

Yellowstone Science

A quarterly publication devoted to the natural and cultural resources



Geyser Gazing

A Visit with a Historian

Tales from *Forest and Stream*

Protecting Pronghorns



Legends of Yellowstone

It was a great legend...that near the end of their exploratory journey across the Yellowstone region, members of the Washburn party, camped near the confluence of the Firehole and Gibbon rivers on September 19, 1870, discussed how to divide up the landscape among themselves. Instead, reported expedition leader Nathaniel Langford in 1905, a man named Cornelius Hedges magnanimously suggested that everyone in the party should support setting the region aside as a “great National Park.”

The creation story of the world’s first national park was proudly told by many a ranger for decades at campfire programs in Yellowstone and across the nation. Yet when I first joined the staff here in 1982, we naturalists were taught that the legend was likely false, exaggerated at least; in his diary of the day, Hedges noted nothing exceptional: “...No fish in river, grub getting very thin...”

Though earlier historians had criticized the simplistic Yellowstone creation tale, it was park historian Aubrey Haines who notably challenged its validity in the

1960s, while writing a comprehensive history of the first park. Not until I interviewed Aubrey for this issue did I learn another *Yellowstone Story*. The NPS was preparing to celebrate Yellowstone’s centennial in 1972, attended by park managers and supporters from around the world, when Haines’ work was to have been published by the Park Service. According to author/historian Paul Schullery, who helped me interview Haines, “The old guard in the NPS and the conservation community was very angry that [Aubrey] debunked the myth of the Madison Campfire story and proved that Yellowstone [Park’s] origins were much more complex.” As a result of the furor over questioning the legend in his book, Haines retired earlier than planned. Myths and legends are powerful influences on our culture, and perhaps on managers as well.

Haines’ research *was* published, a myth exposed—and the Service and Yellowstone survived with public affection intact. Aubrey has become quite a Yellowstone legend himself, still re-

searching and writing park histories, 25 years after his retirement. The above photo is affectionately called “The Historian and Three Other Guys,” though the latter are too modest—they include former park historians Lee Whittlesey, the current archivist; Paul Schullery; and Tom Tankersley—each of whom has himself carried on the tradition of preserving the ongoing record of Yellowstone.

Still, I was dismayed to find that NPS officials had even attempted to suppress the results of Haines’ careful study. Although researchers working for government agencies are often accused of being under the thumb of agency managers or politicians, in my years in Yellowstone I have observed such scientists to be independent and outspoken in their opinions. I fervently hope that it is our continued intent to foster sound, objective studies. We should not expect them to produce consensus, but to at least contribute to healthy, informed debate on how to best conserve the cultural and natural resources in all of our parks—even as we spin our tales around the campfire. SCM

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Gazing at Yellowstone's Geysers

by Ralph Taylor

When the alarm goes off at 2 A.M., I grope to silence it. I crawl out of my warm bed and dress quickly, as it is cold in my room at the Old Faithful Inn, even though it is June. I move as quietly as I can, because the floors creak and the walls are no barrier to sound at all.

I put on my coat and backpack, find the flashlights—a white light and a small one with a red lens to preserve night vision. Making my way to Geyser Hill in the Upper Geyser Basin, I leave behind the pools of bright light in the Inn's parking lot and walk in deep shadow around Old Faithful and down to the bridge over the Firehole River. I hope the shadows along the trail are just trees growing along the path and not sleeping bison!

On my first trips alone in the geyser basin, the shadows seemed threatening and the stillness a bit scary. Now Geyser Hill is a familiar place, where the white geyserite sand and lack of trees allow the starlight to show me the way. On this night, I am just trying to stay warm and get to Plume Geyser quickly, to mark the geyser after what I hope will be the last eruption tonight. To check for eruptions

that may occur during their absence, geyser watchers like myself place a marker, such as a small pile of sand, a stick, or a few pine needles, where the next eruption will wash it away.

After half an hour of waiting, Plume finally erupts. After placing the marker, I wait another hour in the increasing cold in case there is another eruption, then head back to try to get a few hours sleep before dawn.

What am I doing here? I am one of more than a hundred amateur geyser watchers who return to Yellowstone year after year to enjoy and learn more about geyser activity. I am here to try to figure out what Plume Geyser is doing this summer, to add a little to our store of knowledge about Yellowstone's geysers.

Geyser Gazers: For the Fun and Science of It

Yellowstone has the world's largest collection of geysers, and thus attracts a large group of dedicated (some say obsessed) geyser aficionados known as

“geyser gazers.” Spanning a wide range of backgrounds and levels of interest, these geyser gazers return to Yellowstone annually to watch their favorite geysers and socialize with other gazers.

The geyser gazers can be spotted in the geyser basins using CB radios to keep in touch with each other, notebooks to record geyser times, wide-brimmed floppy hats and long sleeves for protection during long hours in the high-elevation sunlight, and backpacks in which to carry all their other gear. Visitors learn to look for these telltale signs because the gazers can be good sources of information about what is happening and where to go next. The radios and word of mouth help maintain an efficient grapevine communicating the latest lore among the gazers.

The involvement of many gazers starts with a simple desire to figure out when a certain geyser will erupt, since the park naturalists at the Norris, Old Faithful, and West Thumb thermal areas can provide predictions for only a few geysers. Frequent visits can also lead to an interest in geyser geology, the connections between geysers, or just tracking changes in a

favorite geyser. But some geyser gazers like myself become more technically oriented, and spend years studying one or more geysers in depth, including the details of the eruption sequences, temperature studies, and long-term patterns of activity.

While most gazers keep the information they gather in their heads, others record their data and observations in written reports. Many of these reports, which document thermal activity that would otherwise go unrecorded, are on file in the park archives in Mammoth Hot Springs. For example, Rocco Paperiello and Marie Wolf, a couple from Montana, have spent years visiting thermal areas in the backcountry, writing detailed descriptions and preparing maps of less frequently observed thermal activity.

Other gazers have reported on the activity of major geysers. When Morning Geyser in the Fountain Paint Pot area became active again in 1991 after nearly a decade of inactivity, Lynn Stephens, a college professor and longtime geyser gazer and park volunteer, was present for most of the eruptions and documented the whole sequence with a statistical analysis. Paul Strasser, another longtime gazer, studied Fan and Mortar geysers, two large geysers near Morning Glory Pool that are active most seasons but typically erupt only once every three to five days, and often at night. He combined temperature studies and many hours of observation in the field with a historical search to discover the complicated sequence of activity leading up to the eruptions, and to trace long-term changes in the eruption patterns.

In the early 1980s, a group of long-time gazers decided to create an organization to collect and publish information about the geysers in Yellowstone and other thermal areas around the world. In September 1988, the Geyser Observation and Study Association (GOSA) was formed as a non-profit corporation in California. Now with about 250 associates, GOSA publishes a bimonthly newsletter containing mostly geyser news from Yellowstone. It has also published five volumes of *GOSA Transactions*, which include reports and technical articles on geyser activity, and a sixth volume is due this year. The efforts of GOSA have

encouraged the publication of dozens of reports on geysers and other thermal activity. Since geysers are always changing, this kind of study is never complete, but these efforts provide insights into the behavior of the geothermal system that are appreciated by geyser fans who use the knowledge to enable them to see more of the rare eruptions.

How I Became a Geyser Gazer

My lifelong fascination with geysers began during my first visit to Yellowstone in 1966, the year after I graduated from college. Over the next 15 years, I made almost annual trips to Yellowstone and spent several days each time watching geysers, mostly in the Upper Geyser Basin. My serious geyser watching began in 1982, when I met some of the geyser gazers. I found out about geysers the way many geyser gazers do, by spending hours talking (and, more importantly, listening) to the endless discussions in the basin, while waiting for a geyser to erupt. As I began to learn the names of Yellowstone's many springs, vents, and minor geysers, I grew determined to discover some of the secrets of the geysers for myself.

In 1986, while watching Fantail Geyser, newly active that year, I met the late Rick Hutchinson, the park's research geologist. He agreed to let me help out with thermal observations as a park volunteer, which provided me with several opportunities to study geysers at closer range than would otherwise have been possible. Rick also suggested ways I could improve my reports, and methods of data analysis to help reveal patterns not evident from the raw data. As a bonus, I had some rare but greatly treasured opportunities to help with other projects, such as the thermographic mapping of Gibbon Canyon and taking a film crew in the "thermal boat" on Grand Prismatic Spring.

My educational and professional background is as an electrical engineer, specializing in real-time software systems—hardly a background to prepare me for patient observations of geothermal phenomena. It took some time to learn to study a system where I could make no changes, but merely observe and deduce. From an engineer's perspective, this is a

strange way to operate! And because of my "real" career as an engineering manager for a manufacturing company in Ohio, I was only able to visit Yellowstone for a week or two at a time. I needed subjects that would allow me to observe many activity cycles and collect a lot of data in just a few days. A benefit of focussing on the relatively minor geysers is that many of them have never been studied intensively.

My First Subject: Anemone Geyser

I'd always been interested in Geyser Hill, a concentrated group of more than 30 erupting features northeast of Old Faithful, ranging from major geysers like Giantess and Beehive, to very small ones like Anemone Geyser, my first study subject. Located at the southwest edge of Geyser Hill, Anemone is actually two separate but related geysers, "Big Anemone" and "Little Anemone" (sometimes known as "North Anemone" and "South Anemone"). While "Big Anemone" erupts every 7 to 10 minutes to a height of about 3 meters for about 22 to 25 seconds, "Little Anemone" has several different eruption patterns. I had observed that there was a sequence of events around the time of the eruption of "Big Anemone," and wanted to determine the relative timing and the regularity of the activity.

During the four years I studied Anemone Geyser, from 1985 to 1988, I saw some interesting changes in the eruption patterns. In 1985, the water in "Little Anemone" rose and fell before each eruption of "Big Anemone," then "Little Anemone" usually erupted. Sometimes "Little Anemone" did not erupt, but the pattern was generally consistent. In 1987, I noticed significant changes. "Little Anemone" began occasionally having eruptions that lasted up to 15 minutes and suppressed all activity in "Big Anemone," and it developed a new runoff channel. This pattern has continued, and the runoff channel is now well established.

Although I made no major discoveries during my study of Anemone Geyser, it was instructive to watch the activity, decide which were the key factors in the activity, record my observations, and analyze the data. This work led to a paper

on Anemone Geyser that was published in the first *GOSA Transactions*.

A Jewel of a Project

Over the years, I have visited all of the front country thermal areas regularly, renewing my acquaintance with the thermal features each year and looking for new or unusual activity. While watching Jewel Geyser in Biscuit Basin, I had noticed that the interval between eruptions, which consist of from two to ten quick bursts, seemed to occur after a longer pause following an eruption of many bursts. Since Jewel Geyser's eruption intervals (the time from the start of one eruption to the start of the next) are less than 10 minutes, I could collect a significant amount in a few days of observation.

For this study, I recruited my wife, Brenda, to help collect data for several days in four consecutive summers. After observing 130 eruptions over a total of 17 hours in 1989, we determined a linear algorithm that enabled us to predict the next eruption by counting the bursts of the last eruption. We observed 95 intervals during 12 hours of observation in 1990, 41 intervals in 1991, and made some follow-up observations in 1992.

During the study period, we observed the length of time between eruptions, the

Photo courtesy Ralph Taylor.



A large burst from Jewel Geyser, located in Biscuit Basin.

number of bursts per eruption, and the distribution of the burst sizes. Through 1991, the distribution stayed relatively constant, with about 40% of the bursts small, 20% to 30% medium, and about 25% large (Fig. 1). In 1992, however, although Jewel continued to erupt from an overflowing pool, there were many more small bursts, longer intervals between eruptions, and more bursts per eruption (Fig. 2). When I compared the data for August 5, 1992, and September 27, 1992, the data showed that the September eruptions had many more bursts than those observed in August.

The significance of a geyser gazer's work often comes from establishing

baseline conditions through routine recording of geyser activity, so that when some event occurs that causes change, the change can be quantified. For example, in November 1992 a research well, "Y8," located in the Biscuit Basin parking lot about 350 meters east of Jewel Geyser, began leaking about 140 liters of water a minute. The well was drilled in 1967, one of 13 such wells used by the U.S. Geological Survey to study Yellowstone's geothermal features. The well began leaking at 35 gallons per day in early November 1992. While the leak was being repaired, the water levels in Jewel Geyser were observed to be much lower than before; indeed, they remained

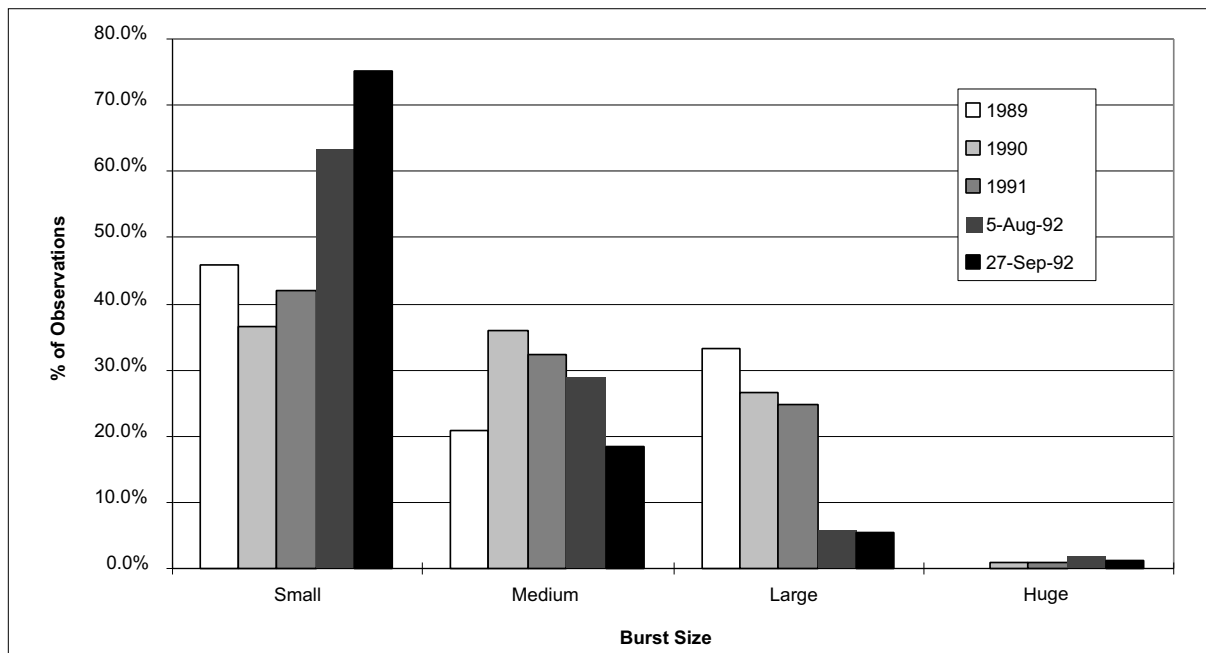


Figure 1. Burst size distribution of Jewel Geyser.

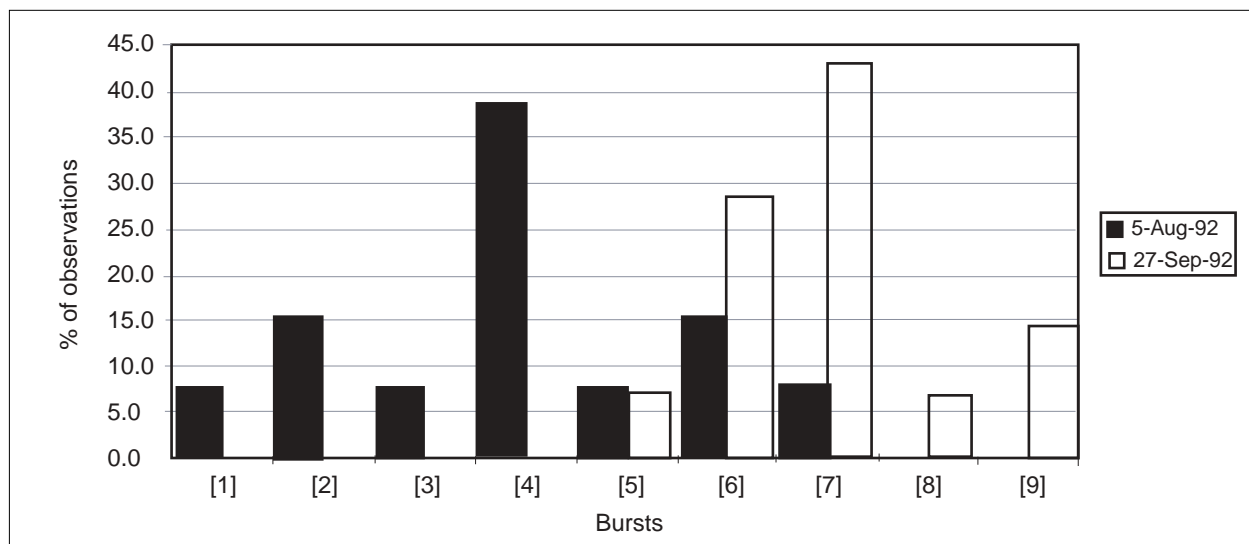


Figure 2. Frequency of bursts per eruption of Jewel Geyser, 1992.

low from 1992 to the summer of 1997. It is not clear whether the leak in the test well caused the water level in Jewel Geyser to drop, but my observations clearly showed that the eruption pattern had changed significantly by late September, weeks before the leak was discovered. Jewel Geyser has continued to erupt from an empty pool with more and stronger bursts, probably because of the reduced water pressure. At this writing, in early spring 1998, Jewel's water level is reported to be higher, possibly because of an earthquake in the Biscuit Basin area in January 1998. The leaking research well and the recent earthquake are good illustrations of the constant change in Yellowstone's geyser basins.

Plume Geyser: Asleep or Just Dozing?

Since Plume Geyser is located just 30 meters (100 feet) west of Anemone Geyser, I was familiar with its habits; I had a lot of Plume Geyser eruption data in my field notes from the 1980s. There was ample documentation in the geyser logs in the Old Faithful Visitor Center (where park staff and research-minded geyser gazers record their observations) to show that for many years Plume had had consistent eruption intervals throughout the day. But in the summer of 1991, Jens Day, a long-time geyser gazer and park volunteer, noted that its interval was varying from night to day. Scott Bryan, a geyser gazer, geologist, and former park

naturalist, also wrote about the diurnal changes in Plume's interval in his study of Geyser Hill. This was an interesting anomaly that I decided to investigate further.

Early in the summer of 1992, Rick Hutchinson and Heinrich Koenig, another thermal volunteer, placed an electronic temperature monitoring device in Plume Geyser's runoff channel for a 96-hour period. The record of the runoff temperature clearly showed the eruption intervals were longest in the early morning hours, reaching 40 minutes near dawn, and decreased through the day, reaching about 30 minutes by mid-afternoon.

To see all the details of Plume's behavior, it was necessary to watch each eruption from a position on the Geyser Hill boardwalk about four meters west of the geyser vent. Plume's eruptions, which were about eight meters in height, consisted of two to five bursts that lasted about eight seconds each separated by about 16 seconds (counting from the start of one burst to the start of the next). It is quite challenging to try to record the exact start and stop times of each burst to the nearest second while standing on the crowded Geyser Hill boardwalk in the middle of August!

Since I wanted to determine Plume's diurnal cycles, I needed to watch the eruptions around the clock, every 30 to 40 minutes, for several days. With the help of my wife, Brenda, and three other intrepid geyser gazers from GOSA, Plume

was observed for 84 consecutive hours, beginning at 7:31 A.M., August 1, 1992, providing data on 150 consecutive eruptions. Although we found no distinguishable shifts in the number of bursts, burst sizes, or burst duration, I was able to measure a change in the interval between eruptions over the course of the day (Fig. 3). The diurnal cycle is fairly obvious in the plot of interval between eruptions. A sine curve fitted to the data indicates a daily variation in interval of just under three minutes. The actual variation on August 2 and August 3 was closer to 10 minutes.

After the 84-hour watch of Plume, it was clear to me that the effort to observe such a frequent geyser around the clock for that length of time is not practical. It required five dedicated observers and arduous nighttime stays on Geyser Hill just to get four days of data. A single observer could only obtain data on a fraction of the intervals. Fortunately, our study demonstrated that the key variable at Plume was the interval between eruptions. It proved possible to use a combination of eruption times derived from a temperature monitoring device and the data from the Old Faithful geyser log book. The log book data is biased, because fewer observations are made at night. The number of intervals observed between 10:00 P.M. and 7:00 A.M. is very small—nearly all were the result of our study. However, the use of the temperature recorder to determine eruption times



Above: Ralph Taylor taking notes in the field. Below right: StowAway device—a temperature monitor, showing the two-meter thermistor cable and a short cable used to download the data to a portable computer. Photos courtesy Ralph Taylor.

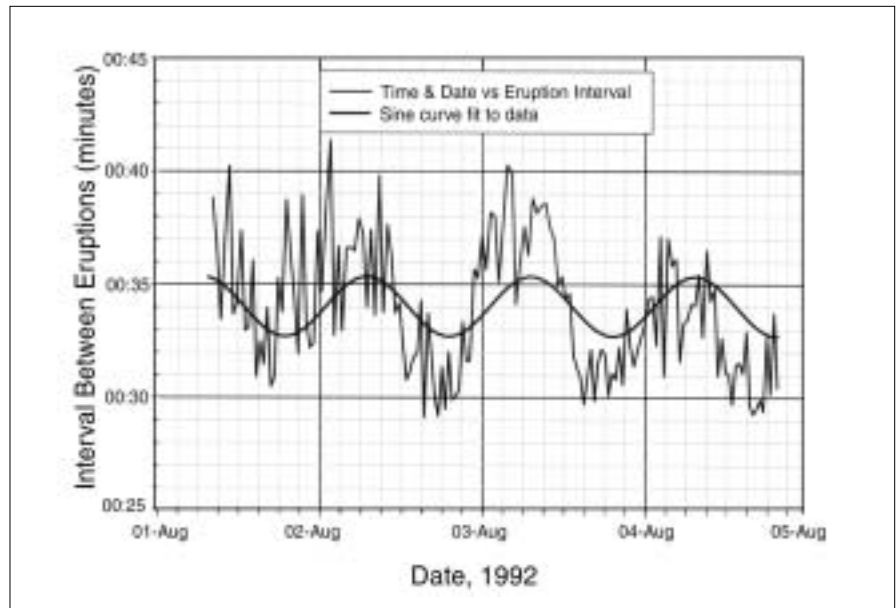


Figure 3. Interval between eruptions of Plume Geysier.

remedied that problem.

Using the intervals from both the log book and the electronic monitor, I produced a graph of the mean interval observed each hour of the day for all of the Plume Geysier closed intervals (intervals during which the geysier was under observation for the entire time) in 1992. The first bar represented the mean of all intervals observed between midnight and 1 a.m., and so on. The resulting graph showed a clear decrease in interval from morning to late afternoon (Fig. 3).

During the winter of 1992-93, Plume Geysier became dormant. The water in the geysier cooled, cyanobacteria grew in the vent, and I wondered if I'd have a geysier to watch. Plume began erupting again in the spring, but it appeared to have quit erupting altogether during the night. However, this nighttime dormancy had not been proven when I arrived in May, so I obtained permission to leave the walk at night to place a small piece of wood as a marker near the vent. Finding the right location and a reliable marker that will remain in place during non-eruption overflows yet wash away during an actual eruption can be difficult, especially on a geysier like Plume where the eruption is mostly vertical and the runoff joins a stream close to the vent. It is also important that the marker not wash into the

geysier, which might damage its plumbing.

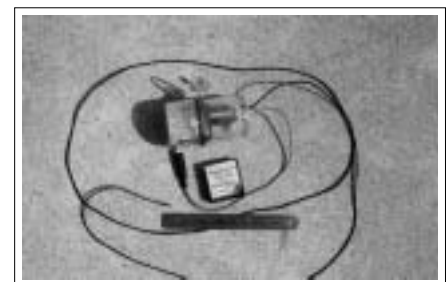
I stayed on Geysier Hill in the early morning hours of several nights, placing the marker after what I hoped was the last eruption. Often this meant waiting through several eruptions until I thought Plume had quit. On some nights an eruption occurred after I left. I did finally manage to place a marker that was still there when I arrived at dawn the next morning, showing conclusively that there had been a period of several hours when Plume did not erupt at all. It had apparently developed the habit of "sleeping" at night! Based on this information, and because the diurnal variations were still present, Rick Hutchinson maintained the electronic recorders on Plume for the rest of 1993, and let me use the data to complete my study. Plume went dormant again in the winter of 1993-94, but rejuvenated in the spring. By the summer of 1997, the diurnal cycle was no longer evident.

Why did Plume begin having these odd diurnal shifts, and then suspend activity at night? We will probably never know for sure, but the most likely reason is that as cooler nighttime water ran down from Giantess Geysier, it flowed into openings in the sinter sheet surrounding Plume and cooled the water in Plume sufficiently to prevent eruptions. As the day warmed,

the water temperature apparently rose enough so that Plume's eruptions resumed. Over time, the cooling effect at night may have lessened as sinter deposits or debris blocked the channel to Plume; Plume then began having eruptions at regular intervals again.

Electronic Monitoring of Geysier Activity

As my Plume Geysier study showed, keeping watch on a geysier around the clock, especially when it erupts frequently, can be laborious. My exposure to the electronic devices used by the NPS for geysier monitoring suggested several other projects that could be done using the monitors. After getting Rick's approval, I obtained some monitors of my own and a research permit to deploy them unobtrusively on several geysiers to obtain baseline eruption data.



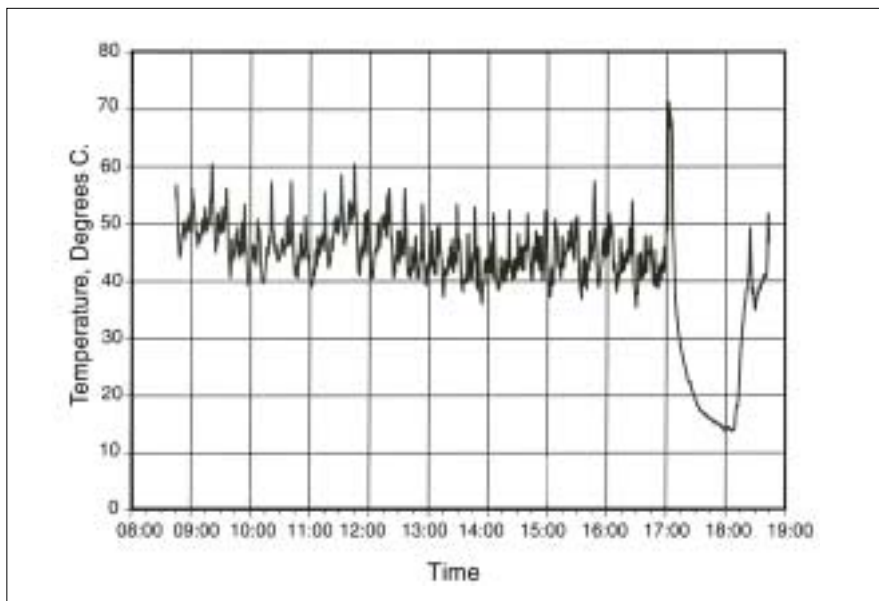


Figure 4. Runoff temperature of Depression Geyser.

Geyser researchers record geyser activity using battery-powered computerized recorders that were first designed to monitor the temperature in refrigerated trucks and rail cars, but have since been applied in many other ways. The recorders use a thermistor to sense the temperature of the intended subject (geyser runoff water, in this case). The thermistor can be placed several meters away from the recorder, and the device can record the temperature at preset intervals. The instrument in its waterproof container is only 10 cm long and 6 cm in diameter, making it easy to bury out of sight. The device that I use can record as many as 32,000 samples, which can cover a day or several weeks, depending on how often it is programmed to record the temperature. For geysers with long intervals between eruptions, it is sufficient to record the temperature every minute. For a geyser like Plume, where the interval between eruptions is short, I prefer to use a shorter sample interval.

A simple recording of the geyser runoff water temperature contains a large amount of information. At Depression Geyser, a small geyser north of Beehive Geyser that typically erupts two or three times daily, the recorder was set to sample every 24 seconds. Figure 4 shows a ten-hour segment of the temperature record

from September 27, 1997. It is easy to see that an eruption occurred at 17:00, where the temperature suddenly rises from around 42°C to 72°C, followed by a gradual cooling for 65 minutes. The geyser crater, which was completely emptied by the eruption, refilled during the cooling period and reached overflow at about 18:10. The small peaks where the temperature rose about 10°C correspond

to the periodic rise and fall of the water level in the crater. To identify these relationships, a certain amount of direct observation is necessary. However, once the action of the geyser has been correlated with the temperature record, it is possible to determine a lot of information from the temperature plot.

Although we were able to use the temperature record to estimate the duration of the eruption (about 5 minutes) for Depression Geyser, this was not always possible. In the case of geysers that erupt with a slender column of water, there is no point at which the temperature sensor can measure the flow and determine the duration of the eruption. Therefore, the temperature record is only part of the information needed to characterize a geyser's performance.

Depression Geyser is relatively small and rarely observed between dusk and dawn, so its eruption intervals cannot be readily determined from on-site observations. But because it follows a characteristic pattern of an eruption followed by an hour or more of declining temperatures, with periodic temperature variations indicating the overflow cycles, we can learn something about its long-term trends by looking at its temperature record for the whole season. Figure 5 is a graph of its eruption intervals during the summer of 1997 as derived from the temperature



Depression Geyser, located in a shallow depressed area on the west side of Geyser Hill. It erupted from the pool of water about every 9 hours in 1997.

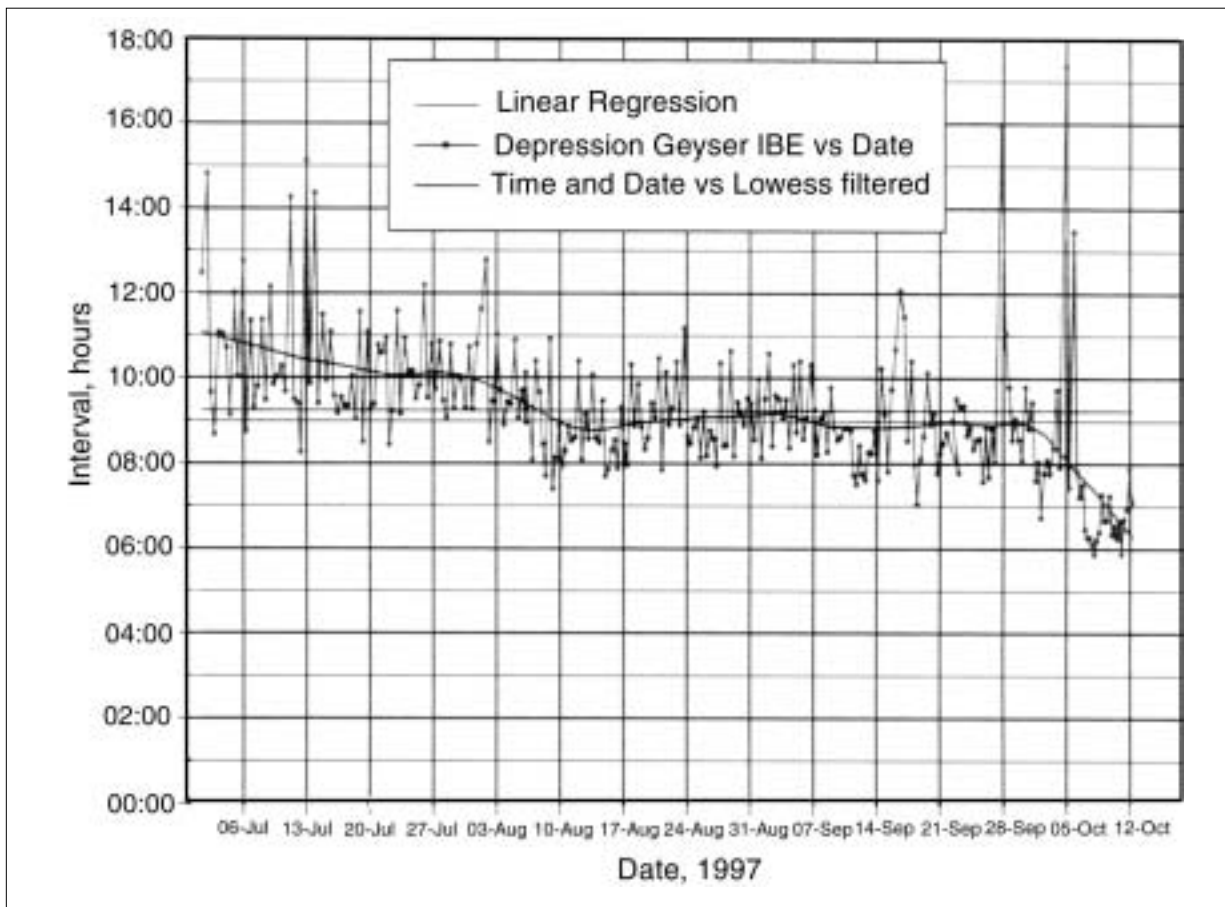


Figure 5. Depression Geyser interval between eruptions (IBE) vs Date.

recorder data. The gray line is a straight-line regression fit to the interval data, indicating a trend toward shorter intervals as the summer progressed. Although some of the intervals appear unusually long, the temperature record shows that these were indeed single long intervals, not missed eruptions. The long intervals were probably caused by a strong west wind that cooled the geyser pool, dissipating the heat needed to trigger an eruption.



Upper Geyser Basin. NPS photo.

What Next?

In January of 1998, a small earthquake occurred near Biscuit Basin, and shortly thereafter geyser gazers noted some significant changes on Geyser Hill. Giantess Geyser erupted shortly after the earthquake, for the first time since October 1997, Cascade Geyser reactivated for the first time in nearly a century, and Jewel Geyser has begun erupting from a full pool for the first time since 1992. I expect to be back at Geyser Hill this summer and to continue my monitoring of several other geysers. There is always something to study in Yellowstone's ever-changing geothermal systems. ✱

Ralph Taylor is a retired electrical engineer with a Bachelor of Science in electrical engineering from the University of Cincinnati. He has been a director of the Geyser Observation and Study Association

since 1991, and has served as president of GOSA since 1994. Ralph has published several papers on geyser observations in the GOSA Transactions, and hopes to continue as a geyser gazer and NPS volunteer for many years to come.

FURTHER READING

The geyser gazer's bible is: Bryan, T. Scott. 1995. *The Geysers of Yellowstone*. The University Press of Colorado. 463 pp.

For papers by geyser gazers on geysers in Yellowstone and around the world, *GOSA Transactions* (Vol. 1 to 6) are available from the Geyser Observation and Study Association, c/o Janet and Udo Freund, 39237 Yellowstone St., Palmdale, CA 93551.



Photo courtesy Aubrey Haines.

*Yellowstone Science Interview:
Aubrey Haines*

Yellowstone History: 125 Years and More to Tell

Aubrey Haines was a park ranger, engineer, and Yellowstone's first historian before his retirement in 1969. He has had a long and distinguished career and has written many books about this and other parks, including The Yellowstone Story, Volumes I and II, which tour guides and interpreters still rely upon as the most comprehensive telling of park history and legend. He continues to write; one of his current projects is Tales from the Yellowstone, a compilation of what Aubrey called "the minutiae of historic happenings here."

At Yellowstone's Fourth Biennial Science Conference, held in October 1997 at Mammoth Hot Springs, the sponsors instituted what they intend to become a regular feature of the park's conference series—the Aubrey Haines Luncheon and Lecture, honoring a significant contributor to the study and documentation of Yellowstone history. Aubrey was present for the first of these tributes in his honor, and was interviewed during the conference by the editor and the former editor/sometime park historian, Aubrey's successor, Paul Schullery.

The Early Days

YS: Could you start by reviewing your job background—where you came from, and how and when you first got interested in Yellowstone?

AH: I was ready for college in January 1933, and since I saw the forest industry as the way to go at that time, I entered the University of Washington during the Depression, with the intent of preparing myself for a job as a forest engineer in the Pacific Northwest—building roads and bridges for logging companies.

The first summer after going to school, I found a job cutting hemlock cord-wood for the Port Townsend paper mill—at a dollar and six bits a cord, peeled!—but soon heard there was going to be a Civilian Conservation Corps, and they were looking for young men who didn't have much to do—who did, in that day? As forestry students could join up as "leadmen" for \$1.20 per day, I went for that, and spent the summer of 1933 at Skykomish, Washington, on survey and classification of logged-over lands the

logging company wanted to exchange for Forest Service timber. That winter we moved down into the Puyallup Valley and built roads for the state forestry organization. In the spring they sent us to the northwest corner of Mount Rainier National Park, where they put me on relocating foot trails that were steep, rough, and mostly in the wrong places.

One day in June 1934, District Ranger John Rickard asked, "Would you like to be a fire lookout?" It didn't take a moment to answer "yes!", and I had a summer job for \$4 per day. Since I was to be on duty every day of the week, that amounted to \$120 a month, which was a fortune in that day, believe me. In the rainy seasons and late summer they'd have me on trail work and telephone line work, things like that—good experience. I worked there every summer through 1938.

The year before I graduated, the fire dispatcher, Al Rose, sent me a letter: "There's going to be a Civil Service examination for park ranger—be sure to go down and take that." I did, and after graduation I went back up on the Shriners

Peak lookout. About mid-summer came a letter from a Hawaii Volcanoes National Park offering me a ranger job. I got on the wire and Al Rose put me in touch with Superintendent “Major” Owen Tomlinson. He said, “Don’t take that one—you’ll get another chance.” About a month later came another letter, this time from Yellowstone. Tomlinson said, “Take that one—that’s good!” So that fall after work was over, I passed the physical and oral exams, got me an old car—an old Nash Twin 6 off the lot for \$65—and went to Yellowstone.

YS: It was the first time you’d ever been here?

AH: I grew up in Oregon and Washington and had never been farther than Spokane. I arrived at the park December 8, 1938, and was waiting in front of the “Temple of Truth” [an employees’ nickname for the green-roofed Corps of Engineers’ building in Mammoth Hot Springs, a.k.a. the “Pagoda”] at 8 o’clock in the morning, when W. Leon Evans came over to open up. He put up the flag and said, “Well, we’ll have to swear you in.” So he took me up to T. Paul Wilcox, the judge. I got a manual and a .45 pistol and was told what kind of extra clothes I might need. They said, “Tomorrow we’ll send you over to the East Gate to replace Walt Gammill.” And that was all the indoctrination there was.

Since Sylvan Pass was closed by snow, I drove around to the East Entrance by way of Cody. The last two miles (from Pahaska Tepee to the gate), the snow on the road increased from a skiff to over a foot, but my old car chewed its way in. Walt was surprised and said, “Gee, I left my car down at Pahaska!” The next day Dave Condon, the District Ranger, got stuck in a GMC pickup about halfway from Pahaska. We went down and shoveled him out and brought in the snowshoes and extra lantern gasoline, stuff like that. I should have taken my car out right then, but I didn’t do it. In a couple of days we got heavy snow. So, I just took the oil out of the crank case and put the battery in the station, and figured I was there for the winter. That wasn’t bad. I had a telephone line to Cody and I could call there for what I needed in the way of groceries. Somebody’d bring them up and they’d give me a ring and say,



Aubrey Haines in his ranger-patrolman uniform next to car number 106 in June of 1940. Photo courtesy Aubrey Haines.

“Pahaska Bill’s got your groceries.” It worked fine.

The “Phantom”

YS: Did you have skiing experience before, or law enforcement training?

AH: No, no. I didn’t know a darned thing about it. They didn’t tell me what was going on, but I soon found out I was there because they were blocking the road in case the “Phantom” showed up again. He was an unidentified person who pilfered cabins in the southeast corner of the park during the summer and fall of 1938, and, probably, was Earl Durand, the man who killed four officers in a wild spree of lawlessness in and around Powell, Wyoming, in the late spring of 1939.

YS: So your job was to sit there and just check every day, and provide an obstacle.

AH: I had nothing to do except to make sure that nobody went in or out, so if he did go in, at least they’d be able to send a patrol after him. I was recalled from the East Entrance about Valentine’s Day of 1939, and made several ski patrols in the interior of the park that spring. On one, Tiny Semingsen and I had gone up to Round Prairie and over the ridge to the cabin on Cache Creek, and it happened that we came out the same day that Durand made his escape after killing the first two officers. They thought he was going to fade into the mountains there, directly opposite of where we were on the boundary, and maybe hole up in a park cabin.

When we came down the hill on our return that morning we saw two ski men coming across Round Prairie, and as they got closer we could see they had rifles. Headquarters had sent Lee Coleman and Frank Anderson to rescue us. But instead of coming into Yellowstone, Durand turned the other way.

YS: Did they ever catch him?

AH: They got a force of about a hundred men up on Rocky Fork River, and he killed two more there—they even had the National Guard there with a field piece to shell that place. But he got out and cornered a rural mailman and used his vehicle to go into Powell where he held up the bank. The townspeople were alerted when he fired a few shots in the ceiling, and that brought everybody; they came with their guns. He was going to leave, pushing the teller ahead of him out the door, and they shot the teller and probably wounded Durand; anyway, he went back inside and killed himself.

YS: It sounds relatively boring around this place since!

AH: It was a fun place for a young fellow.

Accumulating Yellowstone Tales

YS: When did you start getting interested in history, and when did that become your job in the park?

AH: On another interesting patrol, I went with Verde Watson from West Yellowstone into Hayden Valley and to Canyon, then back around to Mammoth.



Sgt. Haines in the Corps of Engineers, 1942. Photo courtesy Aubrey Haines.

By that time I'd been able to order in some ski boots and necessary equipment. At Madison Junction, there was a little cabin used by the naturalists in the summer. There Verde told me about the scouts who had brought a body from South Entrance to Mammoth. He thought it was Phillips, who had died at Old Faithful from eating vegetation that turned out to be water hemlock, but he was confused on that; this was a Yellowstone tale with many versions. They supposedly stood the box with the dead man in it beside the window and the scouts played a game of cards, and this lasted into the next morning. The sun warmed it and the box began to shake a little, and somebody said "Wait a minute Bill, we'll come out and let you out." Later, I found the real site of that 1906 happening—at Fountain Station.

But anyhow, we went on up Nez Perce Creek, where we ate lunch. We sat down in front of a white panel with green lettering on it, which was the place where the Cowan party of Helena tourists had been captured during the Nez Perce war (at present Cowan Creek).

When we got into Hayden Valley, sticking out of the snow were remnants of a massive log fence. Verde said, "This was an old dairy ranch for the hotels." That was not true; it was an attempt to save the buffalo back in the 1890s, which didn't

work; they enclosed several miles of country where they thought they could pen some and feed them hay—it was a silly idea, actually. Anyhow, I had a natural interest in history, and events like that began stacking up in my memory. But I didn't write anything until I came back after the war.

I went (in June 1941), because a young unmarried ranger wasn't anywhere near as important as the young people around Cody and Powell who worked the oil rigs or herded cattle. I thought I'd be gone a year and then come back. It turned out to be four years in the Corps of Engineers type-mapping roads. But I did return before the end of the war, after I was disabled in the New Guinea campaign. It was lucky for me, because that's when I met my wife, Wilma.

YS: How did that happen?

AH: I had a little gas, not much, to do some looking around. I drove down to Gardiner one evening and then up the old road. When I got almost to the top, there was a little drift of snow in the road in which I stalled the car. As it vapor-locked, I stepped out to wait and let it correct itself, and there on the bank were two girls sitting on a rock, watching. I talked with them a bit, and as the next day was Sunday, I asked, "Would you like to go over and look at the Petrified Trees at Specimen Ridge?" You see, nobody could travel around, and I guess anything was fun. So we went out there, a nice little trip, and I took an interest in Wilma Smith; she was the superintendent's secretary at the time. A year later I stole her! I think Mr. Rogers didn't mind too much; he walked her down the aisle at the chapel. Our children were born here too; this place was home to us for a long time. When Wilma and I married, we had quarters over the north side of the museum.

YS: So you were at work as a ranger again, with a lot of general duties?

AH: Since I was having trouble with malarial fever recurrences, I was used in the fire cache that summer of 1946. It was a bad fire year, and I got rid of most of my chills and fevers on the fire line! Chief Engineer Phil Whohlbrant had two assistant engineers, but had lost one to the war effort and had been unable to fill the position. So he asked me, "Would you like that engineering job?" "Yeah!" I

said. So they sent me to Cody, where I took an engineering exam and passed it, and they said, "You're an engineer now, a civil engineer."

The next two years I spent on topographic mapping of what is now Grant Village and construction of sewer and water lines for the Canyon Hotel and Campground. By fall 1948, Mission 66 [*an effort to upgrade roads and visitor facilities across the NPS*] was shaping up, and office rumor had it that the Western Office of Design and Construction was going to take over all engineering work in the park. So I asked for a year's leave of absence to turn my bastardized engineering background into a professional degree. My request was denied, so I resigned. We moved to Missoula, where I got a Master of Science degree, followed by a year's work toward a doctorate at the University of Washington. Our funds were exhausted by that time (1950), so I returned to Mount Rainier as a district ranger.

A Historian in the Making

YS: But that was still long before you were Yellowstone's historian. Where did you learn to do history, to do research?

AH: I got very good training at the University of Montana under Dr. Paul C. Phillips, one of Montana's really fine historians; I took many of his courses. I got a lot of personal attention from him. He was the one who said, "Why don't you edit Osborne Russell's *Journal of a Trapper*." So I began. In fact, while in Seattle working on my doctorate, I completed the editing of the journal but I never did the dissertation.

I came back to Yellowstone in June 1956—strangely, by transfer into the very same engineering position I had resigned from eight years earlier!

YS: But you were beginning your historical research on the side. Did you think of it as a contribution to the knowledge about Yellowstone?

AH: No, it was a hobby interest. But it soon got to where I began writing about Yellowstone. The very first thing was *The Bridge that Jack Built*, which was the Baronett Bridge at the mouth of the Lamar. And Lon Garrison, who was superintendent after 1956, felt the park needed a



Baronett Bridge across the Yellowstone River. Photo by William H. Jackson, 1871. NPS photo archives.

historian. I was transferred from engineering to the naturalists' department in December 1960, as the park's first historian.

YS: The park had never had a historian before?

AH: In the Army days, Captain Hiram M. Chittenden had written *The Yellowstone* because he had a strong history interest. But that's all the park had in the way of a history. And Garrison was getting requests from school children and others interested in the park who wanted information. In the morning I'd go to the office and there'd be letters and a note, "Aubrey, would you answer these for me?" When I got that out of the way, I could gather archival material or read up, or chase some facet that I was trying to unravel; I usually had half a day free to research and write.

I found chunks of the Folsom-Cook-Peterson diaries [from one of the early expeditions to what is now the park, in 1869] scattered around here and there, and I thought, where is the whole diary? I never did find it. But I finally put together a kind of montage, published as *Valley of the Upper Yellowstone* (1965). It's interesting that now there's another chunk that I didn't know of before. This lad who discovered the long-lost diary of H.D. Washburn [from the 1870 expedition he co-led with Nathaniel P. Langford,

and cavalry Lt. Doane], Lee Parsons, found a transcript of missing Cook-Folsom information copied in the front of Washburn's diary. How marvelous! Lee is a good researcher, and he writes well. I've been pushing him to get his information in print. He has the means to turn out a first-class book on Washburn. And he must do it!

YS: What other things would you like to see in print?

AH: The park needs book-length biographical studies of Washburn, Langford, and Superintendent Norris (the book by Judge Don Binkowski is not a satisfactory treatise, though he had ample research material), and less extensive works on Walter DeLacy and John H. Baronett. The study of the old Buffalo Ranch John Tyers [assistant park naturalist in the 1970s] is working on should be very helpful in its examination of the human side of that operation—who was there and how they fed the buffaloes out there in the winter, how they culled them and gave them their shots, and where they moved them around in the 1930s.

The Importance of Yellowstone's Military Record

YS: Did you start a museum collection, or were there some beginnings already?

AH: There was a small museum in the

former Army Bachelor's Officers Quarters, or 'BOQ' [today the Albright Visitor Center] building from the late 1920s on. I started gathering records, and soon tumbled to the fact that the military record here was unique. You see, the Army is not supposed to govern people within the limits of the U.S. in times of peace; that is something that civil government is supposed to handle. But Yellowstone was here before any of the civil government around it, and so when the states were formed, each state—Idaho, Wyoming, Montana—was required to admit that they did not have jurisdiction in Yellowstone.

So here was Yellowstone, not a civil entity in the sense of having civil government and jurisdiction established within it. The federal code covered serious things like murder and all the felonies, but when it came to rules and regulations, they were unenforceable, and therefore you couldn't make a case out of minor things, like killing an elk. This was a big problem.

Fortunately, Missouri Senator George Vest, a post Civil War legislator, had seen the wisdom of attaching a rider to another act saying that in case of necessity the superintendent could call on the Secretary of War to provide troops. So as soon as civil management of the area broke down in 1886—Congress had failed to fund Superintendent Wear's administration and he couldn't run the park—Captain Moses Harris' First Cavalry was brought in from Miles City, Montana, and Harris became the first acting military superintendent.

From then until the end of the Army administration in 1918, the U.S. Cavalry created a unique collection of records—it's a large one, amounting to about two tons. It's the only such record of the Army as a civil governing agent, in spite of the fact that that is not their role. Yosemite's record wasn't quite the same, because Army occupation was not continuous, and state law remained active in Yosemite. But that's a moot point; because those records were destroyed. Somebody said, "Let's clean the place out." And they loaded them into pickups, hauled them to the dump and set fire to them. Only Yellowstone's military records remain intact.

YS: The Park Service has a terrible repu-

tation about records; they did the same thing with Civil War records long ago—thousands of documents thrown out. What did you do to gather up the first archives at Yellowstone?

AH: I kept running into fragments of this military record, so I started gathering them. I had an office upstairs in the northwest corner of the BOQ. I assembled the records there and catalogued them. The first sizeable lot came from shelves in the restroom in the back corner of the old headquarters [now called the “Pagoda”]; a whole bunch of these letter-books—Army records—were stuffed up on an overhead shelf and in the basement! Another cache was in the attic at the paint shop, and some were in the attic of the wooden troop barracks [now the *Yellowstone Center for Resources building*]. . . I recovered a number of volumes from houses on Front Row where people had taken them to look at. Wherever they could find a place, they’d stuff them away. I let it be known that I was interested in the old records, and they came in from all around. There were Judge Meldrum’s court records. There were the log books they kept out at the soldier stations, and the guardhouse records. They kept an account of every stagecoach that came up—the number of passengers, driver’s name—amazing records. So I gathered it all together and called it a Yellowstone archive, and it makes me happy to know that this unique collection is now a unit of the National Archives.

The “Yellowstone Story”

YS: By the mid-60s, you were being given time to work on the two volumes of *The Yellowstone Story*.

AH: It was after I wrote *Yellowstone National Park: Its Exploration and Establishment* that Garrison decided he wanted *The Yellowstone Story*, about 1965. But there were several years where I was gathering my wits historically, collecting information.

YS: It was the first fairly comprehensive history of the park?

AH: It wouldn’t have been, except that I got balky! The Washington Office wanted a one-volume book and proceeded to bobtail my manuscript. I wouldn’t go

along with that, and finally withdrew the manuscript, and the YLMA (the Yellowstone Library and Museum Association) took over and found a publisher.

YS: I remember several of the park staff lobbying, saying, “There is no way you can cut the heart of that manuscript and turn it into a little book. That would not do service to anybody.” And Al Mebane, who was chief naturalist at the time, agreed and found John Schwarz and the Colorado University Associated Press, who published it in conjunction with the former YLMA.

AH: I finished the manuscript before I retired, at the end of 1969. But you see, it traveled around a long time through the Service, and thus was not available as one of Yellowstone’s centennial year publications, as originally intended. But I appreciate very much that the park stood by me and published the full manuscript. The problem stemmed from the fact that I questioned the Madison Junction campfire story of the park’s creation, and the world-wide national park movement, originating from a discussion at that place on the evening of September 19, 1870. [Ed. Note: *Historians now generally accept that the campfire story is more NPS “legend” than truth, as evidenced from the records left by members of the Washburn-Langford-Doane expedition.*]

YS: It should never have taken eight years to get the book out, but the park did stand by you.

AH: Yes, they did. I turned it over to YLMA as a royalty item—it’s their book.

Well, it was done on government time anyhow. While this incident led to an earlier retirement than might otherwise have been the case, I was freed to do some other good work; it all balances out and no regrets!

Legends Versus Serious Research

YS: You and your fellow rangers—what kind of reports were you asked to write that helped contribute to the historic record, whether or not it was intended that way?

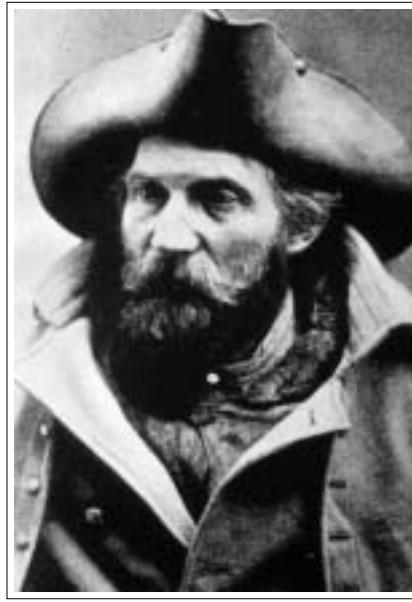
AH: A written report on where we went, the animals we saw, and what happened was made following each patrol. There were also reports each month and for special incidents. As far as a particular interest in history, there was none at that time. But there were a lot of tales around—like the burial at Nez Perce Creek. There was a tale that a woman had died in childbirth there at midwinter and the baby had been raised by the father on Eagle Brand milk until the snow was gone in the spring and they could get out. I found later when I got in touch with the family, that’s not the way it was! She was a tubercular case—she’d gone in there a very ill woman, and the child was 18 months old.

YS: That’s the legend of Mattie Culver, who supposedly died in childbirth along the Firehole River.

AH: That’s right. I made the mistake in the first edition of *The Yellowstone Story* of telling it like the original park tale. The



Guard mount at Fort Yellowstone in Mammoth Hot Springs, ca. 1910. NPS photo.



Above left: Philetus Norris, the second superintendent of Yellowstone, served from April 1877 until February 1882. Above right: Harry Yount was hired as the first gamekeeper in Yellowstone in June 1880. The effort by Norris and Yount to protect the ungulates in Yellowstone's Lamar Valley was the first "game management program" undertaken on federal land. NPS photos.

second edition corrected that.

YS: After you retired in 1969, the park seemed to let the history program that you'd gotten started languish. I think the park is finally trying to embark on a more organized program of cultural resources, and so we have an archivist and some positions devoted to cultural resources, although we still don't have a full-time historian again.

AH: I was lucky in that they let me research.

YS: How did you manage? That took a lot of travel—you had to go to the historical societies; you tracked down so many obscure items.

AH: When I came on duty as historian, Chief Park Naturalist Robert McIntyre informed me there were no funds for travel or for purchase of reprints or maps, and I worked within that limitation during the first three years. However, I was able to make day trips by official vehicle to the Montana State University Library in Bozeman and to the Montana State Historical Society in Helena, and to manage some research in connection with assigned trips to Big Hole Battlefield and other historic sites in Montana. Tape recorder and 35mm camera along with written notes served to capture some very

important documentation. But toward the end of that period, two of the park's sincere supporters, Hugh Galusha and Isabel Haynes, made it possible for me to make two visits to St. Paul, first to examine the Langford papers at the Minnesota Historical Society, and later the old Northern Pacific Railway files.

When it came to getting out *The Yellowstone Story*, Superintendent Garrison let me make a tour that included St. Paul again and Denver and the University of California at Berkeley (for early newspaper files); Yale University (for Russell and A. Bart Henderson manuscripts); Philadelphia (American Philosophical Society and Jay Cooke's records); St. Louis (Missouri Historical Society for early exploration and fur trade records); Tulsa (Thomas Moran's papers); and the Huntington Library at San Marino, California (for Supt. Norris' papers). Research at the National Archives and Library of Congress in Washington, D.C., was separately funded for a documentary on "Yellowstone National Park: Its Exploration and Establishment."

I have always kept notes—everything that looked like it might possibly have a future use got a 3"x 5" card. So, by the time I started, in large measure I knew

what I was looking for and had some idea where it was. I was able to work in the National Archives twice. A lot of material came from there, probably not as much as is there, but it did the job.

YS: In his first year here, when our current Superintendent, Mike Finley, heard a story—or a reason for not doing something—he'd sometimes ask, "Is that Yellowstone myth, or is that truth?"

AH: I think he knows that myths grow around a place like this. We have a Jim Bridger myth here, and we have another myth about how the Indians were afraid of the place, which is baloney. Those are the major myths, but not all that have developed around the park's interesting history.

YS: There have been some interesting presentations here at the conference about the Native Americans and their relations with the park. Do you find anything you hear difficult to believe or different from what you had previously thought?

AH: When miners started prowling the Yellowstone about the time of its exploration—1869–70–71—the miners and Sheepstealer Indians didn't mix. So Chief Washakie of the Shoshoni sent word to them, "Come down to us." And many settled at Camp Augur on the Wind River in Wyoming; in 1871 the Indian agency moved to Fort Washakie. Only a few went to Fort Hall in Idaho. They were Shoshoni-Bannock, but they were part of the same culture, the same people.

They were talking at the conference about some of those early ideas, that pictured Sheepstealers as ignorant or a pygmy race; it's not true. The Sheepstealers were the "have-nots" of the Shoshoni-Bannock people—the poorer people who did not have the horse, did not have the gun. So they were relegated to making a living in the mountains in the old-fashioned way, like most Indians before development of the Plains-type culture of the teepee, the gun, the horse, and buffalo hunting. They had to hunt in the mountains, and naturally they lived a furtive life there. They were not numerous enough to defend themselves; that'd make a person furtive!

YS: Today, ethnographers talk about interviewing natives about their oral history and their traditions and the stories they've told—was that a technique used

Gamekeeper Harry Yount was the first paid “scout,” forerunner of the rangers. I always showed my students of Yellowstone history the chimney rocks where the Yount cabin was, out in the Lamar Valley, near Soda Butte, and told them, “This is the beginning of wildlife management in the United States, right here.” I wish the park would develop that and take credit for it. It’s a big thing, and it’s been almost totally ignored.

when you were a historian?

AH: No. I understood that to be anthropology, rather than history, but I did find archeology to be helpful.

Untold Stories: The Minutiae of History

YS: What else would you like to see the historians work on these days? What do you wish you could’ve spent more time on?

AH: One of the things I wish could be given emphasis is that Superintendent Norris and Harry Yount began wildlife management in the United States. It failed, yes; the early attempts failed! But this is where it happened. Norris intended to capture buffalo calves, and to raise buffalo calves you have to have milk. So he’d made an arrangement with James Beattie, who ranched just north of the park boundary near Gardiner in 1877—his cattle could forage on park grass if he could have milk for the buffalo calves. But the Nez Perce, when they came through here, killed Beattie’s cattle for traveling rations.

Gamekeeper Harry Yount was the first paid “scout,” forerunner of the rangers. I always showed my students of Yellowstone history the chimney rocks where the Yount cabin was, out in the

Lamar Valley, near Soda Butte, and told them, “This is the beginning of wildlife management in the United States, right here.” I wish the park would develop that and take credit for it. It’s a big thing, and it’s been almost totally ignored.

The boat industry on the lake is another interesting thing that needs to be put together as one whole story, not several pieces—not just E.C. Waters or Eugene Topping, with his sail boat, nor the present-day hotel company. “Uncle” Billy Hofer ran the boat business for a while after Waters was put out of the park for failing to take proper care of the buffalo he held captive on Dot Island (he was guilty of much more!) A good story there.

YS: Billy Hofer’s career here was so long...he left us a lot, more than 50 articles just in *Forest and Stream* (see *Sarah Broadbent’s* article, also in this issue.) and a few letters and photos—he was a real character.

AH: He was a frontiersman who was a “white hat” guy. He was a good man. Even Teddy Roosevelt thought highly of “Uncle Billy.”

YS: There is so much more interest in history now. If a graduate student wanted to know who else needs a biography here, who would be a good subject?

AH: Start with Mike Finley, and then do a resume on each new employee, from a

paragraph to a page on where each came from and his or her training and background. When he or she leaves you have it up-to-date. The same way with buildings—when you tear one down, you want to be sure you’ve got information on when and why it was built, what it cost, and so forth, and maybe a picture of the building.

YS: What are you going to do with all your records?

AH: I’ve been asked that a number of times, and I refuse to answer, because I want to use them a while yet! Some of them are already in the Montana State University rare books room. MSU also has a copy of most of the archives. While I was in Yellowstone, I’d take a car load of the Army records to the library for microfilming and return what they had finished. If you have a fire here, MSU has a copy all the way through the Army period. Since that is a unique record, the only one of its kind, it just *had* to have a duplicate somewhere. Jim Hill money, provided by the family that built the Great Northern Railway, financed that copying work.

YS: How would you tell today’s park employees to keep documenting history? We tend not to think of things that we’re living today as something that’s going to be important in the future.

AH: Oh! Be careful that you document as you go along. I believe in a running record that has three sections. One of them is places in the park, one is people in the park, and the third is happenings year by year, with line entries for events and reference. When a question comes up about something, those quick-reference volumes are a place to go for an answer. Now, with no published annual reports and a rather short record retention, such systematic recording may be all that stands between the historian of tomorrow and a long, difficult newspaper search. Writing the history of Yellowstone’s second century of existence may be a difficult job—prepare for it!

YS: I like what you said during your comments at the luncheon in your honor—about how there’s all kinds of good work to be done before we celebrate the park’s 150th anniversary.

AH: You bet! ✨



Bison in show pen on Dot Island, 1906. NPS photo.



Tales from *Forest and Stream*:

News of Yellowstone in the late 1800s

by Sarah Broadbent

Last summer, as we celebrated Yellowstone's 125th anniversary, we were reminded of the park's early history. What was the park like in the late nineteenth century and what were the major issues facing its managers? How did the American public view and value the first national park? And how did Yellowstone develop over the last century to make it the park we know and love today? Among the many historical resources that teach us about the early years of Yellowstone is a sporting journal called *Forest and Stream*.

This periodical contains a wealth of information about early park history, the conservation battles, and the conditions of the park's natural resources in the latter part of the nineteenth century. Because of the value of the information found in this periodical, I undertook a project in 1992 to collect and index Yellowstone-related material. The intent was two-fold: to create a very detailed accounting of every article that mentions Yellowstone, and to develop a method to search those articles.

Influencing the National Park Movement

The periodical *Forest and Stream* played a central role in the early history of the American conservation movement. Established by Charles Hallock in 1873, and taken over by George Bird Grinnell soon thereafter, *Forest and Stream* became a leading forum for sportsmen, naturalists, and others interested in the protection of natural resources. Grinnell deserves much of the credit for *Forest and Stream's* eminence. A distinguished naturalist and anthropologist, founder with Theodore Roosevelt of the Boone and Crockett Club (a sportsmen's club that took a special interest in Yellowstone affairs), father of the Audubon movement, and in many other ways a pioneering conservationist, Grinnell used his periodical to alert the public to many conservation crises. *Forest and Stream* remained an important voice in resource issues until 1930, when it was absorbed by *Field and Stream*.

No issue was more dear to Grinnell

than the national parks. Yellowstone had been set aside as the first national park in 1872, yet at that time Americans knew little about how to manage, protect, and value this large tract of wilderness. He lobbied for legislation that would protect the park from developers and provide for its management. The late nineteenth century was a time when conservation and preservation ideas were being developed in the country, and a clear conception of what Yellowstone was for and how it should be managed was rare. Grinnell's early coverage of Yellowstone affairs helped develop the idea of the park's value to the nation, and conveyed it to a wide audience.

The coverage in *Forest and Stream* alerted the nation to the problems the national park was facing by focusing on the major events in Yellowstone from the 1870s through the 1910s. Grinnell wrote about issues such as resource protection and boundary legislation, leasing and concessions controversies, park management and its needs, and the conditions of the geysers, wildlife, forests, and streams.

A New Forest Reserve

“For about ten years we have been working to secure for the Yellowstone Park an enlargement of its area, and proper protection for its forests, game and natural wonders. In four successive sessions of Congress bills providing for these measures have been introduced and have passed the Senate, but have failed in the House, usually through the opposition of a small but powerful railroad lobby, which insisted that no bill for the Park’s protection should pass which did not grant them a right of way to build a railroad line through the Park....While the President’s proclamation does not actually add this forest reservation to the National Park, it is the first step toward doing this; for since settlement within the boundaries named is prohibited, it will hereafter be a much simpler matter to have the region formally added to the Park.”

Forest and Stream. April 9, 1891. 36:225



A handwritten signature in cursive script that reads "G. B. Grinnell".

Above: George Bird Grinnell, editor of *Forest and Stream* and early conservationist. Grinnell frequently ran stories about Yellowstone, describing its scenery and wildlife along with the needs of park management.

Conserving Yellowstone’s forests and game was a common theme. These articles reveal both the major conservation issues of early park history and the early values associated with Yellowstone.

In numerous articles Grinnell explained the usefulness of extending the park’s boundaries. He repeatedly noted that the land just east of the park was worthless for settlers but very valuable as a preserve for the game, forests, and watersheds. Forests and watersheds were resources early conservationists attempted to protect, and Grinnell promoted that in the Yellowstone region. This campaign was an influential factor in the creation of the first forest reservation on Yellowstone’s south and east border in 1891. It was hoped that this land would be added to the park, but that never happened. The reservation was significant for another reason: it was the beginning of the national forest system. Other reserves were established following this one, and in 1905 the U.S. Forest Service was established to manage these lands.

Forest and Stream also lobbied for better protective legislation. The organic act that created Yellowstone was vague, and gave little power to the park superintendents. For more than a decade articles appeared detailing resource destruction and supporting protective legislation introduced by Senator Vest of Missouri. Legislation that created stiff penalties for

poaching in Yellowstone was finally passed in 1894, in large part due to Grinnell’s work. That winter Emerson Hough, staff correspondent for *Forest and Stream*, was sent to join Billy Hofer in his explorations of the park. The two were in the park when Edgar Howell was arrested for poaching bison. Hough quickly sent off the poaching story to Grinnell who published the event in *Forest and Stream*. This reporting helped to convince the Congress to pass the Lacey Act of 1894, strengthening the authority of park managers.

The main opposition to the boundary extension and protective legislation was a railroad lobby, which wanted to build a line through the northern part of the park to Cooke City, Montana. Grinnell wrote extensively about the forest and game destruction that would occur if a right-of-

way for the railroad was allowed. A battle developed between those in favor of protective legislation and those in favor of a railroad in the park. Repeatedly these two interest groups blocked each other’s legislative attempts. Grinnell used *Forest and Stream* to lobby for the conservation and extension of the park. These articles provide insight into a very early conservation battle.

The railroad was also interested in developing concessions in the park. In 1883, the railroad reached the town of

Our Yellowstone Expedition

“The most important achievement of the *Forest and Stream*’s Yellowstone Park Game Exploration was Mr. Hough’s prompt and authoritative report upon the work of the buffalo butcher Howell. This report came just at a time when its publication in our columns was calculated to compel attention at Washington and to demonstrate the necessity of immediate action. It opened the eyes of the public and of Congress to the cold hard fact that the National Park game must be protected by adequate provision of law, and the law was enacted.”

Forest and Stream. June 16, 1894. 42:507.

Snap Shots

“The volume of travel to the Park has been very great this year, even to the point of evoking a remonstrance from some of the old-timers, whose sentiments are probably well expressed by one of our correspondents when he writes: I have no further use for the National Park. It has become what Congress set it aside for, a pleasuring ground for the People—with a big P. It is full of men, women and children. Last night I counted seven boats on the lake; camping parties of women were singing; I heard a baby cry. The country is fairly populous. Doubtless this is a good thing, but I don’t want to travel where people are so thick. The Park is too crowded, and I do not mean to visit it again, unless I come in the capacity of a ‘tourist.’”

Forest and Stream. September 19, 1889. 33:161.



This map, “National Park Boundaries—Present and Proposed,” was published in *Forest and Stream* January 7, 1899, as part of a large effort to expand Yellowstone’s boundaries.

Cinnabar, Montana, just north of the Yellowstone border. With the arrival of the railroad and the hope of increasing park visitation, there was pressure to develop more visitor services. The Yellowstone Park Improvement Company, which was associated with the Northern Pacific Railroad, attempted to acquire a lease from the Secretary of the Interior for hotel, transportation, and telegraph privileges. Grinnell considered the power of the proposed lease to be excessive and very detrimental to the park, and used *Forest and Stream* to lobby against

it. This was the beginning of Grinnell’s long-standing skepticism about corporate interest in Yellowstone. Throughout the years of *Forest and Stream*’s coverage of Yellowstone affairs, Grinnell monitored the power of concessions operations.

Park Management and Tourism: a Look Back in Time

Forest and Stream also reported on the activities of park managers. During its first 14 years the park was managed by

civilian superintendents whose administrations were constrained by a lack of authority. Because funding for civilian management was not provided by Congress, the military was placed in charge of park management from 1886 until the creation of the National Park Service in 1916. Articles in *Forest and Stream* describe superintendents and the major activities of their administrations. For example, Superintendent Carpenter was engaged in a land claims scheme on the borders of the park and had strong affiliations with the Yellowstone Park Improvement Company. Grinnell disapproved of the superintendent and waged a successful campaign in *Forest and Stream* to have him removed from office in 1884.

Favorable management activities were also covered. Detailed information on the early fish stocking program, feeding park game, and efforts by the army to suppress forest fires are found throughout this periodical. At the time these “resource management operations” were considered to be good for the park, quite different from modern-day management ideas. These stories show how natural resource man-

Putting Out the Fire

“...when the announcement of the fire came, the whole command promptly started out and put the fire out. Captain Boutelle was dining when the fire was reported. He did not stop to finish his meal, but gave orders to have “boots and saddles” sounded at once, and in a few moments the troop was off. There was no sending out of scouts who should look at the fire, see whether it was much of a blaze or not, and then report. Captain Boutelle just went out and put the fire out. A delay of twelve or twenty-four hours would have permitted the conflagration to assume such proportions that it would have been beyond the control of any body of men.”

Forest and Stream. July 25, 1889. 33:1.



Above left: President Theodore Roosevelt, Billy Hofer, Amos Winchester, and John Burroughs in front of a tent camp, March 1903. Right: Interior of a Wylie camp dining tent. NPS photos.



The National Park

“The travel to the Park is increasing rapidly. Tourists over the stage lines are arriving in parties from forty to sixty daily. From seven to fifteen teams with camping parties pass the Hot Springs every day. On the 14th inst. twelve teams belonging to American immigrants from the Black Hills, on their way to Oregon, started through the Park. After doing the wonders here they will continue their journey, leaving the Park at Riverside. Following the teams from Dakota was one from northern Iowa bound for the same State. They are well provided with everything necessary for their long drive and to settle in a new country...”

Hofer, T.E. *Forest and Stream*, July 25, 1889. 33:3.

agement ideas have changed over the years.

Trips to the Yellowstone region are also covered in *Forest and Stream*. Accounts are given of extended trips by sportsmen hunting in the Yellowstone region, visits by the Presidents of the United States, and camping in the park with the Wylie Tent Company. These articles give a feel for what it was like to tour the park more than 100 years ago.

Throughout the pages of *Forest and Stream* the fight to protect Yellowstone wildlife from destruction is prevalent, especially in the articles written by Thomas Elwood “Uncle Billy” Hofer, who worked as an outfitter in the Yellowstone area for years, and wrote of his trips and the conditions of the park and its wildlife. Hofer’s articles are examples of how *Forest and Stream* was used to teach the public about their new national park and its wonders and potential threats to the resources.

As modern park managers addresses ever more complicated and sophisticated issues, historical information about earlier conditions becomes more important. A century of human manipulation of the Yellowstone setting has left us with many questions about the park area’s natural

state prior to intensive development and use by technological humans. Sources like *Forest and Stream* are therefore not merely of antiquarian interest. The numerous incidental and intentional discussions of wildlife habitats and distribution, for example, are of considerable value to modern biologists seeking to retrace the history of the park’s world-famous animals. Early descriptions of fishing conditions are of use to modern managers seeking to restore Yellowstone fisheries to their robust, pristine state. In these and many other ways, *Forest and Stream* can help modern managers and researchers refine our understanding of Yellowstone’s complex past.

Between 1873 and 1930, more than 500 Yellowstone-related articles appeared in *Forest and Stream*. Near the turn of the century Yellowstone articles were less frequent, but mentions of other national parks and debates about the forest reserves around the nation became more common. *Forest and Stream* remained an important voice in resource issues until 1930, when it was absorbed by *Field and Stream*.

Articles found in *Forest and Stream* tell us about the first national park at a very early stage. A computer-based in-

dex, completed in 1996, is now available in Yellowstone’s Research Library, along with copies of the articles from *Forest and Stream*. This index allows users to quickly search through this large volume of material and find the specific information they need. For those of you interested in Yellowstone’s past, exploring this information is now much easier.

Acknowledgments

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Sarah Broadbent has worked in Yellowstone since 1986. During the fires of 1988 she began working in the Research Division for the National Park Service, and is currently a writer-editor in the Yellowstone Center for Resources. She earned her M.A. in history from Montana State University in May of 1997.

Yellowstone Pronghorns:

Relict Herd in a Shrinking Habitat

NPS photo.



by James W. Caslick

As we craned our necks for a first glimpse of Yellowstone, the old bus lurched to a stop just inside the park's North Entrance gate. A small herd of pronghorns (*Antilocapra americana*) had stepped into the road and now gazed at the noisy bus just a few yards distant. Their large dark eyes seemed to express a mixture of surprise, curiosity, and a bit of quiet disdain that seemed to say "What are you doing here?" That encounter was the beginning of my love affair with Yellowstone wildlife, now in its forty-seventh year.

It was May 1951 and our busload of eager employees-to-be was arriving for the summer season, having mostly de-trained at Livingston, Montana. Little could I have imagined then that almost 50 years later I would be returning to admire Yellowstone pronghorns at close range every week for three winters (1996-1998), while monitoring them as a volunteer wildlife biologist.

An Isolated Herd?

Actually, the pronghorns that my wife, Edna, and I are now monitoring could be

the great-great-great-grandkids of those that stopped our bus on that memorable day in the early 1950s. That, in itself, is wildly unusual in the wildlife world, where it is more common for at least some wandering members of a local population to breed with some of a neighboring population, mixing it up genetically during these wanderings. But that doesn't happen now with Yellowstone pronghorns, say some scientists who have studied them recently. The present herd of about 250 animals (sometimes called antelope or pronghorn antelope) is thought to be the remnant of a population that is known to have persisted in this location since establishment of the park.

Between the 1890s and the 1940s, the park's pronghorn population was estimated to be between 400 and 600. Artificial reductions of the population from the 1940s to 1966 attempted to maintain the herd at 125 to 150 pronghorns. Many of the trapped animals were transferred to establish herds elsewhere. In March 1967, the aerial count was 188. Since then, only one year has been missed (1994); the lowest count was 102, in 1981, and the highest count was 594, in 1991. Since

1995, between 210 and 235 pronghorns have been counted each spring during this flight (Fig. 1).

Research on Yellowstone pronghorns has not been profuse, but has included a study of the female reproductive cycle (O'Gara 1968). In the 1980s and early 1990s, a park biologist studied the ecology, behavior, and management of Yellowstone pronghorns, particularly as related to their use of lands outside the park. He also studied how their movements were affected by a fence along a portion of the northern boundary (Scott 1992).

Lee et al. (1994) described Yellowstone pronghorns as having been geographically isolated from all other pronghorns for 100 years or more. Some of us have our doubts about complete isolation, however, choosing to side with an old maxim in biology that nothing in nature is likely to be absolute. In any case, there are recent and reliable sightings of single pronghorns as near as six miles south of Emigrant, Montana (24 miles north of Yellowstone). Those observations within the last three years were made by a park wildlife biologist and the Caslicks, in

different years, and at close range. Last winter, between November 16, 1997, and February 7, 1998, two park employees reported as many as 11 pronghorns in the lower Rock Creek drainage, about one mile north of the Carbella Bridge, approximately 15 miles north of the park. We do not know whether those wandering pronghorns had moved down the Yellowstone Valley from the park or whether they later joined the Yellowstone population. Observations of pronghorns in Yellowstone have shown that during spring migration they have moved from the North Entrance gate area to the Lamar Valley in only three days, a distance of 30 miles, demonstrating an ability to move very rapidly over long distances.

Prairie Speedsters

Other observations have confirmed that this fleet-footed beauty of the plains can cover a lot of ground in a short time. One account tells of a sprinting buck in Oregon overtaking a car going 61 miles per hour. The same author claims that if representatives of all the mammals in the world were lined up for a race, the cheetah would lead for a few hundred yards, but at the end of one-half mile the pronghorn would be leading the pack. An Olympic gold to the American pronghorn in the half-mile sprint!

This spectacular speed and those huge protruding eyes that constantly monitor all surrounding activity seem to be their combined first line of defense from predators. When alarmed, they flare their white

rump patches, apparently sending an instantaneous warning on the pronghorn internet to others within view. An apparent preference for the wide open spaces also serves them well, given these special attributes. When chased, these sure-footed speedsters appear to move like a flock of birds that instantaneously changes direction on some cue that we are unable to detect. If motion pictures of this movement are slowed down to allow study of their running gait, there seems to be some synchrony among the runners, many hooves striking the ground in concert.

We watched one such chase recently when a canid (coyote, wolf, or dog, we couldn't tell at that distance) pursued a herd of 40 or so pronghorns at a fast clip over open snow-covered ground. From our higher vantage point, the herd's movement resembled that of a cloud's shadow moving swiftly over the snow, ever so smoothly gliding over and around the small hills below. The herd eventually split in two when its pursuer took a shortcut over a hilltop. The pursuing canid stuck to the 10 or so that had split off, then doubled back with them around a hill and out of our view. We don't know the outcome, but our bet was in favor of the pursued, since there were no fences within at least a mile.

Foiled by Fences

Livestock fences have been serious problems for pronghorns since Euroamerican settlement of the West. Unlike deer that readily jump most live-

stock fences, pronghorns seldom do so, even when chased. If the lowest fence wire is less than 16 inches from the ground (or the snow), they have difficulty in squeezing under. Through the years, many pronghorn deaths have occurred at fencelines. Some were entanglements but some have occurred during severe winters with deep snow, when these animals were virtually trapped by fences and were unable to move to more favorable habitats; losses of 60 percent or more of some herds have been recorded (Bell 1954). Martinka (1967) reported that reproductive rates of Montana pronghorn herds that survived one such starvation loss in a severe winter ranged from 39 to 100 fawns per 100 does, less than half the usual number. We can only speculate about the numbers of chases by predators that have ended at fencelines, the traditional migratory movements that have been changed by fences that now criss-cross the West, and the pronghorn death-traps that have been formed where both sides of the highways were fenced.

Concerned about the potential effects of a wooden buck-and-pole fence constructed in the 1980s by adjacent landowners along part of the park's northern boundary at Reese Creek, park investigators found that pronghorns had trouble crossing the new fence and sometimes were delayed within it. However, they eventually were able to cross through it in about three of four attempts (Scott 1992).

Shrinking Shred of Habitat

Perhaps fences and the human activities that accompany them have been major reasons that our Yellowstone pronghorns have become only a remnant of a once-larger population that extended northward for many miles down the Yellowstone Valley. Wildlife slaughters by market hunters of earlier days may well have been locally important in some places, but changes in habitat conditions—often very subtle—probably have been far more important in determining the welfare of wildlife populations through time. Using new technology, we are only just beginning to be able to measure and appreciate the effects of stress imposed upon wildlife when forced into close encounters with humans—yes,

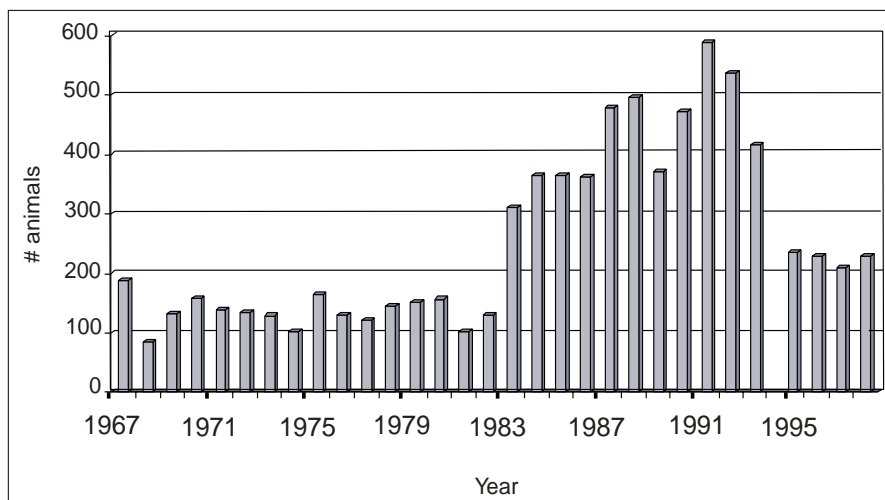


Figure 1. Pronghorn counts 1967–1998, Yellowstone National Park.

even by that bus on the park road so many years ago, or today by the cars, snowplows, snowcoaches, snowmobiles, and other vehicles on park roads. We do have effects on wildlife, even though we might not see a reaction, as has been shown by monitoring the heart rates of deer. When they heard a snowmobile, heart rates increased even though the snowmobile was so distant that the deer didn't flee from it (Moen et al. 1982). In Yellowstone, research has documented the distances moved by elk when disturbed by cross-country skiers and assessed the energy costs associated with these movements (Cassirer et al., 1992).

Estimates of wildlife populations in the 1800s ranked pronghorn numbers very close to those of bison—about 50 million. By the 1920s, pronghorns had been reduced to about 130,000. Today there are about one-half million, with more than half of those in Wyoming. The 1998 spring count in Yellowstone was 231. A Montana State University scientist has warned that an isolated population this small has an 18 percent probability of extinction within 100 years (Goodman 1996).

Because the mission of the National Park Service is “to preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations” (Lewis 1998), questions arise about attempting to manage the uncertain future of pronghorns in Yellowstone. If the population is indeed in the process of dying out, should steps be taken to prevent this, under current management philosophy that embraces natural processes? If so, what should be done? If preventative measures are not undertaken, will the park face a costly reintroduction program in the future?

Pronghorns Previously in Peril

This is not the first time that the welfare of Yellowstone pronghorns has been a topic of considerable interest. Although wolves and bison share the spotlight today, pronghorns had their day on center stage about 70 years ago. Concern about inadequate winter food for pronghorns and other game animals prodded Con-

GREAT FALLS TRIBUNE

Livingston Closer to Park; Addition Made to Preserve

LIVINGSTON. Nov. 1, 1932. (AP). This city today learned it is three and a half miles closer to Yellowstone park than it was two weeks ago.

Addition to the park of a 7,600-acre tract between Gardiner and the former park boundary accomplished the feat. A copy of the Presidential proclamation making effective a congressional act of 1926, dated Oct. 20, was received here today.

The area was acquired by the government as an antelope preserve...

gress to answer the call by adding 7,600 acres to the park in 1932. That land had mostly been owned by the government for years and was administered by the Forest Service, but parts of two privately owned ranches were then purchased and added to the public domain. This was the so-called “Gardiner Addition” along the northern edge of the park between Gardiner and Reese Creek, the principal habitat of Yellowstone pronghorns today.

That addition occurred a human generation ago. Memories are short, people retire or move on, history is often ignored, and new issues crowd in to replace old ones. No wonder that almost nobody around now remembers that this addition was acquired “as an antelope preserve” as described by the local press (*see inset*). Park biologist Doug Houston reported an increase in pronghorns following this addition of winter range to the park.

Winter range of Yellowstone pronghorns covers about 13,000 acres, and all the park's pronghorns move to it for the winter months. It has rolling topography, is the lowest elevation in the park (down to 5,265 feet), is semi-arid, with annual precipitation of only 10 to 12 inches. This winter range generally extends from Mammoth Hot Springs and Gardiner, Montana, along the Old Yellowstone Trail to the park's boundary at Reese Creek and beyond to the Devil's Slide (Fig. 2). On a year-round basis, an average of about eight percent of the herd is outside the park.

Monitoring New Threats

Stephens Creek bisects the central core

of this traditional pronghorn winter range. For many years it has been the location of the park's horse corrals, an outdoor storage area for park vehicles, and an area where rangers conduct target practice. Pronghorns apparently were quite tolerant of this sporadic and generally low level of human activity. At least they commonly fed and rested within a few yards of the corrals, throughout daylight hours. However, in 1995, in conjunction with intensified management efforts, new bison corrals were constructed there, and a new mesh-wire fence was erected to extend from the corrals northward across the valley for more than one-half mile. The purpose of the fence is to help guide bison into the corrals during capture activities. At the time of construction, the bottom of the new fence was raised 24 inches to allow pronghorns to squeeze beneath it. Furthermore, several 16-foot gates were installed in the fence line and have remained open to allow wildlife passage during periods of non-use.

Resource managers and others have long recognized the potential for such changes in habitat to impact wildlife. The Draft Environmental Assessment, Interim Bison Management Plan of 12/20/95 recognized that temporary displacement of and stress to pronghorns and possibly their unintentional capture and injury might occur as a result of bison management activities. To detect and quantify those potential impacts occurring in the core of pronghorn winter range, we initiated a weekly monitoring of pronghorns in 1995 and continued it in 1996-98.

“It's a big park and the pronghorns can just move over,” some have said. But therein lies the biological rub! If they

move over, they move northward out of the park where they have become less welcome as human settlement intensifies. To move southward back into the park would be to return to higher ground and the deep-snow Siberian-type winters that they now escape by wintering near Stephens Creek. Snow depths at this lower elevation usually do not bury all the sagebrush, a staple in their winter diet, and shorter food plants there seldom are buried so deeply on windswept knolls that these animals are unable to reach food by pawing. In biological terms, this Stephens Creek area of sagebrush and grassland is truly a critical winter range for park pronghorns.

Usually in April, about one-fourth of the wintering population migrates back to higher elevations in the park, spending the short summer mostly in Gardner's Hole or in the open valley areas along the Yellowstone River to Tower Junction and beyond to the Lamar Valley and surrounding subalpine meadows (Fig. 2). About one-third of this upland summer range burned in the 1988 fires, and these burned areas were not avoided by pronghorns during years immediately following the fires (Scott 1993).

Three-fourths of the population remains year-round on the winter range. Between the last week of May and the first week of July, the fawns (or kids) are born; twins are more common than single births. Forty years of park records show that about 25 percent of these newborns survive through the summer months. Predation by coyotes has been the major cause of mortality among fawns and adult pronghorns in Yellowstone (Scott 1993). Studies in Montana, Idaho, and Utah have shown that coyotes, bobcats, and golden eagles, or a combination of these three, have been indicated in fawn mortalities of 12 to 90 percent (Kitchen and O'Gara in Chapman and Feldhamer 1982). To date, six pronghorns (1 adult and 5 kids) have been reported as killed by recently reintroduced wolves.

In pronghorn herds outside the park where older bucks are selectively shot by hunters, bucks may move around and gather harems. But in Yellowstone, as in some other parks and refuges where these older bucks are protected from hunting, bucks that are at least three years old may

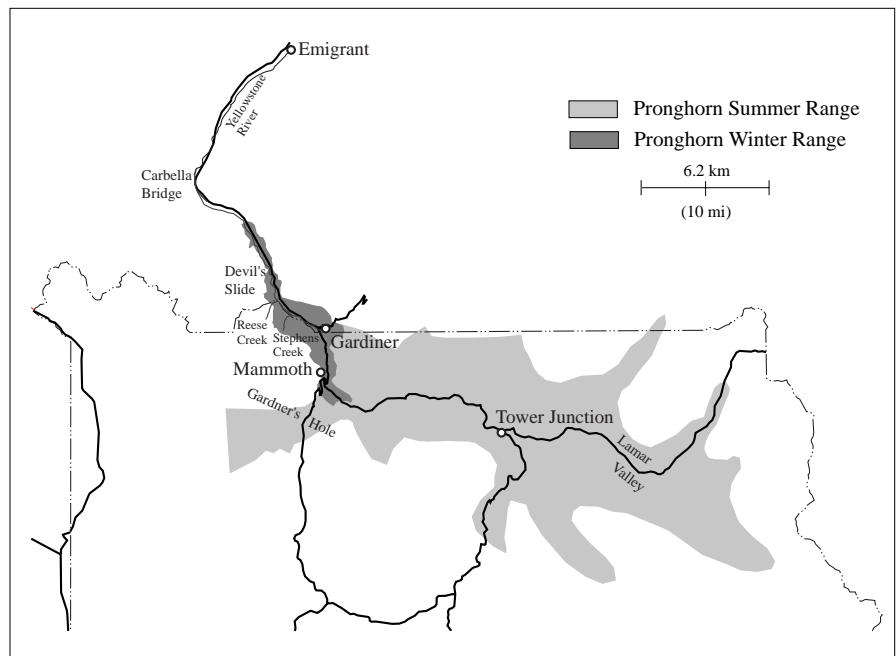


Figure 2. Pronghorn winter range is restricted primarily to lower elevation areas in the park and north of the park. Most pronghorns occupy these lower elevation areas year-round.

defend a particular breeding territory for several months. In Yellowstone, these older bucks defend their territories against trespass by other bucks from March to October, although the actual breeding period is short, usually the first two weeks of September. By mid-November, most have returned to the open sagebrush-grasslands between Mammoth Hot Springs and Reese Creek, their winter range. Bucks then shed their black horn sheaths, making them more difficult to distinguish from yearling males until horns have regrown by the following March. Further confusing to human would-be census takers, about 70 percent of adult females (does) in Montana also have horns (O'Gara 1986)! Perhaps it's just as well that we can't easily figure out all of this at first glance, and rightly humbling to suspect that pronghorns probably can. Best bet for us is to look for the black cheek patches that distinguish the bucks.

For the past three winters, Mrs. Caslick and I have been looking for those black cheek patches as we count and classify pronghorns on a weekly basis. We also map pronghorn locations and record human activities that are occurring on their winter range during our surveys (joggers, vehicles, construction, etc.). This monitoring has shown that pronghorn feeding

and resting areas have generally shifted away from the immediate vicinity of the Stephens Creek bison management facility, pronghorn groups are now smaller, and groups are more dispersed. Tracks and trails in fresh snow indicate that they still use or at least pass through the immediate area of the new bison management facility, mostly at night. They use the open gates to cross the new fence that bisects their formerly unfenced park habitat. We conclude that this new facility and the increased level of human activity at Stephens Creek have affected pronghorn use of that area. The long-term significance of this displacement and this further loss of habitat remain unknown. The bottom line seems to be that pronghorns are being squeezed from their critical winter range by human settlement, both inside and outside of the park.

Although we do not know whether these factors are significant, it is noteworthy that the core of this critical winter range supports the only big-sage/bluebunch wheatgrass habitat type and the only bluebunch wheatgrass/Sandberg's bluegrass habitat type in the park. Despain (1990) described the latter habitat type as having two phases that "are the only areas where antelope winter." Within this winter range, we have

seen pronghorns most frequently in areas that have been mapped and described by soil scientists as heavily grazed by cattle in the early part of this century, artificially altered by irrigated agriculture, and now vegetated mostly by exotic species. Exotic plants in the area have generally been referred to as “mustards” and crested wheatgrass. Based on our observations of pronghorns pawing through snow in the vicinity of the Stephens Creek corrals, we speculate that exotic plant species may now be important components of the winter diets of Yellowstone pronghorns, since food habits studies conducted elsewhere have consistently shown herbaceous plants other than grasses are major food items for pronghorns, where available. Further identification and study of the distributions of all exotic plants in this winter range might help clarify their possible relationship to the winter distributions of pronghorns that our surveys are now documenting.

Some Management Options

If we continue to learn more about Yellowstone pronghorns and their relationships to the area that was purchased for them, perhaps we can at least forestall fulfillment of dire predictions about their future. At minimum, we could make every effort to avoid taking more of their turf or disturbing them for other purposes. We could also clear away the facilities we’ve constructed at Stephens Creek, clean up the area, clear out, and let them have it for themselves again, just as some habitat in the park’s Fishing Bridge area has recently been returned to grizzlies. Other potentially helpful actions might be aimed at securing pronghorn winter access to private lands outside the park, through conservation easements, leasing grazing rights, and the removal of fences. Should fence removal be unacceptable to cooperating landowners, fences could be modified to facilitate pronghorn movements by adopting Bureau of Land Management (BLM) specifications for constructing fences on public lands that are occupied by pronghorns. For pronghorn winter habitat, this cooperative habitat management area should include the open Yellowstone Valley grasslands and sagebrush areas lying west

of the Yellowstone River and extending at least two and a half miles northward from Reese Creek to the Devil’s Slide.

If given half a chance for survival, including undisturbed access to their winter foods, fences modified to BLM specifications (or no fences), and suitable open lowlands that provide elbow room measured in connected chunks of hundreds of acres, perhaps Yellowstone pronghorns will persist. Perhaps, too, this would enable another rookie seasonal ranger arriving through the park’s North Entrance gate to someday have a memorable close encounter with these speedsters of the prairies, these beauties of the grasslands, inspiring yet another life-long love affair with Yellowstone’s wildlife. Let’s hope so! ❁

James W. “Jim” Caslick worked for three summers as a seasonal ranger in Yellowstone in the early 1950s, long before any of the present park staff arrived. In Yellowstone, he met his future wife, Edna, a fellow college student who worked at a Hamilton’s Store and “got blisters dipping ice cream at a nickel a scoop.” Jim recalls that “the Edsel patrol car I drove was so powerless that all I could do was keep the lights flashing and hope to catch up at the next bear jam.” Jim earned a Ph.D. degree at Cornell University and was a wildlife biologist for the U.S. Fish and Wildlife Service before joining the Cornell faculty. In retirement, the Caslicks are now beginning their tenth consecutive winter as volunteers working on wildlife projects and writing assignments, and assisting the Tower ranger staff in Yellowstone.



Jim and Edna Caslick. Photo courtesy of the author.

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New World Mine Settlement Finalized

Two years after President Clinton signed an agreement to trade up to \$65 million in federal assets for land once proposed for large-scale extraction of gold, silver, and copper at the New World Mine, the settlement was finalized. On August 8, 1998, lands owned by Crown Butte Mines, Inc., were formally transferred to the U.S. Forest Service, while \$22.5 million was to be held in escrow for cleanup of pollution attributed to historic mining activity in the area. Details on when and how these reclamation funds will be spent have yet to be worked out. The head of the Environmental Protection Agency participated in a ceremonial transfer of the properties on September 15 at the LaDuke trailhead north of Gardiner, Montana.

New Pronghorn Studies to Begin

In July, the Superintendent approved funding for a new pronghorn study that will take place over the next three years. This work will focus on the relationship between pronghorn nutritional status and fawn production as well as investigating the timing and causes of fawn mortality. The research will be led by Dr. John Byers of the University of Idaho, who has conducted research for the past 17 years on pronghorn at the National Bison Range in Moiese, Montana. Dr. Byers is currently involved in studies in New Mexico and Colorado that will provide a basis for comparison with the Yellowstone population. This new research will provide valuable insights into factors influencing the small, isolated, and recently declining Yellowstone pronghorn population.

Park Hires New Wildlife Biologist

Yellowstone welcomes Dr. Glenn Plumb to the staff of the Center for Resources, in a newly created position as a section leader in charge of wildlife monitoring and management programs. Dr. Plumb began his new duties in late October. His most recent position has been at Badlands National Park in South Dakota, where he was responsible for reintroduc-

tion of endangered black-footed ferrets as well as other wildlife issues. Prior to that, he served as both acting and Assistant Director of the University of Wyoming/NPS Cooperative Wildlife Research Unit in Laramie. He and his family will live at park headquarters in Mammoth.

New Educational Products Focus on Yellowstone's Thermal Habitats

From September 22-25, 1998, Walter Cronkite visited Yellowstone to shoot segments of a new film to be shown at the Old Faithful Visitor Center beginning in 1999. This film will use the engaging story of microbial life in Yellowstone's hot springs and thermal features to present this and other U.S. National Parks as scientifically valuable reservoirs of biological diversity and places that play a role in national life. By providing a window on the unexplored biological frontiers represented by Yellowstone's 10,000+ thermal features, the film will draw parallels between 19th-century explorations of the park and 20th-century discoveries that provide glimpses of the origins of life on earth and clues about possible life elsewhere in the universe.

The film is a major output from the Yellowstone Thermophiles Conservation Project (YTCP), launched in 1997 by the World Foundation for Environment and Development (WFED) in cooperation with the Yellowstone Center for Resources, the National Park Foundation, and the Yellowstone Park Foundation. Major support for the film has also been provided by the American Society for Microbiology, the Cleveland Foundation, and other donors. Walter Cronkite volunteered his talent for narration of the film, and musical talent is being donated by Chip Davis of Mannheim Steamroller/



Walter Cronkite and Preston Scott, WFED Director. Photo courtesy WFED.

American Gramophone. Kurtis Productions of Chicago is responsible for technical production of the film and has donated footage from a previous park shoot.

Through a cooperative agreement with Yellowstone, WFED also has been working to enhance public understanding of the park's bioprospecting initiative. To this end, WFED and the YCR are producing a report on bioprospecting at Yellowstone to be available in 1999.

For additional information about the film or the bioprospecting report, contact: WFED, 1000 16th Street, NW, Suite 415, Washington, DC 20036, Fax (202) 463-9376, E-mail: info@wfed.org.

Errata

The previous issue of *Yellowstone Science* featured an article about wolverines, an elusive mustelid native to the park. Alert readers may have noticed that the opening page of the article features a background image of a *different* (though similarly tenacious) mustelid—the badger. This graphic error is the responsibility of the publications staff and not at all that of the article's authors. We regret the case of mistaken identity.



Badger.



Wolverine. NPS photos.