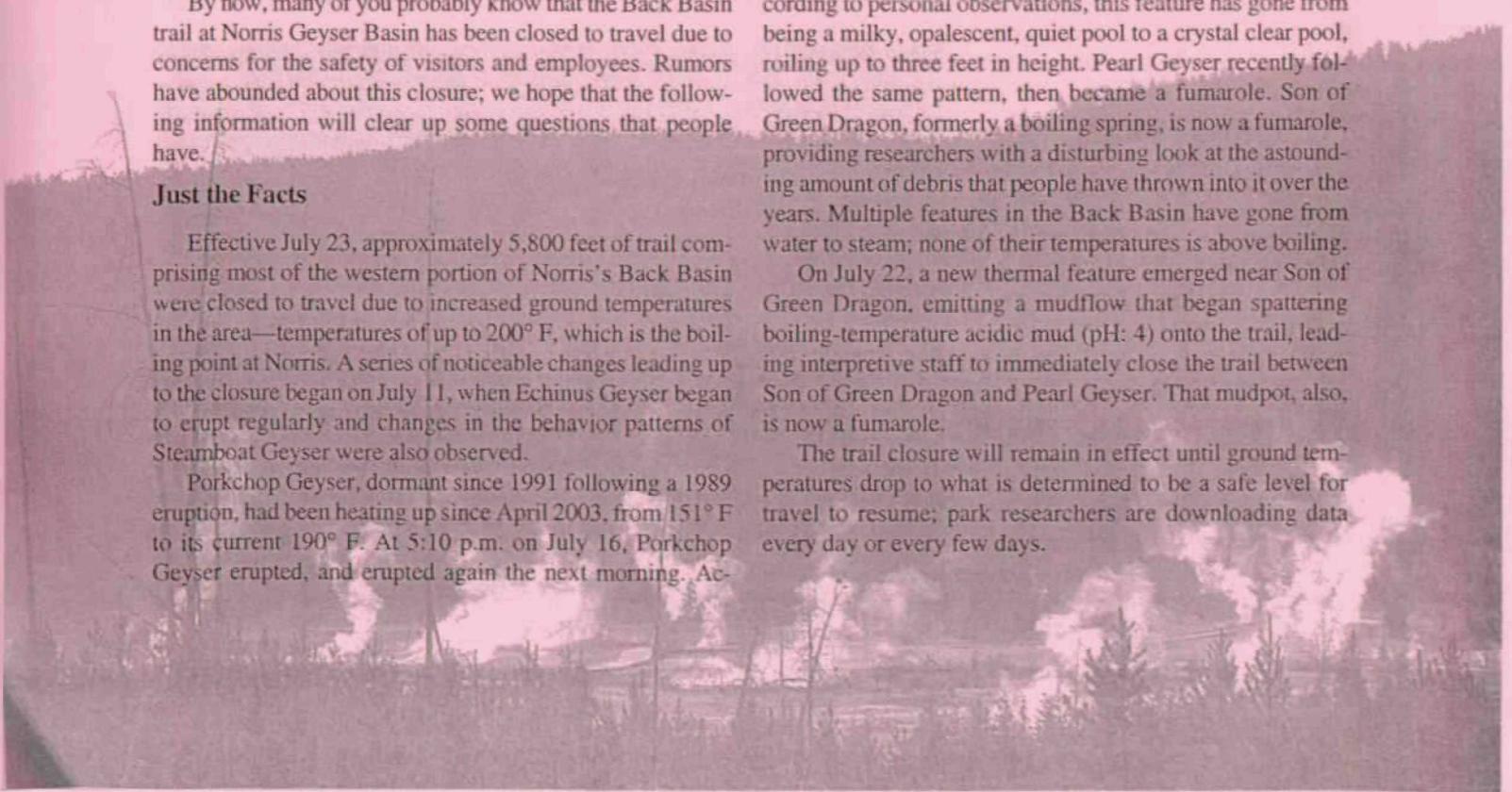
Effective July 23, approximately 5,800 feet of trail comprising most of the western portion of Norris's Back Basin were closed to travel due to increased ground temperatures in the area—temperatures of up to 200° F, which is the boiling point at Norris. A series of noticeable changes leading up to the closure began on July 11, when Echinus Geyser began to erupt regularly and changes in the behavior patterns of Steamboat Geyser were also observed.

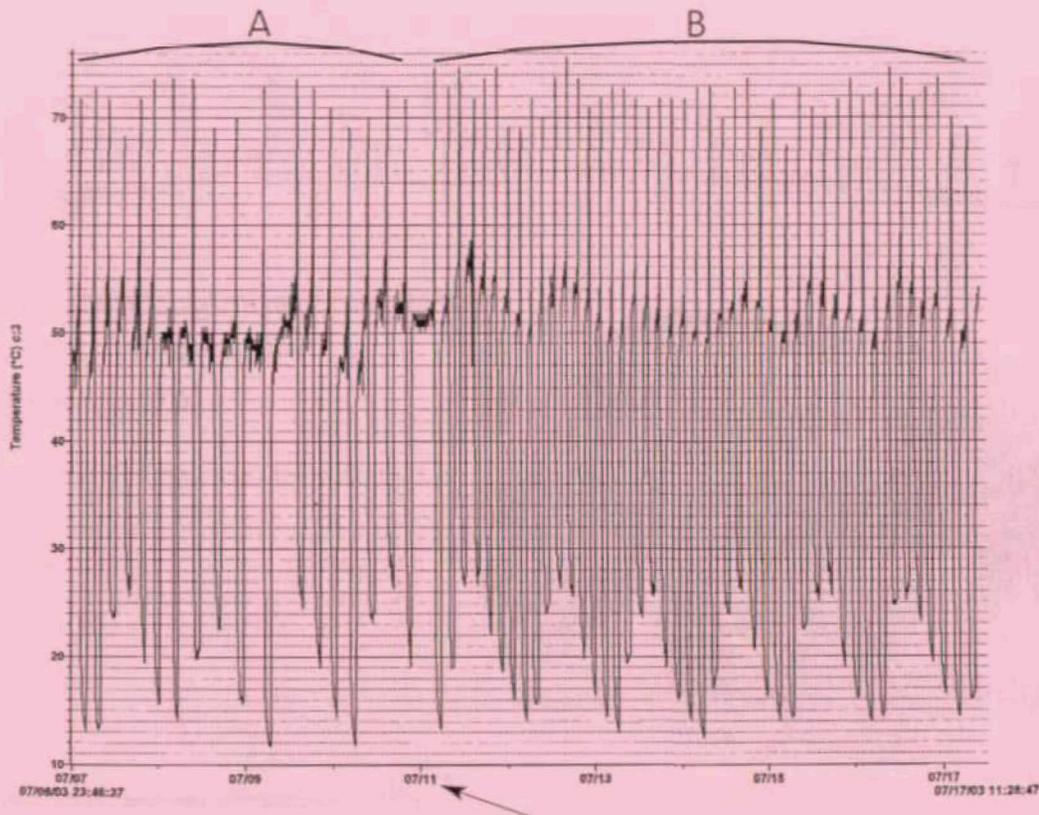
Porkchop Geyser, dormant since 1991 following a 1989 eruption, had been heating up since April 2003, from 151° F to its current 190° F. At 5:10 p.m. on July 16, Porkchop Geyser erupted, and erupted again the next morning. Ac-

ording to personal observations, this feature has gone from being a milky, opalescent, quiet pool to a crystal clear pool, roiling up to three feet in height. Pearl Geyser recently followed the same pattern, then became a fumarole. Son of Green Dragon, formerly a boiling spring, is now a fumarole, providing researchers with a disturbing look at the astounding amount of debris that people have thrown into it over the years. Multiple features in the Back Basin have gone from water to steam; none of their temperatures is above boiling.

On July 22, a new thermal feature emerged near Son of Green Dragon, emitting a mudflow that began spattering boiling-temperature acidic mud (pH: 4) onto the trail, leading interpretive staff to immediately close the trail between Son of Green Dragon and Pearl Geyser. That mudpot, also, is now a fumarole.

The trail closure will remain in effect until ground temperatures drop to what is determined to be a safe level for travel to resume; park researchers are downloading data every day or every few days.





Echinus Geyser went through a period of regular eruptions following July 11. Lines A and B above show eruption intervals prior to and after that date.

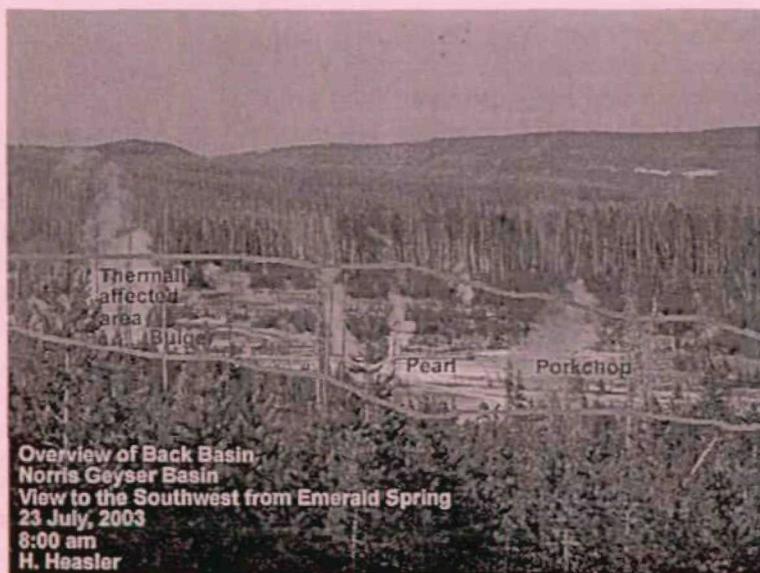
### Observable changes

Much of the Back Basin trail leaves the boardwalk and travels directly on the ground, and visual changes in this portion of the trail were what led researchers to take a more careful look at the area's ground temperatures. Large, dark brown, hollow-sounding, moist spots began to appear on the usually white, dry sinter of the trail. As it was the middle of July, following four weeks without rain, this was determined to be unusual, and it was suspected that the spots might have been the result of steam condensing beneath the trail. Another visual clue was the death of nearby trees and vegetation, accompanied by the sweet smell of vegetation curing as it cooked in areas both adjacent to and away from the boardwalk. The boardwalk itself started to turn charcoal-brown in some areas.

According to park geologist Hank Heasler, walking or standing on those portions of the trail now becomes uncomfortable and unpleasant after just a

few minutes. He recalls that when he and others first began gathering data on the increasing ground temperatures, he observed a family sitting on a bench





situated atop some of the ground later measured at 200° F, complaining about the extraordinary heat of the day. The only one of them to realize (perhaps unconsciously) that the heat wasn't just in the air may have been their son, a boy of about six, who kept raising his feet off the ground and into the air as if to cool them.

Park scientists currently have eight temperature loggers (of the sort described in the early spring 2003 issue of the *Buffalo Chip*) in place on the Back Basin. Four are deployed in about one inch of earth on the trail, to segregate them from the air temperature, which is measured by another logger. When downloading the data from these loggers, staff are required to wear leather boots with wool socks. Synthetic socks are not permitted because of their potential for melting under high temperatures. Gaiters are worn over the boots and pants to prevent the boots from filling up with water in the case of someone's breaking through the crust. Despite the summer heat, staff must wear a full outer layer, including gloves and a jacket, when sampling thermal features. They are also spending time polishing up their NPS badges, which tend to tarnish with prolonged exposure to thermal gases. Data from the ground loggers have been showing a constant 200° F throughout the day.

### Theories abound

So are the changes at Norris just part of the area's typical dynamism, or do they indicate something more unusual afoot? No one really knows. For the park, the most important point is that the area needed to be closed in order to protect visitor safety. Answering questions beyond that is problematic, because although good data sets exist about Norris, there has been no systematic, intense data collection effort there of the sort that would allow scientists to determine whether what's currently happening falls within the parameters of "normal" events at Norris. Thus, no causative mechanism for the increased temperatures has been identified.

Some people have been pointing to what's come to be known as the "annual thermal disturbance" at Norris—a noticeable change in the color and steam discharge of many of Norris's existing geysers and thermal pools occurring each year that may be related to increased emission of deep, hot waters. Many recent observations fit within the parameters of the annual disturbance. Porkchop Geyser's temperature increase, for instance, is not an unusual occurrence during the annual disturbance. On the other hand, the annual disturbance typically occurs in the fall,

and although some scientists have speculated that it may be related to the low water levels that occur then, no one is certain what triggers the annual disturbance. If it were triggered by low water levels, the exceptionally dry summer weather that this area has been experiencing could be an explanation; it might just be happening early, say some.

Other questions include whether the warm-up might be related to the emergence of new thermal features at Nymph Lake, and Steamboat Geyser's increased eruption activity over the past year, or if the earthquake swarm of January 2002 (see the March/April issue of the *Buffalo Chip*) may have altered the geology of the area. On that last point, Bob Smith, of the University of Utah's Yellowstone Volcano Observatory (YVO), relates that seismic activity at Norris has recently been some of the quietest he's seen in 30 years. Norris is not totally devoid of tremors, of course, but quakes have been fewer in number than that to which he has become accustomed to seeing.

And what about the uplift zone? The caldera boundary? The North-South fault that runs between Norris and Mammoth? Heasler reports that the new thermal vent at Nymph Lake is located at the edge of the uplift zone. It is also true that the 2.1 million-year-old caldera boundary established by now-retired USGS geologist Bob Christiansen runs through Norris, possibly indicating a tendency toward geological instability. And some people say that the waterworks of Norris and Mammoth Hot Springs may be connected via the fault line that links them. All of these ideas are worthy of exploration; the goal now is to collect the data that will help us begin to support or refute them.

### Partnering for baseline data

Of course, that is easier said than done, given the aforementioned lack of systematic data collection. Through its partnerships with the USGS and the

University of Utah, however, the NPS is beginning to change all that. When NPS researchers first realized the potential threat posed by the recent changes at Norris, they passed the information along to researchers at the YVO, jointly operated by the NPS, USGS, and University of Utah. The partnering agencies immediately set about creating a plan for how to better document events at Norris, as well as determining what their longer-term implications might be. A great amount of time and effort, including sometimes-nightly calls among scientists, resulted in a more aggressive scientific monitoring plan that will be co-sponsored by the three agencies. A major component of the plan is the "urgent deployment" (meaning that it is occurring with the goal of capturing data while events are happening) of special seismometers and GPS equipment in the Back Basin. The partnership has also produced a revised geochemical sampling plan for the entire Norris area, as well as new plans for temperature monitoring.

Following the installation of the seismometers and additional GPS stations (which will be deployed within a 500-meter radius of Vixen Geyser and allow scientists to chart surface movement, e.g., changes in the uplift), Heasler expects that scientists will be able to document all thermal events better than before; have a better chance at determining whether they are "normal;" and improve our knowledge of just what's going on in the "upper 100 meters" below Norris, with information that is published and reproducible by other scientists, as well as available for interpretation and debate by a wide range of scientists. The challenge is to collect data that's retrievable, and usable by people many years from now. As things currently stand, he explains, we "can take the pulse, breathing rate, and blood pressure of [Norris], but we've been doing it for about a 1/10 of a second [in geologic time]. There are different reasons why a patient's pulse rate might be elevated—he might have just run up a flight of stairs, or he might be getting ready to have a heart attack."



Installation of a Norris seismic site on August 10, 2003, by Jamie Farrell (left) and Greg Waite (right) from the University of Utah. A typical deployment consists of the seismometer (under the insulating barrel), a solar cell to charge batteries, and digital signal acquisition system (behind solar cell).

In response to the increased heat and steam emissions in parts of Norris Geyser Basin, the Yellowstone Volcano Observatory is deploying a temporary network of seismographs, Global Positioning System (GPS) receivers, and temperature loggers. The temporal deployment is intended to document chemical and physical signals that accompany this increased activity, to identify the underground locations of hydrothermal steam sources and the relationship of the Norris Geyser Basin to the background general seismicity, and crustal deformation of the Yellowstone caldera. It may also detect any precursory signals to geyser eruptions and hydrothermal explosions.

The GPS equipment is designed to detect very small movements of the earth, and the seismic array can measure earthquakes associated with flow of thermal water and/or located on buried faults. Seven seismometers that record a wide range of seismic frequencies typical of hydrothermal and volcanic systems, called broadband, will be placed throughout the Norris Geyser Basin, five of them within and around the hydrothermal disturbed area itself. These "broadband" seismometers are especially sensitive to the long-wavelength ground vibrations that occur as water and gas move through underground cracks as well as deeper volcanic sources.

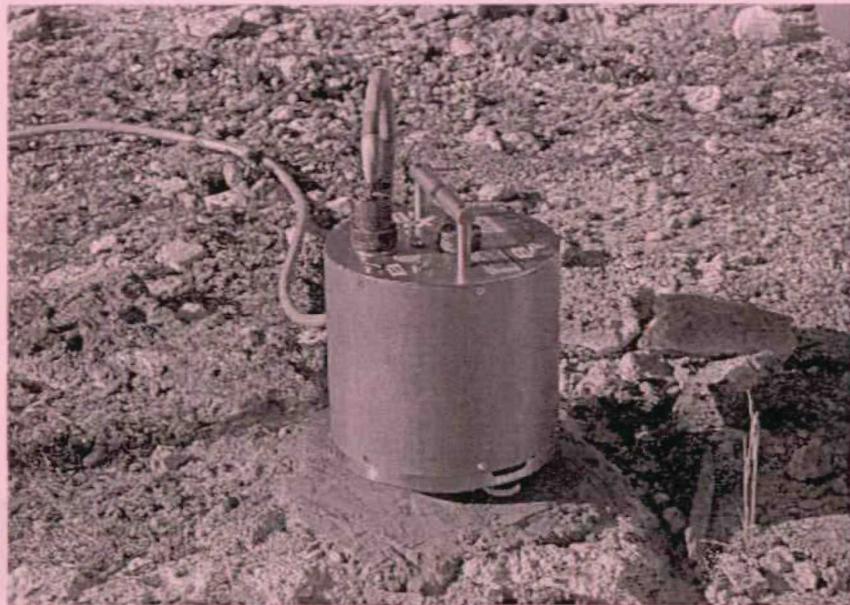
The seismic array will be complemented by high precision GPS receivers that precisely measure the coordinates of points on the ground from data transmitted by an array of satellites that can be compared with each other to measure the relative ground velocities through time. These data complement Yellowstone's permanent GPS network.

This new technology may detect movements of the ground associated with underground pulses of water and steam (including geyser

eruptions). Thermometers placed in hot springs and creeks will continuously document the flow of water out of the geyser basin. The scientists hope to link individual pulses of water, changes in their chemistry and temperatures to pressures in the earth. This data may provide information on ground motions and seismic signals that precede them.

The Yellowstone Volcano Observatory (YVO) is a collaborative partnership between the U.S. Geological Survey, the University of Utah and Yellowstone National Park. The Yellowstone seismic and GPS network consists of a modern digitally telemetered network of 22 seismographs and five permanent GPS receivers throughout Yellowstone National Park in support of the YVO and a National Science Foundation (NSF) project focused on the Yellowstone hotspot. These networks are operated and recorded by the University of Utah.

The Yellowstone Volcano Observatory is designed to provide geophysical and geochemical monitoring of Yellowstone National Park that enables timely guidance to the NPS and improves scientists' understanding of ongoing volcanic, hydrothermal and earthquakes activity. Two NSF-supported University research consortiums and the University of Utah are providing the temporary equipment and technical support (IRIS, Integrated Research Institutes in Seismology and UNAVCO, University NAVSTAR Consortium). Funding is available primarily from the USGS Volcano Hazards Program and Yellowstone National Park. The USGS operates five volcano observatories, including ones in Hawaii, Alaska, the Cascades (Washington) and Eastern California. Unlike some of the other observatories, YVO includes staff and funding from academic and other non-federal sources.



One of the seven highly sensitive seismometers installed in the Norris Back Basin area. This type of seismometer continuously measures both horizontal and vertical ground motions over a wide range of frequencies. This allows the detection of very minor earthquakes and also acoustic energy associated with the Norris hydrothermal system.

#### Conclusions— Risk Assessment

The overall purpose of the new data collection is not to document all of the new changes at Norris simply for the sake of documentation, but rather to maximize the park's ability to ensure the safety of visitors and employees. Collecting ground information about Norris's upper 100 meters will help researchers and managers to assess risk factors quantitatively, which includes determining when it is safe for Back Basin travel to resume. Contrary to some reports, the closure at Norris is not without precedent; a section of West Thumb Geyser Basin was closed for approximately a year after a new feature erupted under and through the boardwalk there. Following the eruption, which lasted a week or two, scientists performed monitoring and data collection, and investigated whether the boardwalk ultimately should be moved. After many months, the feature appeared stable, and the boardwalk through that area re-opened this summer. As in that West Thumb case, the

Back Basin will remain closed until temperatures drop back down to a safe level or it is determined that additional boardwalks should be built to reroute the trail.

In terms of the events themselves, and what they might portend, no one can say for certain, at this point, just what is "abnormal" in a place as volatile as Norris, where temperatures as high as 500° F have been recorded just 1,000 feet below the surface (courtesy of a 1960s-era USGS drill hole [see *Yellowstone Science* 10(4)]), and so the risk assessment will be ongoing. Hydrothermal explosions are always a concern in Yellowstone, but are a concern that needs to be investigated, says Heasler. In the meantime, YVO is working on updating its web site to include much of the already-existing data related to the recent changes, including temperature data and analyses of GPS and seismic data. It is currently hosting data for Steamboat Geyser's recent eruptions. Visit <http://volcanoes.usgs.gov/yvo/monitoring.html> to view this information. 🐼

# EAST FIRE THREATENS FISHING BRIDGE & EAST ENTRANCE

by Carol Shively

On Monday, August 11, at 5:30 p.m., lightning struck the upper reaches of Cub Creek, starting the East Fire. Because of the extreme drought and the potential threat to roads and developments, the park undertook initial attack on the fire by air. Driven by gusting winds, the fire began to spread rapidly, doubling in size over several days and moving at a rate of two



The East Fire on the shore of Yellowstone Lake.

miles per day. The East Entrance Road was closed to public use. Ominous mushroom shaped plumes of dark smoke filled the sky. By Friday, August 15, the fire reached the shore of Yellowstone Lake. Park rangers evacuated hikers from the Nine Mile Trail and either drove or towed over a dozen vehicles from this trailhead to safety. The fire's blistering advance and a serious motor vehicle accident occurring at the same time did not allow them time to remove two of the vehicles at this trailhead and the four vehicles left by canoeists at the Sedge Bay put-in spot.

The fire continued its westward run toward Fishing Bridge. The Northwest Oregon Incident Management Team had taken over management of the fire on the evening of August 14. At a late night meeting on August 15, the



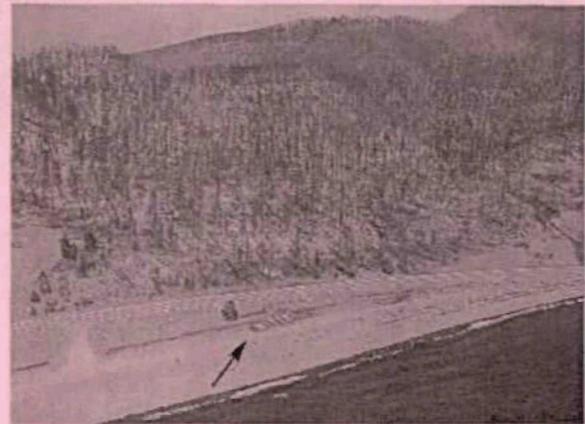
GREG WAITE

The Lake Butte seismic station, monitored by the Yellowstone Volcano Observatory, was consumed by the East Fire on August 11.

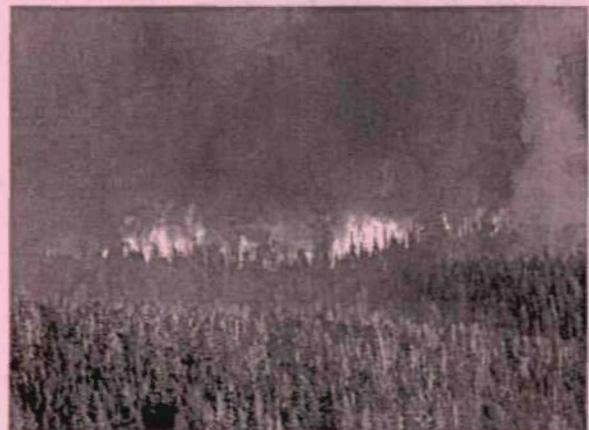
team informed the park that if the fire reached the Pelican Valley trailhead, three miles from Fishing Bridge, they would initiate an evacuation of the area. Visitors at the Fishing Bridge RV Park were informed of this decision via notices placed on their vehicles by early the next morning. Interpretive rangers prepared for the removal of important items from the Fishing Bridge Visitor Center. An irrigation system was ordered to protect this treasured museum, which is a National Historic Landmark. A change in

wind direction the next morning allowed firefighters the opportunity to build an indirect fire line along the Pelican Valley Stock Trail and conduct a controlled burn, igniting fuels between the fire line and the fire. A change in the wind and quick action by fire crews averted the evacuation of the Fishing Bridge area. With the wind now blowing east, firefighters continued to monitor the Fishing Bridge situation, but focused their attention on the fire's movement toward the East Entrance. By Monday, August 18, the East Fire was five miles northwest of the East Entrance. In addition, the Grizzly Fire, to the south, now also threatened the East Entrance Road. Fire crews on both fires planned

torching on the East Fire, August 16, 2003, with burnout procedure to the west of the fire.



Vehicles burned in the advance of the East Fire at Sedge Bay.



Torching on the East Fire, August 16, 2003, with burnout procedure to the west of the fire.

burnouts of unburned fuels between the fire and the road to facilitate the re-opening of this important park thoroughfare. Crews either walked or were flown in to the rugged terrain southeast of Crow Creek Pass and established Spike Camps. Their objective was to build a fire line from the east flank of Silver Tip Peak south to the Crow Creek Trail in an attempt to stop the fire's run down the Crow Creek drainage to the East Entrance, Pahaska Tepee, and other North Fork lodges. The burnout procedure is planned for south of Silver Tip Peak and the Crow Creek Trail. Irrigation sprinkler systems are in place around East Entrance and the Pahaska Tepee Lodge to protect the structures there.

On the Grizzly Fire, crews were taken by boat across the lake to the southeast arm, where they hiked in to establish spike camps in the Signal Hills area. Their objective is to stop the fire from getting into the Columbine Creek or Middle Creek drainages, which could threaten the East Entrance structures on that flank of the fire and the Clear Creek Cabin on the west flank of the fire. Irrigation systems were put in place to protect this historic cabin.

As of 5:00 p.m. on Thursday, August 28, the size of the East Fire Complex (East and Grizzly fires combined) was estimated at 23,500 acres. A total of 568 firefighters were assigned to the incident (2 Type 1 crews and 12 Type 2 crews), supported by 11 engines, 4 tenders, 1 heavy lift helicopter, 3 mediums and 1 light helicopter. Containment was estimated at 70%, with two miles of line remaining to be built. Estimated cost to date was \$6,300,000. On September 2, containment was estimated at 85%, and mop-up and rehabilitation had begun. The estimated containment date is September 15.



Burnout procedure (on the left) meeting the west flank of the East Fire, August 16, 2003.

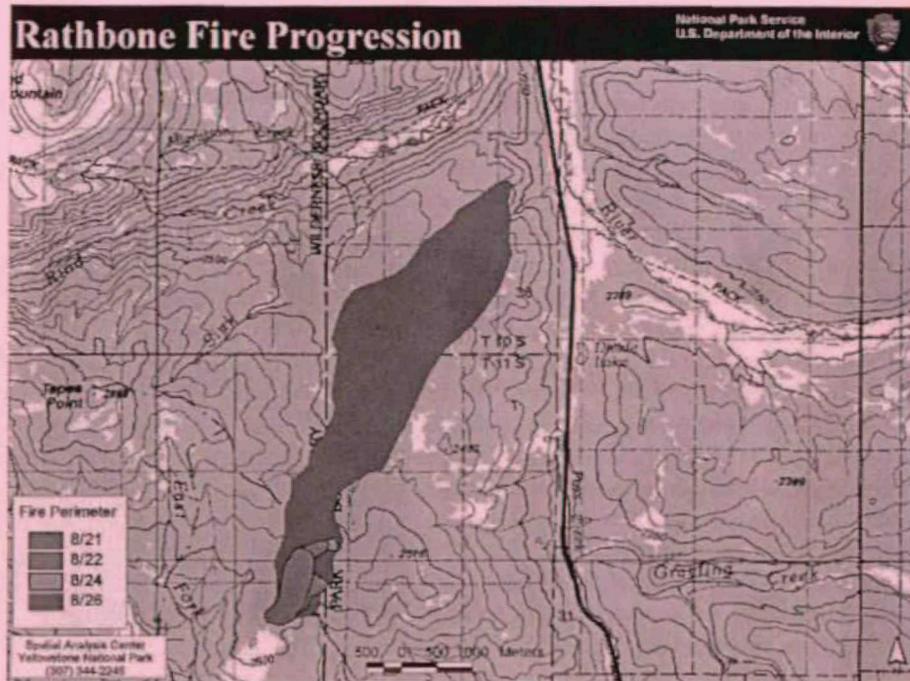
## ADDITIONAL FIRE INFORMATION



JOHN STUBBINS

An early-August lightning strike on Frank Island caused the island's entire 638 acres of forest cover to burn. Although the lake provides an obvious fire break, initial efforts to contain the fire were made, due to the presence of bald eagle nests. Containment efforts were abandoned after it became clear that they would be unsuccessful.

GIS map showing the progression of the Rathbone Fire following its massive run on August 26 (shown as dark grey). The dark black line is U.S. Highway 191, which was temporarily closed along the northwest side of the park on that afternoon at about 4:30. The fire was approaching the road near the Fawn Pass Trailhead, making travel along the highway unsafe. At press time, the fire was estimated to be 4,469 acres in size (the map at right shows 1,762 acres). The park's East Entrance Road has experienced regular temporary closures over the past week due to unsafe conditions created by the East Fire.



Complete information on this year's fire season in Yellowstone, including maps like the one pictured here, is available at [www.nps.gov/yell/technical/fire/index.htm](http://www.nps.gov/yell/technical/fire/index.htm).

# CURRENT BISON MANAGEMENT PROJECTS

by Chris Geremia, Mark Biel, and Rick Wallen

## Summer Bison Classification Effort

Management decisions regarding Yellowstone bison require an understanding of the population demographics of the herd. One population measure of particular interest to the Bison Ecology and Management Office (BEMO) is the herd's age and sex structure. Changes in this composition over time reflect both the ecological consequences of living in Yellowstone and the effectiveness of management decisions. In order to track the herd's composition, BEMO personnel complete a herd classification three times each year. Ground surveys are conducted to determine the percent composition of adult bulls (>1 year), adult cows (>1 year), yearling bulls, yearling cows, and calves. This fieldwork occurs during February, July and October.

Aerial and ground observations of bison are combined to account for as many animals as possible. Our goal is to find and classify 80-100% of the bison in Yellowstone. Biologists, technicians, volunteers, and of course, our favorite packer from the Stephens Creek corral combine efforts to search all suitable habitat in as little time as possible. During summer, our efforts are focused in the Hayden and Lamar Valleys. Due to rutting behavior, bison distribution is much more confined in summer

months, especially July, than in winter months.

This summer, over 3,000 bison were classified over five days. In Pelican Valley and on the park's west side (Madison, Firehole and Gibbon River drainages), only bulls were found during aerial reconnaissance. This year, the proportion of the population comprised of calves is greater on the northern range than in the central portion of the park (Table 1). Long-term monitoring of these proportions will determine which management questions will be addressed by managers. Factors that cause these proportions to change include winter severity and, thus, mortality of young animals, management prescriptions that address resolution of brucellosis in our population, and mortality caused by predation pressures.

Concurrent, independent observations of groups were used to determine classification accuracy. The greatest error was found in classifying bulls (8.1%) and cows (7.5%). High

Table 1. Bison population in each age/sex category, summer 2003.

	ADULTS		YEARLINGS		CALVES
	Male	Female	Male	Female	
Northern Range	27%	42%	3%	4%	20%
Central Herd	24%	46%	5%	8%	15%

Between 3-4% of each herd was classified as "unknown."

accuracy was found in classifying yearlings (1.1% for yearling bulls and 1.7% for yearling cows), which is promising news in regard to the proposed remote delivery vaccination effort. Correctly identifying the age classification of target animals will be imperative to the success of that effort. In the long run, if our vaccination program is a success, we will expect to observe more calves during our summer classifications.

### Mary Mountain Site Investigation

As research on the proposed remote delivery vaccination effort (as outlined in the Interagency Bison Management Plan) continues, the Bison Ecology and Management Office (BEMO) is identifying and assessing possible backcountry vaccination sites. BEMO personnel are looking for sites where numerous bison naturally pass. Ideally, bison must travel through the site only once during an extended time period, thus eliminating the potential for multiple vaccinations. The site must also have a safe location where personnel can wait for the bison and safely deliver the vaccine via a bio-absorbable, compressed cellulose-type bullet with a vaccine encapsulated inside. These locations must be within approximately 20–30 meters of where the bison are traveling. The Mary Mountain patrol cabin meets these criteria. The central Yellowstone sub-population utilizes Mary Mountain as a travel corridor, spending the summer in the Hayden and Pelican Valleys and wintering in the Madison, Firehole and Gibbon River drainages. As many as 2,000 animals annually travel east through the pass during late spring and early summer. This year, between May 5 and June 26, BEMO personnel maintained a near-constant presence at the cabin in order to evaluate the potential success rate of vaccinating from the cabin.

As bison groups moved past the cabin, BEMO personnel attempted mock vaccinations. A potential vaccination zone around the cabin was established, represented by a circle with a 30m radius centered at the cabin porch. The cabin porch was chosen as the vaccination delivery site in order to

minimize disturbance to bison as they travel this corridor. Target animals were defined as all yearling bison moving through this vaccination zone. If a yearling bison presented itself as available (not blocked from view by other bison) in the vaccination zone, a .22-caliber starter pistol was fired to mimic the noise of a vaccine delivery by a pneumatic air rifle. To be considered available, the animal needed to walk through at least part of the vaccination zone. Concurrently, the vaccinator, located on the cabin porch, required an unobstructed view of the animal's target area, defined as the right quadriceps and hamstrings muscle mass located on the animal's hindquarter. This area represents a 20cm diameter target zone on yearling bison.

Bison movement through the potential vaccination zone was crepuscular (active at dawn and twilight). Bison moved across the Mary Mountain pass in groups ranging in size from 1 to 256 individuals. When they passed through the potential vaccination zone and observed the BEMO staff at the cabin, most bison groups exhibited defensive behavior, either increasing gait or grouping together, apparently in response to our presence at the cabin. The bison did not exhibit any behavioral responses to the sounds of the gunshots. The majority of groups (52%) entered the potential vaccination zone walking and in single file, but quickly changed gait to a trot and grouped into a line of between one and five animals across when they observed people. These defensive behaviors obviously decreased the percentage of yearlings that were available for mock vaccination. Of the 250 yearlings moving through the potential vaccination zone between May 5 and June

26, during sufficient lighting, 37% presented their hindquarter clearly enough that a vaccine could have been delivered.

Currently, Mary Mountain represents one of several potential vaccination sites in the park. The next challenge for BEMO personnel will be increasing the potential success rate from 37%. One possibility involves training personnel to administer the vaccine to a target animal moving at a trot or run. Based on data already collected, this would increase vaccination delivery success to greater than 80%. ■



*Above, bison move through the target zone at Mary Mountain cabin.*

*Below, the bison travel route is in the foreground. The cabin sits within 15 meters of the travel route, making it an ideal point from which to vaccinate bison.*



# SIGN OF ITS TIMES

by Alice Wondrak Biel

Late this past May, YCR biological technician intern Ryman LeBeau and other members of the Bison Ecology and Management crew were surprised when, several miles into the backcountry in the area of Mary Mountain (see previous article), they discovered this sign nailed to a tree:

## NATIONAL PARK SERVICE

On this spot (August 24, 1877) the Nez Perce chiefs held a council to decide the fate of the Cowan party, who had been captured that morning in the Lower Geyser Basin. The party was released, but afterwards recaptured, taken back about a half mile east of the council ground, and there attacked by the Indians. Cowan was left for dead. Carpenter and the two ladies were taken along as prisoners, and the rest escaped.

## DEPARTMENT OF THE INTERIOR

They were surprised not only to find an interpretive sign nailed to a tree that far into the backcountry, but moreso at the story it told. Or, more accurately, doesn't tell—namely, anything about the historical context in which the events took place, or the Nez Perce perspective of those events.

That context, of course, is that in the summer of 1877, the Nez Perce were fleeing the troops of U.S. Army General Oliver O. Howard, who sought to force tribal members onto reservation lands in Idaho's Clearwater Valley and, for some, Oklahoma. In the course of their effort to reach the Canadian border and freedom, five bands of Nez Perce passed through Yellowstone National Park. Encountering a group of tourists that has come to be known as the Cowan, or Radersburg party, they asked for food, offered to release the party in exchange for other supplies, and warned them to stay off the main trail as they traveled. According to historian Jerome Greene, the violent events described by the sign occurred only after party leader George

Cowan intervened to prevent other members of his party from cooperating with the Indians' requests, and then ignored their warnings to stay off the main trail.

The sign also seems odd because it assumes the reader already knows part of the story, with its unexplained allusions to "Carpenter" and "the two ladies." As it turns out, "Carpenter" referred to Frank Carpenter, who was another member of the party and brother to Ida Carpenter and Emma Cowan (wife of George), who were "the two ladies."

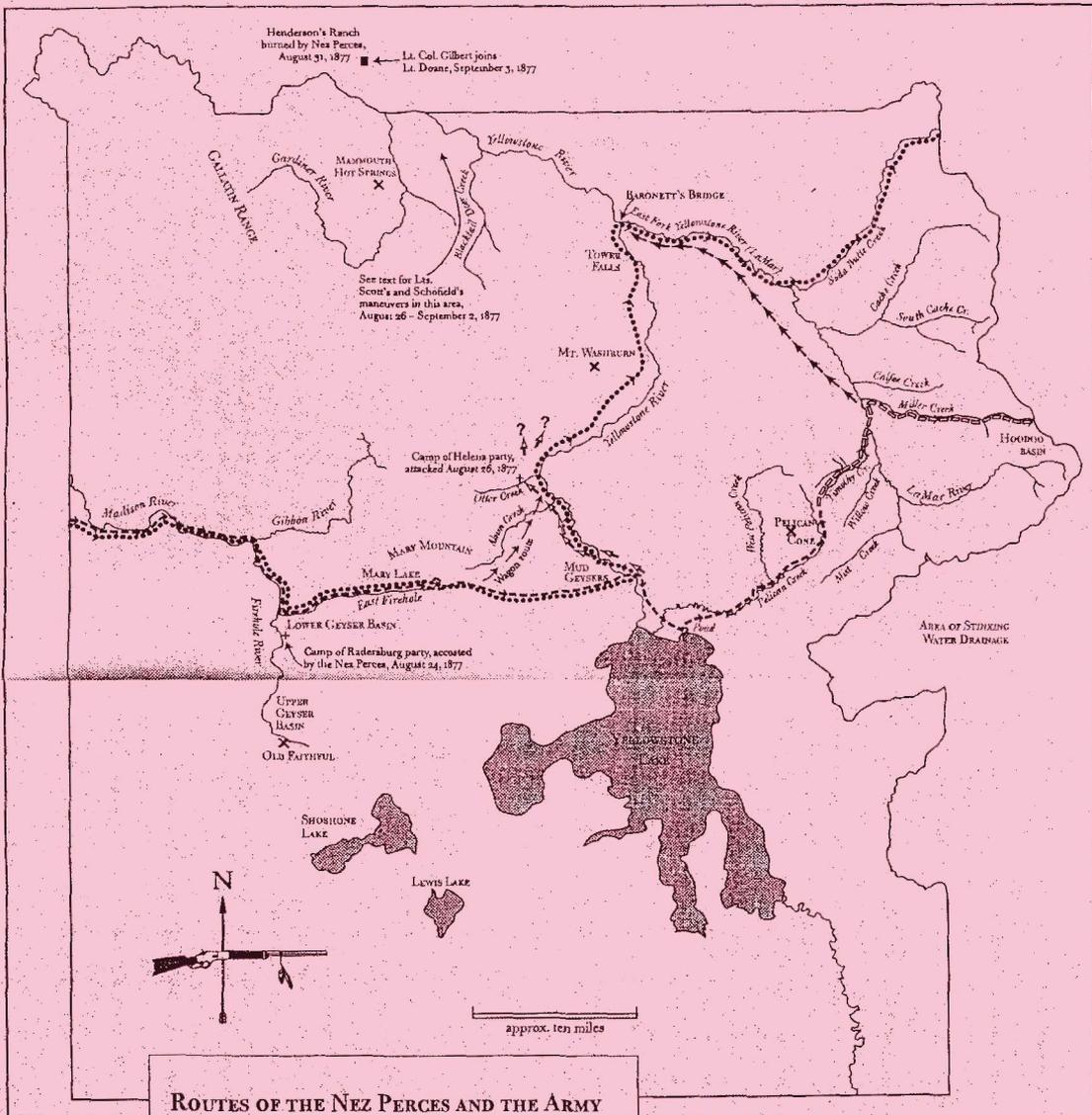
But how would we know that?

It turns out that the sign is a relic from what was once a series of eight wooden signs, originally placed by U.S. Army engineer and Yellowstone historian Hiram Chittenden to mark sites of significance from the Nez Perces' 1877 flight through the park. These signs were reported as being in place by 1904, but had all disappeared by 1950. Metal replacement signs were erected, possibly in the 1930s, but all those have also disappeared except for the one discussed in this article. Some may have fallen down; others were likely stolen or simply removed.

What is perhaps most striking about the sign, when we come upon it today, is its strongly biased narrative of what is now universally recognized as a far more complex tale



The sign seen by Bison Ecology and Management employees. It may date from the 1930s.



**ROUTES OF THE NEZ PERCES AND THE ARMY  
IN THE NATIONAL PARK,  
AUGUST - SEPTEMBER 1877**  
*(all routes are approximate)*

- Route of main body of Nez Perces
- Conjectural route of main body of Nez Perces
- Route of Howard's command
- Nez Perce scouting party to Baronett's Bridge
- Nez Perce warriors who attacked Helena party
- Wagon route

than "On this site, innocent white tourists were savagely attacked by Indians." In this sense, the sign itself is a valuable historical artifact, representative of times and attitudes past; it is not, however, a particularly effective tool of historical interpretation. For Ryman, who happens to be a member of the Cheyenne River Lakota Nation, the sign was particularly potent as a remnant of long-entrenched Western views of Native Americans that have typically given rise to one-sided narratives of historical events, even—especially?—when re-

counted by the federal government as official history.

Of course, we are moving toward changing that pattern, with reinterpretations and long-deserved acknowledgements such as the newly-dedicated Indian Memorial at the Little Bighorn Battlefield National Monument. Native Americans are involved in many of these efforts; in Yellowstone, park staff have entered into a partnership with three tribes—the Confederated Tribes of the Colville Indian Reservation, the Confederated Tribes of the Umatilla Indian Reservation, and

the Nez Perce Tribe—to cooperatively develop visitor education media for the Nez Perce (Nee-Mee-Poo) National Historic Trail in Yellowstone. In a meeting approximately a year ago, the group suggested replacing another sign that describes the Nez Perce flight through the park, along with the Cowan incident, currently located at the spot along Nez Perce Creek where the Nez Perce initially encountered the Radersburg party. This kiosk currently features a map of the 1877 mobile war on one side and on the other, a picture of the tourist party and a description of what happened at the site.

The group agreed that in a new interpretation, one side of the kiosk might provide a backdrop about native peoples' affiliation with the Yellowstone landscape and the reasons for it—primarily, the area's abundant resources, with the idea being that the 1877 war was but a small part of a much fuller story of the Nez Perce and Yellowstone. The other side, they suggested, might explain that the Nez Perce came this way in 1877 because they had historically used the Yellowstone area, and their familiarity with it led them to view this place as a haven. It would also tell the story of the Nez Percés' violent encounters with the Radersburg party and, later in August, another tourist party known as the Helena party.

Overall, the group was interested in providing a broader historical context for those incidents; conveying that the Nez Perce involved in these altercations had already en-

dured nearly two months of actively fighting and fleeing the U.S. Army since an initial battle at Idaho's White Bird Canyon on June 27. Most recently, on August 9–10, they had fought both the Army and local settlers in the two-day Battle of the Big Hole (near today's Dillon, Montana); the Nez Perce camp had been attacked shortly before dawn. Of course, the Radersburg and Helena parties were probably unaware of the Nez Percés' recent events, and so were unsuspecting when they came upon the Nez Perce in the park. But General Philip Sheridan described the Battle of the Big Hole as "one of the most desperate engagements on record," and Greene says that the battle "played a role in the Nez Percés' subsequent group behavior...as the frustration level rose to extended heights needing release," making it little wonder that the Yellowstone encounters quickly turned ugly.

Ultimately, the lone remaining Chittenden sign is important—most obviously because it marks the spot where an historic event occurred. Could or should this particular sign, though, be retired to the archives (as others have been), and replaced with one that provides a more balanced view—one that maintains that these events were tragic, but acknowledges that they were tragic for all involved? Perhaps even one that provides history and interpretation of Chittenden's series of signs? That is the salient question for park managers at this point. ■

*Park historian Lee Whittlesey has written about Chittenden's Nez Perce trail signs and their history. The following is an excerpt from his upcoming book, *Storytelling in Yellowstone: Horse-and-Buggy Tour Guides in the Grand Old Park, 1872–1920*:*

Virtually no signs in Yellowstone were strictly interpretive [in the park's early days]. In general, such signs, later called "wayside exhibits," did not appear in the park in large scale until the 1920s and 1930s, probably because the smaller park visitation of those days did not generate as much need for them.

One very noteworthy exception was road engineer Hiram M. Chittenden's 1903 success in erecting interpretive signs to commemorate the passage of the Nez Perce Indians through Yellowstone in 1877. In his annual report for 1902, Chittenden discussed his plans for erection of these interpretive signs. "The situation of the prominent historic points on the line of march of General [G.] Howard across the park in pursuit of the Nez Perce Indians in 1877," he concluded, "has always been a matter of interest to tourists since the campaign took place." Because his roadwork paralleled a part of the old trail and threatened to obliterate other portions of it, Chittenden thought it desirable to "locate definitely the more important points...in order that they may be marked with suitable inscriptions."

To help him with this task, Chittenden pressed into service a number of relevant persons who had knowledge of the 1877 campaign. They were: Colonel W.F. Spurgin, who had led soldiers over the Nez Perce trail; George F. Cowan, one of the captured tourists; J.C. McCartney, a founder of the town of Gardiner and long touted as its unofficial "mayor;" Silas Huntley, transportation director for the park stagecoach operations; G.D. Wheeler, Northern Pacific Railroad historian; James Morrison, government scout ("probably more familiar with the geography of the park than any other individual"); and A.E. Burns, overseer of road construction.

*The group's efforts produced eight signs in all, the text of which is reproduced on the next page, along with the approximate locations of where the signs were posted.*

## FULL TEXT OF CHITTENDEN'S ORIGINAL EIGHT INTERPRETIVE SIGNS

At this point, August 24, 1877, the Nez Perce Indians, under Chief Joseph, captured a party of tourists from Radersburg, Mont., including Mr. Geo. F. Cowan. The party were taken up the valley of Nez Perce creek by the trail over Mary Mountain.

Lower Geyser Basin

On this spot, (August 24, 1877) the Nez Perce Chiefs held a council to decide the fate of the Cowan party who had been captured that morning in the Lower Geyser Basin. The party were released, but afterwards recaptured, taken back about a half a mile east of the council ground, and there attacked by the Indians. Cowan was left for dead, Carpenter and the two ladies were taken along as prisoners, and the rest escaped.

head of Nez Perce Creek

'Spurgin's Beaver Slide.' Half a mile back from the road is the place where Captain W.F. Spurgin, 21st Infantry, let General Howard's wagon train down the steep side of the mountain. The marks on the trees, burned in by the ropes used to let the wagons down, are still distinctly visible.

Otter Creek area

On this spot a party of tourists from Helena, Mont. were attacked by Nez Perces, August 26, 1877, and one of their number killed.

forks of Otter Creek

Camp Cowan—This is the site of General Howard's second camp (August 30, 1877) within the limits of the Yellowstone National Park during his pursuit of Chief Joseph. It was near this point that the troops found Mr. Cowan, who had crawled back six miles from the foot of Mary Mountain after having been wounded and left for dead by the Indians. He had passed four days without food.

near mouth of Nez Perce Creek

General Howard's headquarters, September 1, 1877. The ford by which the Nez Perces crossed the river is about half a mile distant. Howard did not follow them but took his command down the left bank of the river, over Mount Washburn, and crossed the Yellowstone at Baronet's bridge.

Nez Perce Ford (formerly Buffalo Ford)

Three fourths of a mile up the valley of this stream is the place where a party of tourists from Helena were attacked by the Nez Perces, August 26, 1877, and one of their number killed.

up from mouth of Alum Creek

General Howard's wagon train, under Major Spurgin, crossed the canon of Cascade Creek at this point.

Cascade Creek

# UPPER GEYSER BASIN UPDATE

by Shannan D. Marcak

Interpreters frequently say, "the only constant in nature is change." That seems particularly true in geyser basins, and this year in the Upper Geyser Basin has been no exception.

One of the earliest changes in 2003 was the reactivation of Baby Daisy Geyser. Dormant since 1959, Baby Daisy appears to have started erupting again on Valentine's Day. Its current average interval is 45–50 minutes, with a wide variance; it often reaches heights of 15–20 feet. If you are unfamiliar with Baby Daisy, it is located in the group of features across the road from Biscuit Basin 30 feet or so in front of the tree line. It can easily be seen from the road; it's the only large-ish geyser you are likely to see erupting in that area.

As spring settled in, deep, new, runoff channels were seen on Geyser Hill in the area of Dome Geyser, evidence of increased activity occurring at Butterfly Spring. Known previously to erupt only occasionally and to heights of just a few feet, Butterfly was reportedly seen having a 40-foot eruption in early May. It continued to have major eruptions lasting two to three minutes throughout the month of May. Major eruptions have not been seen since then, but Butterfly continues to have minor eruptions, usually lasting only a few seconds, but occasionally reaching heights of up to 12 feet.

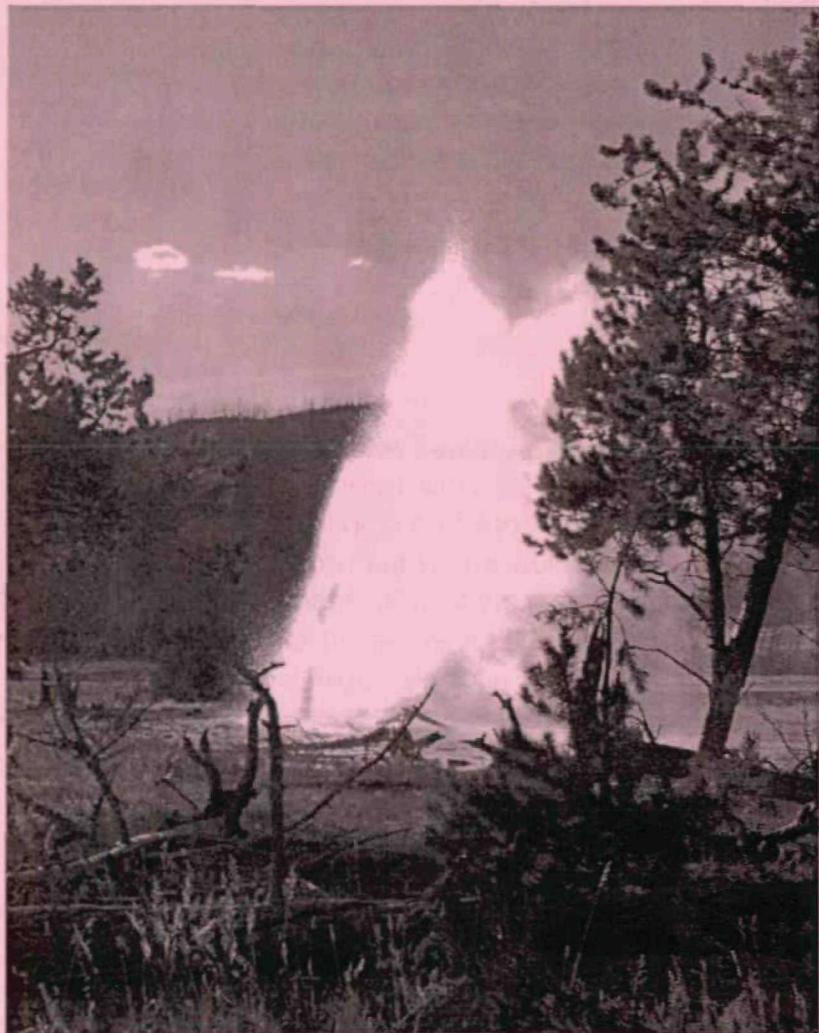
Perhaps the most talked about changes on Geyser Hill have been those in the activity of Plume Geyser. A regular and frequent geyser for the last several years (typically erupting every 40–50 minutes), Plume went dormant for the second time in six months within a week of the April 22 eruption of Giantess Geyser. It wasn't seen again until June 18—a dormancy of 52 days. Upon its reactivation, its interval was long and variable, but as the weeks

passed, it started to look like Plume "was back." Then, on August 17, its eruptions were interrupted by two intervals of more than two hours, followed by an interval of four hours and 25 minutes. It has not been seen since 7:47 that night. Today, Plume is quiet, its vent partially filled with clear, hot water. And so we wait...

If you like to follow the activity of some of the rarer, but more spectacular geysers in the Old Faithful area, it has been a fine year. Giantess has had three

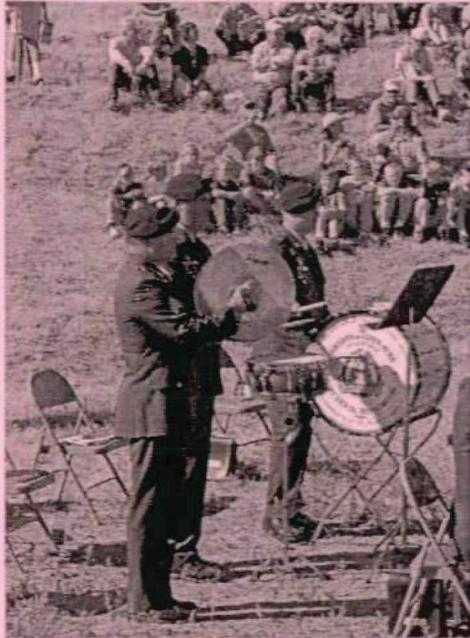
eruptions so far in 2003: January 9, April 22, and June 26. Giant was seen on July 12, its first eruption since April of 2002. And Fan and Mortar, after a period of low activity in April, have recently averaged six to ten days between eruptions.

So, come enjoy the fall at Old Faithful. Watch for Giant's hot periods that may presage another eruption. Help us keep track of Fan and Mortar. Above all, enjoy the wonders of the Upper Geyser Basin. 🌋



Dormant since 1959, Baby Daisy Geyser appears to have started erupting again on Valentine's Day of this year. Here, it erupts on August 27, 2003.

## PHOTOS FROM THE ROOSEVELT ARCH CELEBRATION



Members of the I Corps Army Band from Fort Lewis, Washington, performed Sousa marches and other patriotic tunes for the gathered crowd.



The colors were presented by Yellowstone rangers and the 89th Montana Cavalry, the Montana Army National Guard's Special Honor Guard.

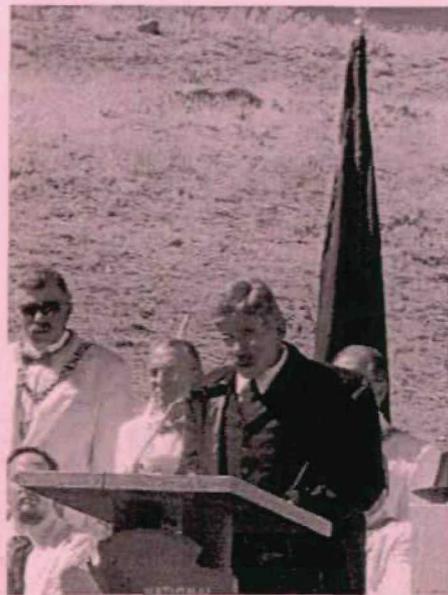
On August 25, 2003, in an event that attracted around 1,000 spectators, the Roosevelt Arch was re-dedicated by members of the Montana Masonic Lodge, led by Grand Master Alan "Doc" Harkins. Preceding the re-dedication, Reverend Bill Young offered an invocation, followed by remarks by Doc Harkins, Yellowstone Superintendent Suzanne Lewis, NPS Director Fran Mainella, and Theodore Roosevelt IV, who delivered the keynote address. Gardiner Chamber of Commerce President Mary Hagemeyer represented the town of Gardiner and read a written statement sent by Montana Governor Judy Martz. Former NPS employee and mason Jim Sweaney presented remarks on behalf of the masons. Music was provided by the I Corps Army Band from Fort Lewis, Washington, and colors were presented by Yellowstone rangers in conjunction with the 89th Montana Cavalry, the Montana Army National Guard's Special Honor Guard. 🐾

The arch event was well-attended by members of the Montana Masonic Lodge. The masons were instrumental in organizing the arch's first dedication ceremony, on April 24, 1903. The most honored guest that day was President Theodore Roosevelt, who was himself a mason. President Roosevelt happened to be traveling in the area at that time, and agreed to participate in the event.





One hundred years later, this year's guest of honor was Theodore Roosevelt IV, great-grandson of President Roosevelt. With advice for those on all sides of today's political/environmental debates, Mr. Roosevelt's remarks were well-received by the diverse audience.



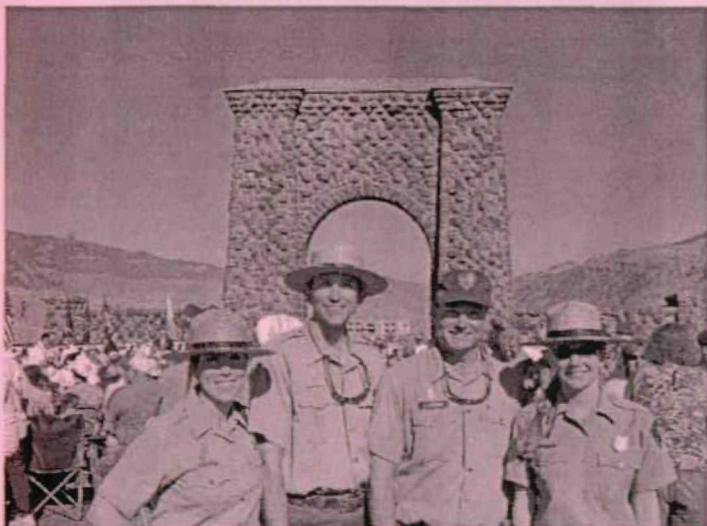
TR re-enactor Mark Klemetsrud took part in the masonic re-dedication ceremony, speaking in reminiscences, as Roosevelt might have today.



The crowd gathers.



A member of the Montana Masonic Lodge pours wine on a stone representing the arch's cornerstone, a seminal part of the re-dedication ceremony.



Many NPS employees attended the event, including Superintendent Suzanne Lewis and NPS Director Fran Mainella (far right).



# BEAR 101'S CHANGE OF LIFE

by Alice Wondrak Biel and Virginia Warner

Almost exactly a year ago, three grizzly bears—a sow and two male cubs—were trapped by Montana Fish, Wildlife and Parks employees after obtaining human foods left unsecured by residents of the Horse Butte area near West Yellowstone, Montana. At that time, Bear 101, as the sow is known, was trapped just about 100 yards from where she was trapped eight years ago for the same reason. That time, in 1994, she was relocated to a spot in Wyoming, roughly on the other side of the ecosystem. This time, because bears that repeatedly gain access to human foods typically have to be destroyed, 101 was slated to be euthanized until West Yellowstone's Grizzly and Wolf Discovery Center (GWDC) agreed to take her and her cubs into captivity.

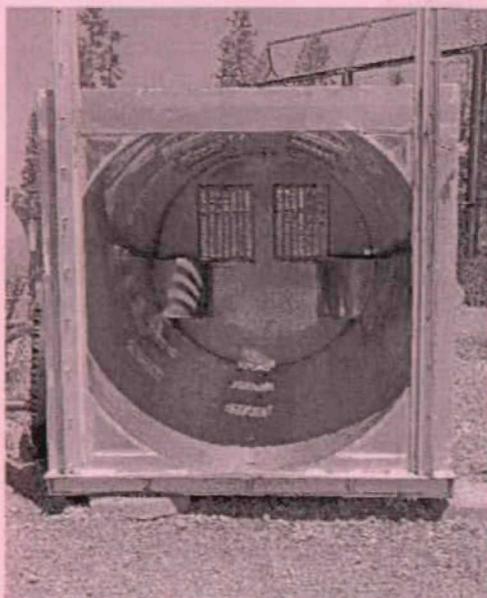
Although still alive, Bear 101 and her cubs are prime examples of the adage that "a fed bear is a dead bear," their removal from the ecosystem amounts to three mortalities in terms of the health of the GYE grizzly population. Last year was rough in terms of natural foods for grizzlies, due in part to the almost total failure of the whitebark pine cone crop (see Autumn 2002 issue of the *Buffalo Chip*). This may be what led Bear 101 back into trouble at Horse Butte; after an eight-year absence, she returned to seek human foods where she had found them before, and there she discovered a veritable cornucopia of temptation for a hungry grizzly and her seven-month-old cubs. Dog food left outside. Open cans of cat food sitting on a hot tub. The bed of a pick-up full of un-

secured sweet horse pellets. Six months of garbage stored in a garage. According to a Bozeman Chronicle article from last year, Chris Servheen, grizzly bear recovery coordinator for the U.S. Fish and Wildlife Service, suspected that some people may even have left food out intentionally for the bears.

## A big adjustment

As a result, Bear 101 and her cubs will now spend the rest of their lives in captivity. Curious about how the three are adjusting to this fact, we traveled to West Yellowstone a couple of weeks ago to talk with the GWDC's Lead Keeper for the past six years, Libby Scott. As one might expect, Scott told us that the adjustment has been harder for Bear 101, now 21 years old, than for her cubs, now 17 months old. Bear 101, of course, still lives geographically in what was her home range for 20 years in the wild. She is surrounded by some of the same smells and environment, but now lives confined in the middle of a bustling town and consigned to a routine. She and her cubs spend most of their time in an indoor den, which Scott describes as the bears' "safe spot," a quiet place, insulated from the noise of the town and strangeness of peering people. In the den, Bear 101 shows no signs of stress.

For fifteen minutes or so every day, however, the three bears are let out into the Center's outdoor habitat, where they can forage for enrichment foods (see below), get some exercise, and be seen by visitors. According to Scott, this is the hardest part of captivity for Bear 101; when she first ar-



*Left*, culvert trap, similar in design to the one used to trap Bear 101 and her cubs, on display at the GWDC. *Right*, Bear 101 (in middle) and her cubs dig into some enrichment food placed in the habitat by GWDC animal keepers.



Bear 101, seen on right, runs from one food site to the next, atop a nearby knoll. One cub follows as the other eats an apple tossed into the pond by one of the keepers.

rived, the sow could only be in the habitat for between 10 and 15 minutes before beginning to exhibit strong signs of stress, including moaning and groaning, huffing, charging in the direction of the people gathered watching her, and generally "tearing up the place." The situation improved with time, possibly as 101 learned that the habitat was a non-threatening place to be, and that her cubs were safe there. After nine months, Center staff found that 101 could stay outside for between 30 and 45 minutes before becoming agitated. In order to minimize her stress, they restricted the movement of the Center's off-season visitors, making them stay at a distance from the edge of the habitat. Unfortunately, the tremendous increase in visitation during this summer has undone much of that soothing work, and 101 and her cubs are back on a 10-15 minute schedule for viewing, though visitors are still restricted in their movement and location when they are outside.

The cubs, who have now lived more than half their lives in captivity, have had an easier time. They are reluctant to leave the indoor den without their

mother, but once outside they are generally more comfortable than 101. This was evident during our visit; upon entering the outdoor habitat, 101 ran quickly and directly from one source of enrichment food to another, while the cubs each spent some time in the habitat's pond, ambled around instead of running, and were less focused solely on food. Unlike their mother, their behavior was a bit more like that of the bears that had been on display just before they came out. A bell rings when it's time for the bears to go back into the den; on the day we visited, Bear 101 headed for the den like a flash of light, one cub trailing behind her. The other, more reluctant, found itself on the receiving end of a mother's disciplinary cuff as Bear 101 ran back out to retrieve him.

### Life at the GWDC

"Enrichment" is the term assigned to foods that are designed not only to nourish, but to provide captive animals with mental and physical stimulation. Before bears come outside, keepers hide food in the habitat's log piles, under rocks, and in the pond to encourage the bears to forage as they would in the wild, instead of just eating out of troughs, for instance, as one might see at other facilities. Food is hidden in different places each day, and with the exception of 101 and her cubs, the bears are

displayed in different groups each day, to give them a degree of social variety. Inside the den, enrichment often comes in the form of puzzle-like toys with food inside; in order to get at the food, the bears have to figure out how to free it. Examples of this include a kibble-filled, hard, plastic ball with holes drilled in it, or a block of ice with a fish frozen inside. The bears' diet at the GWDC consists primarily of fruits, vegetables, and carcasses donated by hunters, and in summer, the habitat's pond is stocked with trout to stimulate the bears to fish. The Center's bears are not declawed, but are spayed and neutered according to regulations established by the Montana Department of Fish, Wildlife and Parks (FWP); this prevents the captive bears from attracting local wild bears during mating season.



Ravens are constantly present in the habitat, ready to scavenge whatever the bears leave behind.

## The future

Bear 101 will not be spayed until she is finished nursing her cubs; Scott expects the weaning process to be her next big challenge. The situation is unusual because the bears were born in the wild and then taken into captivity while nursing; with all of her needs now provided for her, there is less incentive for Bear 101 to "kick her cubs off," as would be typical in the wild as cubs approach the age that hers now are. Scott expects a "long, loud process" as staffers begin to separate the cubs from their mother.

Currently, there is a space inside the den where 101 can be physically separate from her cubs, but still within their view. According to Scott, the weaning process will begin with periodic elimination of even that visual contact which, initially, will probably agitate both the cubs and their mother.

Scott expects that Bear 101 will spend the rest of her life at the GWDC, but is not sure about her cubs. Although the



Being too slow to return to the den earns one cub a disciplinary cuff from its mother.

Center's FWP permit allows the facility to house eight bears, there are currently 10 living there, due to a special exception that allowed the Center to temporarily admit 101 and her cubs as a single bear. As the cubs mature, they will outgrow the Center's available space, meaning that the GWDC would have to expand in order to keep them indefinitely. The only area available right now is an outdoor holding pen that was used to temporarily hold "Kelty," a subadult grizzly trapped in the park a few years ago after repeatedly jumping

on top of tents, until Kelty could be shipped to a facility near the Angeles National Forest. The Center was able to help in that instance because it is now a non-profit institution. Prior to becoming a non-profit, the GWDC was not allowed to display grizzlies from the lower 48 United States, because in the U.S. it is illegal for private, for-profit institutions to display endangered species.

Recent local newspaper stories have demonstrated that unsecured human foods are still a problem in the West Yellowstone area, as well as further up the Gallatin Canyon at Big Sky, Montana; FWP continues to recommend that residents hang bird feeders higher than 10 feet off the ground, and keep pet food and garbage cans secured and inside. 🐾



Left, Lead Keeper Libby Scott spreads enrichment in the habitat.  
Right, Bear 101 (seen on right) and a cub search for food under a pile of logs.

## ...NEWS BRIEFS...

### BLACK BEAR TRAPPED AND REMOVED FROM PARK

Yellowstone National Park officials report that a 144-pound adult female black bear had to be removed from the park's bear population after crushing several tents and obtaining human food in a backcountry campsite. The bear entered a backcountry campsite in the Bechler area, destroyed one tent and damaged four others, and obtained human food from at least one of the tents. Camp occupants, who were not present at the time, did not see the tent crushing but did return in time to see the bear climb the food pole where additional food was stored, knock it to the ground, and consume some of the contents. Park staff were notified and initiated trapping operations at the site. On the evening of August 8, the bear was captured.

Because the bear was deemed a danger to public safety and not considered suitable for release back into the wild, various agencies and a nationwide zoo clearinghouse were contacted in an effort to place the bear in a suitable institution. No agency was willing to accept the bear, and on August 12, the bear had to be euthanized.

Human foods are the chief culprit in the creation of problem bears, and can lead to their becoming increasingly aggressive, requiring their destruction or removal from the area. In this particular incident, the campers' disregard for food storage regulations led to the death of this bear.

An investigation into the incident is continuing.

### REGIONAL DIRECTOR WADE RETIRES

Effective in August 2003, NPS Intermountain Regional Director Karen Wade retired from the National Park Service after a 43-year association with the NPS and four years in her current position. She will be replaced by a current Grand Teton National Park superintendent Steve Martin, a 28-year veteran of the National Park Service and recipient of the Department of the Interior's Meritorious Service Award.

### MADISON AND GIBBON RIVERS OPEN TO FISHING

As of Wednesday, August 27, at 5:00 a.m., the Madison and the Gibbon Rivers opened to fishing with the usual restrictions (flyfishing only, closure at 7 Mile Bridge; see regulations). The Firehole River and its tributaries will remain closed until temperatures drop. 🐻

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