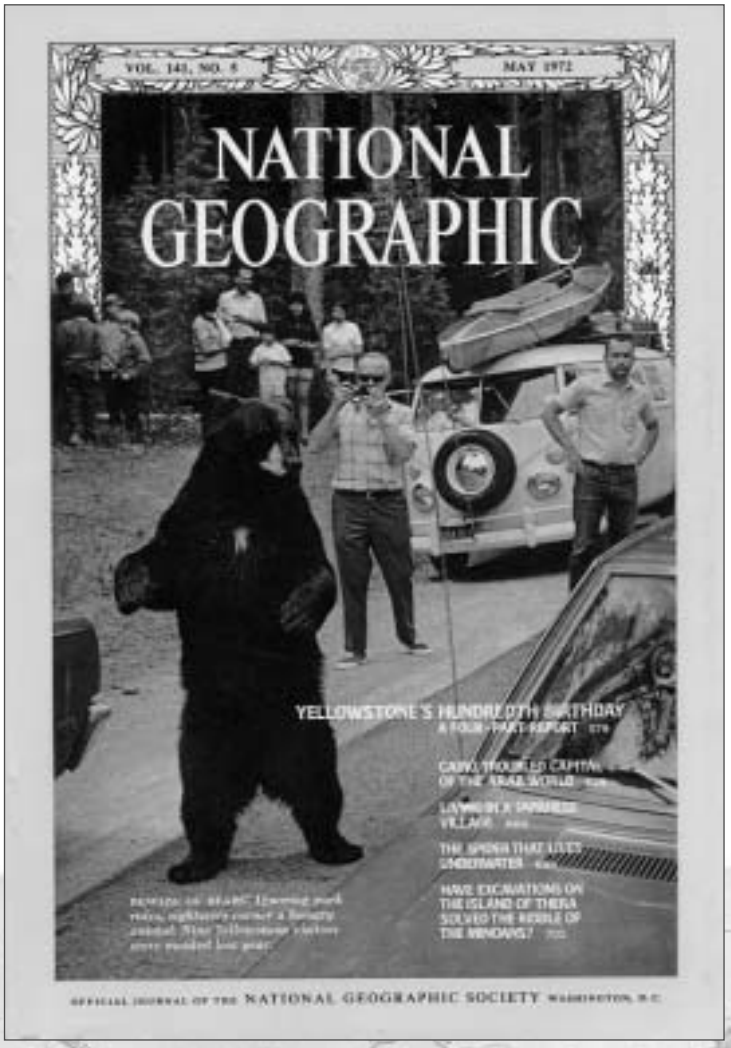
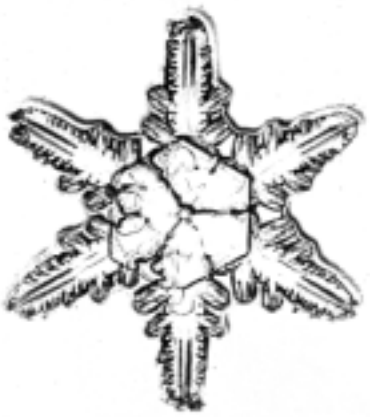
Yellowstone Science

A quarterly publication devoted to the natural and cultural resources





Apollinaris Spring through the Years

Lewis & Clark Among the Grizzlies

1960s Winter Atmospheric Research, Part II

Wildlife–Human Conflicts

Volume 11 Number 1

Labors of Love


DAN NG

As the new year begins, we commemorate the passing of three great friends of Yellowstone.

I didn't know Don White, but his friends tell me that Don's testimony before Congress helped bring geothermal protection in Yellowstone into the national consciousness. This, among many other accomplishments in his career with the USGS, noted in this issue by Bob Fournier and Patrick Muffler, earn him a place in the history of Yellowstone's great scientists and friends.

I did know Tom Tankersley. I worked for him as an interpreter for four years and I would be honored to be considered one of his friends. Tom was an excellent interpreter, a strong manager, and an extraordinary human being. When I think of him, I will remember that gleam in his eye when he told a mischievous story, the way he threw his head back when he laughed (which he did often and contagiously), and most of all, for his remarkable zest for life. In our "Passages" section, Lee Whittlesey documents Tom's well deserved place in the tradition of distinguished historians who have served in Yellowstone.

Many of you who read *Yellowstone Science* will have known Don White and Tom Tankersley. Few of you, however, will remember the gentleman pictured above, John Muller. John's love of Yellowstone and its geysers brought him to Old Faithful for over 20 years. Each year he would save up most of his retirement income to come to Yellowstone from the Hudson Valley of New York, to spend as much of the summer as possible here. Recognizing John's knowledge and dedication, West District Resource Management Coordinator Craig McClure brought John on board in 1992 as a resource management volunteer. Reflecting on John's years in the park, Craig remembers him as a tireless advocate for the geothermal resources of the park and as one of the best examples of an individual who successfully integrated the National Park Service's dual mission of resource protection and visitor enjoyment.

John's accomplishments were many. As Craig tells it, John conceived of and promoted the Great Fountain Project, an effort that, with the support of the Yellowstone Park Foundation, mitigated the resource impacts on the geyser from the adjacent road and reduced off-boardwalk travel by providing more badly needed viewing space at the popular geyser. John assisted interpreters on a daily basis by providing visitors with Old Faithful predictions after the visitor center closed. He conducted thermal observations, interpreted geysers to the public, and was often seen with a hammer re-nailing thousands of loose boardwalk planks that presented a hazard to visitors.

Of all that John did, the project I remember most had to do with asphalt. As an educated man, retired after a long career, John didn't think himself above the painstaking work of picking up the massive amounts of broken asphalt left from miles of decaying walkways laid in the Upper, Middle, and Lower Geyser Basins decades ago. He was concerned that this unsightly debris detracted from visitors' enjoyment of these magnificent geyser fields, and that it was an attractant to those who might vandalize the thermal features. For six summers, John got up each morning and came home at night with bags and bags, eventually room-sized piles, of asphalt chards that he'd collected in the course of the day. At Great Fountain Geyser alone, he individually removed, piece by piece, hundreds of pounds of broken asphalt. It was his personal mission. He continued it until he was no longer physically capable of doing so.

John's name may not be remembered in the big picture of Yellowstone's history, because he was not a career professional here, but rather, an amateur. "Amateur," derived from the Latin verb for love, describes someone who does something not for money, but out of a great passion for a cause—an auspicious, and most fitting title for someone like John. Although his declining health prevented John from returning to Yellowstone after 1997, volunteers like him continue to make up a vibrant part of the Yellowstone workforce. This issue of *Yellowstone Science* reflects that spirit. In his article on the Yellowstone field research expeditions, Thomas Brock writes of the passion and commitment Vince Schaefer brought to his winter research expeditions and his concerted effort to create meaningful volunteer opportunities in science for young people. Jim Caslick, once a seasonal Yellowstone ranger and now retired from the faculty of Cornell University, co-authored this issue's Nature Note on wildlife-human conflicts. Jim and his wife Edna are currently in their 14th consecutive year volunteering their many talents to the park.

In 2002, 444 dedicated volunteers together donated 88,088 hours to Yellowstone. We may not know all their names or faces, but, collectively, they have amassed an impressive body of work protecting the park's resources and serving its visitors.

As for me, I will remember John Muller for befriending this young seasonal interpreter 18 years ago and teaching me about geysers, classical music, fine literature, good whiskey, and most of all, about how one person can make a difference in the world. Here's to you, John, and to all the other "amateurs" for your labors of love in Yellowstone.

Yellowstone Science

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Opposite: *Resource Management volunteer John Muller.*

Above: *Visitors feed marmots at the Old Faithful Lodge, 1930s; courtesy Alice Wondrak.*

Contents

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The Changing Face of Apollinaris Spring

by Lee H. Whittlesey

ALL PHOTOS AND FIGURES YNP ARCHIVES

Two women stand on the new flagstone deck of Apollinaris Spring, 1925. Limestone slabs for the deck were mined at the nearby Hoodoos formation.

Apollinaris Spring, located on Yellowstone National Park's Grand Loop Road about five miles south of Indian Creek campground and 2½ miles north of Obsidian Cliff, is a cold, mineral water spring that was a stopping place for thirsty Yellowstone travelers for about 100 years.

As early as 1885, traveler Constance Gordon-Cummings noticed that the park contained "springs of natural Apollinaris water, sparkling fountains charged with carbonic acid."[1] She was probably referring to present Apollinaris Spring, and her usage of the capitalized name-form probably indicates that the place-name had come into local usage by that time.

But we cannot be absolutely sure of this. Carter Harrison, an 1890 traveler to Yellowstone, may have been the person responsible for bestowing the formal name of the spring in literature, if not local usage.

Harrison wrote:

Guide books tell us not to drink the water. I think their writers were in collusion with the hotel management to force guests to buy [bottles of] lager and apollinaris at 50 cents a bottle. By the way, there is on the first days drive [from North Entrance] an apollinaris spring [note use of place name, even though it is uncapitalized]. It seems to me the simon pure thing. We drank freely of it at the spring and afterwards from bottles carried for several hours. One of the bottles was tightly corked, and, when opened, popped as if well charged...A gentleman in the party who has drank [sic] only Apollinaris since he came into the Park, tasted from my bottle and declared it quite equal to the pure stuff...The hotel people are inclined to disparage the waters of the springs generally, and discourage their use, thereby...largely increasing the consumption of lager and bottled waters...The enormous number of empty bottles along the road sides and at the hotels testify to the thirst and timidity of the traveling public.[2]

The "pure stuff" Harrison referred to was a well-known, commercially-bottled product called "Apollinaris Water" (still sold today) that was taken from a spring at Bad Neuenahr, Rhineland (Germany), which had similar tastes and properties to the water of Apollinaris Spring. In those days, however, there was a prevalent (and untrue) rumor that specifically because of the presence of geysers and hot springs, park water was not to be trusted as drinkable. Thus, park hotels sold bottles of so-called "apollinaris" water as another way to get money out of tourists. Harrison's description depicted this discouragement

of consumption by the park's hotel concessioner, the Yellowstone Park Association. The hotel company tapped into the "timidity of the traveling public," as Harrison put it, by telling them that the park's thermal springs made good drinking water difficult to find in Yellowstone.

Nevertheless, travelers continued to drink from Apollinaris Spring for nearly a hundred years. J. Sanford Saltus, visiting in 1894, described it as "a small hole in the ground about a yard wide, full of clear bubbling water with the flavor of strong lemonade charged with carbonic gas—natural soda water of a most agreeable taste."[3] The reference to lemonade probably related to confusion that was then developing between Apollinaris Spring and nearby Lemonade Creek.[4] And, too, journals and diaries about the park from this period tended to reflect what their writers had read or had been told to expect in their travels.

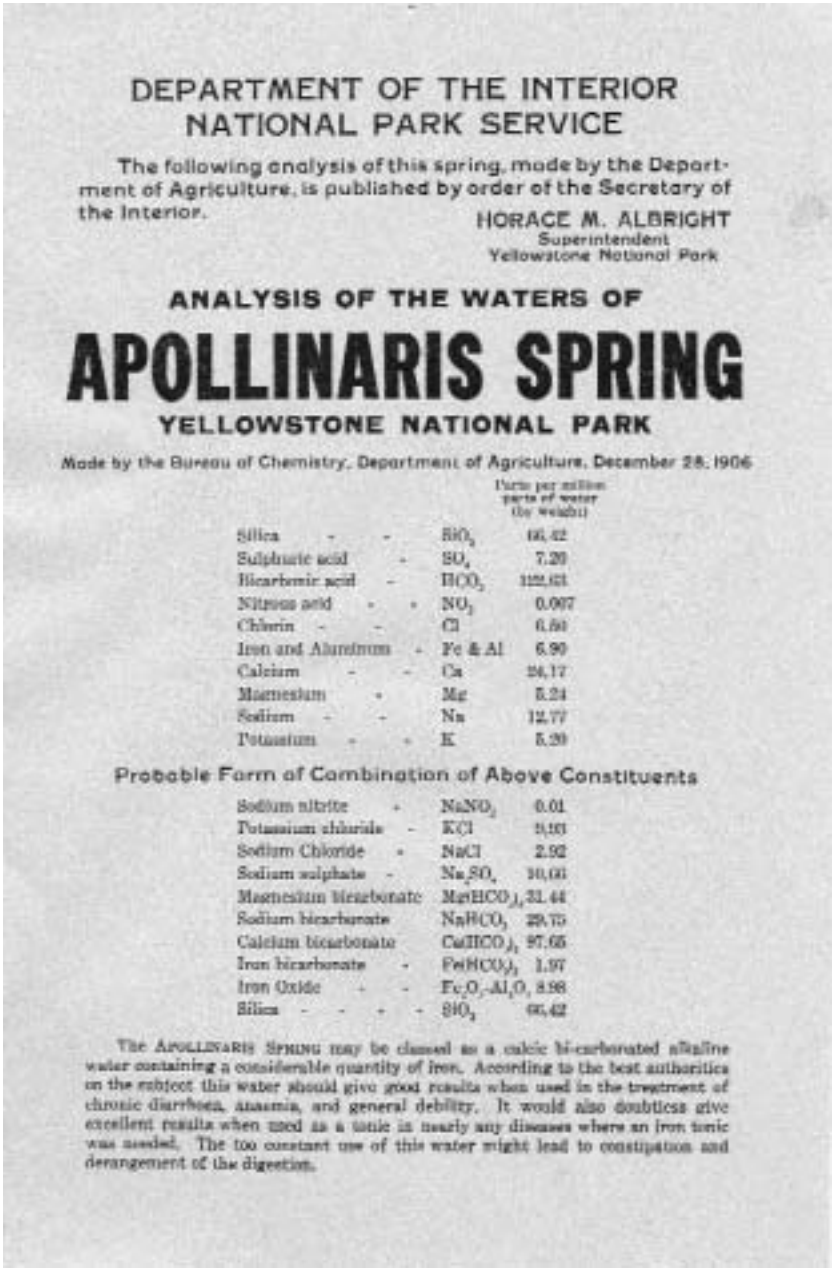
The Saltus reference to soda water recalls the spring's earlier name of "Soda Springs." Traveler Theodore Gerrish passed the spring, probably in 1885, and noted: "'Soda Springs,' so called, boiled out from a little hill beside the road. We tasted its waters, and voted that it could as appropriately be called anything else as 'soda'."[5] The earlier reference by Constance Gordon-Cummings indicates that the name Apollinaris Spring had come into local usage by the late 1880s, and by 1890, Apollinaris had completely supplanted "Soda Springs" in usage.[6]

Park concessions employee Larry Mathews applied to the park in 1896 for a permit to bottle the water of Apollinaris Spring so that he could sell it to tourists for drinking purposes. Superintendent Captain George Anderson replied that he would not approve such a permit, because it would "detract from the natural beauty of the park," and because he doubted there would be sufficient demand to make it a paying investment.[7]

It is apparent that drinking from the spring was ongoing by visitors and park employees, however, so Larry Mathews's idea might have been viable had it been put into practice. Adding to ongoing consumption of water from Apollinaris Spring was the establishment of a Wylie Permanent Camping Company tent-camp there in 1898. That facility operated through the 1905 season, when mosquitoes forced its removal to Swan Lake Flats beginning with the 1906 season.[8] Apollinaris Spring was popular as a camping spot for independent outfitters as well. The camps of licensees Thomas Newcomb, Fred Benson, Clarence Ryerson, and others were located at or near it at least during the years of 1910 and 1911.[9]

Interest in the spring's water chemistry continued. In early 1906, the Department of the Interior ordered the park to take water samples from Apollinaris Spring and other relevant drinking springs so that officials could perform chemical analyses on them. Following that analysis (on which no information has been found), the Department of the Interior sent 50 copies of a relevant poster to the park listing the spring's ingredients, and officials duly erected the posters in park hotels and other relevant places in June 1907.[10]

Park officials periodically posted and renewed the signboards or posters that proclaimed Apollinaris Spring's chemistry.



DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

The following analysis of this spring, made by the Department of Agriculture, is published by order of the Secretary of the Interior.

HORACE M. ALBRIGHT
Superintendent
Yellowstone National Park

ANALYSIS OF THE WATERS OF

APOLLINARIS SPRING

YELLOWSTONE NATIONAL PARK

Made by the Bureau of Chemistry, Department of Agriculture, December 28, 1906

		Parts per million parts of water (by weight)
Silica	SiO_2	66.42
Sulphuric acid	SO_4	7.20
Bicarbonic acid	HCO_3	122.63
Nitrous acid	NO_3	0.007
Chlorin	Cl	6.80
Iron and Aluminum	Fe & Al	6.90
Calcium	Ca	24.17
Magnesium	Mg	5.24
Sodium	Na	12.77
Potassium	K	5.20

Probable Form of Combination of Above Constituents

Sodium nitrite	$NaNO_2$	0.01
Potassium chloride	KCl	9.161
Sodium Chloride	NaCl	2.92
Sodium sulphate	Na_2SO_4	10.01
Magnesium bicarbonate	$Mg(HCO_3)_2$	31.44
Sodium bicarbonate	$NaHCO_3$	29.75
Calcium bicarbonate	$Ca(HCO_3)_2$	97.65
Iron bicarbonate	$Fe(HCO_3)_2$	1.97
Iron Oxide	Fe_2O_3-Al_2O_3	8.98
Silica	SiO_2	66.42

The APOLLINARIS SPRING may be classed as a calcic bi-carbonated alkaline water containing a considerable quantity of iron. According to the best authorities on the subject this water should give good results when used in the treatment of chronic diarrhoea, anaemia, and general debility. It would also doubtless give excellent results when used as a tonic in nearly any diseases where an iron tonic was needed. The too constant use of this water might lead to constipation and derangement of the digestion.

Figure 1. Park officials exhibited a lasting interest in posting the results of chemical analyses of the spring's waters in the years when visitors were permitted to drink them.

Figure 2. In 1902, development at the spring consisted of a rocked-in hole in the ground.

Sometime in the 1920s, superintendent Horace Albright caused a cardboard poster to be placed there [figure 1] that listed the results of a chemical analysis. The list included (in order of concentration from highest to lowest) bicarbonic acid, silica, calcium, sodium, sulphuric acid, iron and aluminum, chlorin[e], magnesium, potassium, and nitrous acid. A wayside exhibit, placed there in 1964, gave a similar list.[11] The 1966 *Haynes Guide* (p. 59) also provided a chemical analysis of Apollinaris Spring: "The principal chemical ingredients of this spring are calcium bicarbonate, silica, magnesium and sodium bicarbonates, sodium sulphate, and potassium chloride, the largest amount of any consisting of about ninety-seven parts per million parts of water by weight."[12]

The Changing Look of the Spring, 1885–1925

A search of Yellowstone's historic photo collection yields at least 66 images of Apollinaris Spring from different years. But because the park does not have prints for many of its negatives, we are unable to look at all of the photographs.

Examination of the photos makes it clear that the spring had four different "looks" from 1885 through 1925. The spring's earliest "look" was its natural appearance, probably represented by Theodore Gerrish's 1885 description that it "boiled out from a little hill beside the road." The spring's second known "look" is represented by a 1902 photo that shows stage driver George Breck standing at the spring, which was then a mere "rocked-in" hole in the ground that measured about three feet in diameter [figure 2].[13] Access to the spring was apparently made by dipping a cup into the hole (the hole being full of water). This appearance was noted by traveler Saltus as "a small hole in the ground about a yard wide."

A third pre-1925 "look" of Apollinaris Spring is represented by figure 3, which shows that a large (probably ten-foot) concrete rim had been erected at that time with a box on a pole at its center, the box apparently containing a drinking cup.

In 1922, Daniel R. Hull, Chief Landscape Architect for the National Park Service, visited the park to make recommendations on a number of landscape issues. He recommended that Apollinaris Spring "should be developed in a more attractive manner."[14] In 1924, because of Hull's recommendations, park officials began roadside cleanup of "unsightly sides and slopes" and general debris on the Mammoth-to-Norris road. They initiated improvements at Apollinaris Spring in 1923, and performed them again in 1925.[15]

The 1925 Renovations

The spring assumed its present, modern look in 1925, when workmen "rocked it in" with travertine flagstones that were also piled three-dimensionally and from which the spring's water streams jetted. This major modernization was completed in part because of concerns about the "unsanitary" means by which visitors drank from the spring (dipping both utensils and their faces into the water).[16] D.R. Hull and H.B. Hommon worked jointly on this project.[17] The following account of it appeared in the June 1925 "Monthly Report of the Superintendent" (see box):

In June 1925, Yellowstone superintendent Horace M. Albright detailed recent renovations to Apollinaris Spring.

Collaborating with Mr. H.B. Hommon, Sanitary Engineer of the U.S. Public Health Service, [Mr. Hull] designed a spring effect, using large rocks, for Appolinaris [sic] spring. This project was submitted in the [budget] estimates for the 1926 fiscal year as a part of the [park's] sanitation program. With a crew of workmen Mr. Hull began work at Appolinaris [sic] Spring about June 10…

For the approaches to the spring he used limestone slabs mined in the Hoodoos for flagstones. For the rock wall from which the Appolinaris [sic] water issues in several streams he used large obsidian and granite boulders. Mr. Hommon designed the water courses [sic] and supervised the installation of the plumbing. He worked out a plan whereby the Appolinaris [sic] water, after passing through the rocks where it can be consumed by the public in a sanitary manner, can be collected and conducted to a sprinkling tank…

Some rather extensive planting [of vegetation] was also done by Mr. Hull. While engaged in cleaning up around the spring, the foreman of the cleanup crew, Mr. Emil Furrer, discovered a second Appolinaris [sic] Spring heretofore unknown. Mr. Hommon had this spring conducted to the old spring and a concrete basin was built around the big spring in order to make possible the retention of water for admission to the pipe line going to the new rock fountains…It had been planned to [similarly] develop the Soda Spring at Mammoth Hot Springs and the Iron Springs [sic] on Gibbon River and on Cub Creek but [budgetary constraints prohibited it]."[18]

By June 27, spring development was completed and Albright wrote Hull that "I think it is the most beautiful piece of landscape work that has been done in the national parks.[19] The design also impressed Gilbert Stanley Underwood, who was designing a dining hall for the Union Pacific Railroad's Oregon Short Line at West Yellowstone at the time. Underwood congratulated Albright for promoting "the right sort of atmosphere in the Parks [sic] development."[20] Albright seemed more pleased than perturbed when he wrote Hull in July that "You will be interested to know that the tourists stand around and photograph the new [Apollinaris Spring] and then climb up through the shrubbery, go back and look at the concrete reservior, monkey with the valves, and in general regard this beautiful piece of landscape work as a child would regard an elephant cage in a circus.[21]

Many historic photos showed these extensive 1925 renovations. For example, one picture (page 2) depicts two women holding cups and standing on the new flagstone deck as water jets from the nearby rock-pile.[22] Photographer Jack Haynes celebrated this modern renovation of Apollinaris Spring shortly after its completion by publishing it as a popular 1925 postcard (figure 4).[23]

The NPS's working Cultural Landscapes Inventory describes the 1925 renovation's effects on both the public and posterity.

The Apollinaris Spring development met with general favor. Tourists, much impressed by the site, examined the improvements and photographed the spring...[Superintendent] Albright himself was so pleased by the development that he wrote, "I think it is the most beautiful piece of landscape work that has been done in the national parks as far as I know." Not only was the project aesthetically pleasing, the cost was also satisfactory at $1,223.87; it was only $23.87 over the initial estimate.

The spring represents a successful early attempt to blend structural developments with the natural scenery. Apollinaris Spring reflects the shift away from wooden stairways, ramps and railings to earthen paths and parapets of native stone that occurred in the late 1920s. The plantings that were used to rehabilitate the spring added to the usefulness and beauty of the area, yet it was not until the end of the decade that the practice was used in a routine manner. The landscape design at Apollinaris Spring established a precedent in rockwork and planting that would serve as a model and example for future construction projects. [24]

Apollinaris Spring After the Renovation, 1926–1964

The inconvenience of attempting to drink from chest-level spouting water fountains that splashed on visitors' shoes may have been the reason for modifications to the Apollinaris Spring development in 1928. In that year, Thomas Vint, who had succeeded Hull as the NPS's chief landscape engineer, designed a naturalistic drinking fountain and pool for the spring development. Placed on the flagstone terrace, the stone-lined, raised pool measured 12 feet long by 4 feet wide by 30 inches high. Constant flow bubblers along the sides of the pool provided easy drinking access. This fountain replaced what appears in historic photographs to have been a metal tray cradled on and between large boulders in the same location.[25] The fountain was removed at an unknown date.

Also sometime shortly after the 1925 renovations, park officials decided to locate an auto campground at Apollinaris Spring. "Apollinaris Auto Camp" appeared in the 1933 park master plan but not in Chester Lindsley's *Chronology of Yellowstone,* in monthly and annual reports of the superintendent, or in Haines's *The Yellowstone Story.*

A park sanitation report indicated that a restroom, water system, and sewage disposal tank were installed at Apollinaris Spring in 1930 as part of a plan for a campground here. The 1933 park master plan stated that this "campground" existed in 1933, and that it was comprised then of a comfort station with a "concrete filtration tank" and the spring's new flagstone layout.[27] Under "proposed" improvements, the report stated that "fireplaces and

Figure 3. Apollinaris Spring prior to the 1925 modernization.

Figure 4. Haynes postcard showing the newly renovated Apollinaris Spring.

Camp employees rehearse for a play, 1926. Sometime in the 1890s, the Wylie Camping Company began the tradition of having their employees perform songs, dances, skits, and readings for park visitors. When the several camping companies were merged in 1917, the new concessioner, Yellowstone Park Camps/Camping Company continued the custom of having employees put on entertainment for guests, a tradition that continued until World War II. Some vestiges of the practice remained into the 1950s, but died in the 1960s. Here, "camps" employees rehearse for a 1926 play at Apollinaris Spring. In the 1920s, nature pageants portraying woodland nymphs and spirits were popular in national parks, and that is probably what is happening here.[26]

[picnic] tables" were planned for installation. The 1941 Master Plan did not mention the Auto Camp, indicating that the place had apparently become a mere picnic area sometime between 1934 and 1940. It was a picnic area when I first worked in the park in 1969, and it has continuously served as such from that time until now.

In 1963, the park became involved in an interesting controversy over the spring's name that resulted in the changing of the interpretive sign there. In June of that year, the "Apollinaris Overseas Limited" company of London became concerned that Yellowstone National Park was improperly using its trademark name Apollinaris. The company worried that the public would think that its commercial beverage was not the original Apollinaris water and would think that the park's spring was "the original." The company wanted an explanation of its own antiquity on the park's interpretive sign. The park responded that use of the name in Yellowstone dated to 1890, but did prepare a new exhibit panel that was slated for "installation at that site next summer." Workmen installed the sign, and it remained in place from 1964 until at least the 1980s [figure 5].[28]

Apollinaris Spring in More Recent Years, 1971–2002

During the summers of 1971 and 1972, I was employed by the park's concessioner as a step-on bus tour guide. At that time, it was routine for most bus tours to stop at Apollinaris Spring to allow bus guests to sample the spring's water. Jokes abounded that this water could give one the "runs," but they were mainly humorous exaggerations. As late as 1978, I stopped my bus tours here to allow guests to drink from the spring.

In 1984, while I was finishing work on the first edition of *Yellowstone Place Names*, I asked why the sign proclaiming "Apollinaris Spring" had been taken down, and why the NPS appeared to be discouraging visitors from drinking from the spring. Assistant Chief Naturalist John

Tyers informed me that "we are trying to comply with pure water standards."

Tim Hudson, the park's former chief of maintenance who worked in Yellowstone from 1971 to 2002, remembers this compliance, and has written a summary of activities at Apollinaris Spring during this recent period (see box, below).

Through the 1990s, Leslie Quinn, Information Specialist for Xanterra Parks and Resorts Ltd., has continued to train his concessioner bus drivers to stop here at Apollinaris Spring, and those drivers and tour guides have continued to stop routinely with their busloads of people. (Quinn admits that the reason is now more related to the fact that there is a set of flush toilets in the nearby picnic area than to the spring itself). Quinn reports the following about the spring in recent years:

[Through the mid-1990s], the feature has alternated between sometimes having the spigots hooked up and flowing and sometimes not. Somewhere along the way I heard that a bit of a fight was going on between two different sets of [NPS] peoples who had keys to the access panels up the hill—one group (and I think this was Maintenance) thought that the water should be kept off entirely since just telling people not to drink out of it was not good enough, while the other group (and I think this might have been someone in Interp[retation]) thought the sign was good enough to keep people from drinking and that water should flow from the spigots for the glory of history.[30]

Figure 5. 1964 sign showing chemical analyses and including a disclaimer demanded by the "Apollinaris Overseas Limited" company of London.

Although I cannot confirm Quinn's assertion of these alleged differences between NPS divisions, a metal springbox remains over Apollinaris Spring today to prevent contamination of the spring's

Former Chief of Maintenance Tim Hudson recounts the recent history of the spring:

When I arrived in the park in 1971, Apollinaris Spring was operating pretty much as you remember. People came and filled up their water jugs, [and] the public was pretty much encouraged to drink out of the spring. As you recall, the water in Mammoth was so bad, especially in the spring[time], that people [at Mammoth] hauled their drinking water. When the road was open, some hauled it from Apollinaris.

By the late 1970s and early 1980s, there was a concerted effort to bring Yellowstone's drinking water up to standards. Included in that effort was the water at Apollinaris Spring, since people were obviously drinking it. There was considerable debate about what to do with the Apollinaris Spring water since it did not meet drinking water standards in two major areas. The spring was not protected from surface water runoff [spring high water], and therefore could easily be contaminated from that runoff, and the water was not disinfected (or should I say, did not have a chlorine residual, since it was not chlorinated). Protecting the spring [by building a springbox around it] was the easiest part, as it [the box] would actually maintain the spring water.

The chlorination/disinfection situation was the problem. We debated many times on: what would happen if we put some sort of chlorinator on the system, and finally decided that the most likely result of chlorination would be to drastically change the taste of the water. This was likely because of the high mineral content and salts that are in the water. We felt that disinfecting the water and altering the taste was not in keeping with the historic "culture" (no pun intended) of the water, so we decided [instead] to de-emphasize the drinking water aspect by not inviting people to drink it.

A contract was let in the early 1980s…to protect the spring from surface water contamination. This is where the "box" came from—it was put in to keep the water a purely spring water. We also, as I recall, redid some of the plumbing [in the area], as this is also the water that runs the flush toilets at the [nearby] picnic area. As I recall, after the construction, we put up a sign that explained that it was not approved drinking water and hoped that would take care of our responsibility.

Over the ensuing years, I know that some changes to the signing, and how the water is released, have been made or attempted. Some of that happened at the local level and I do not know every argument, attempt, etc., that has occurred. I suspect that…some of those gaps [can be filled via the] annual sanitary surveys.[29]

waters by adjacent surface waters.

Apollinaris Spring as a Cultural Landscape

Apollinaris Spring is what's known in NPS parlance as a cultural landscape—a geographic place that has meaning beyond the physical (natural) feature because it is intertwined with human history. Cultural landscapes represent a "marriage" of physical geography and human history, and that is certainly the case at this site.

Human history is thoroughly interwoven with Apollinaris Spring, which has been determined by park personnel to be eligible for listing on the National Register of Historic Places as a cultural landscape, on the grounds that it is (a) associated with the 20th century movement to develop national parks for public enjoyment and (b) also reflects the practices of park landscape design developed and used by the NPS from 1916 to 1942. At press time, park personnel were finalizing a Cultural Landscapes Inventory, which evaluates and documents those features of the site that give it character and retain integrity according to the 1925 period of significance. A National Historic Register nomination is still in the works.

References

[1] Constance Gordon-Cummings, "The World's Wonderlands in Wyoming and New Zealand," *Overland Monthly* 5 (January, 1885): 13. Additionally, an 1884 newspaper article reported that "an Apollinaris Spring" existed at the head of Mill Creek, north of Yellowstone Park. *Livingston* (Montana) *Enterprise*, August 5, 1884.

[2] Carter Harrison, *A Summer's Outing and the Old Man's Story* (Chicago: Donohue, Henneberry, and Company), 1891, pp. 68–70.

[3] J. Sanford Saltus, *A Week in the Yellowstone* (New York: The Knickerbocker Press), 1895, p. 24.

[4] See Lee Whittlesey, *Wonderland Nomenclature*, Lemonade Creek entry, for an elaboration on this.

[5] Theodore Gerrish, *Life in the World's Wonderland* (Biddeford, Maine: n.p.), 1887, pp. 195–196.

[6] The earliest known appearance of the capitalized name-form Apollinaris Spring reportedly occurred in *Outing*, April 1890, p. 20. Both the Yellowstone Card File of place names (in park museum curator's office) and Aubrey Haines in Box H-3, file 5.2.1. "Place Names," 1979–1980, YNP Archives, state this, but the author has so far been unable to verify it.

[7] Mathews to Captain George S. Anderson, October 26, 1896, Document 2729; George S. Anderson to Larry Mathews, November 7, 1896, in Letters Sent, vol. VI, p. 61, YNP Archives.

[8] Establishment of the camp is in information included in Letters Sent, vol. V3, p. 14 (September 30, 1898) and vol. IX, p. 63 (November 1, 1899). Removal of the camp is in Chester Lindsley, Chronology of Yellowstone p. 194, and also in Archive Document #6426, YNP Archives.

[9] Materials in Item 96-B, files 201–202, "Licenses," YNP Archives, relating to Apollinaris Spring and these men.

[10] Thomas Ryan to John Pitcher, January 3, 1906, Archive Document 6592; John Pitcher to Secretary, January 10, 1906, in Letters Sent, vol. XVI, p. 22; Jesse E. Wilson to Acting Superintendent, May 25, 1907, Archive Document 6587, YNP Archives.

[11] Poster: "Analysis of the Waters of Apollinaris Spring," no date [1919–1929], copy at YNP Research Library, Vertical Files, "Geology—Chemical," (Dept. of Agriculture). Photo of wayside exhibit in "Naming of Apollinaris Spring," October 11, 1963, in YNP Library vertical files, "Place Names," (Naming).

[12] 1966 *Haynes Guide*, p. 59.

[13] Photo number YELL-109663, YNP photo archives.

[14] D.R. Hull, Landscape Engineer, Memorandum to Superintendent, Yellowstone National Park, June 26, 1922, box D-26, folder 1, YNP Archives.

[15] Horace Albright, "Roadside Cleanup," Fall, 1925, in box D-5, file 6, "1925: Road Cleanup, Rockefeller Donations, Expenditures, Project Reports," YNP Archives.

[16] *NPS Cultural Landscapes Inventory, Part I*, pp. 9–11.

[17] Note that the Monthly Report spells it "Hommon" while the Cultural Landscape Inventory (below) spells it "Hammon."

[18] Horace Albright, "Appolinaris [sic] Spring," in Monthly Report of the Superintendent, June, 1925, p. 20.

[19] Horace M. Albright, Letter to Dan R. Hull, June 27, 1925.

[20] Gilbert Stanley Underwood, Letter to Horace M. Albright, July 31, 1925.

[21] Horace M. Albright, Letter to Dan R. Hull, July 21, 1925.

[22] Other photos are YELL-28781, 28782-2, 28783, and 28788-3, YNP photo archives.

[23] This postcard is number YELL-94281, which is Haynes postcard number 25119.

[24] This document with all of its enclosures as assembled by NPS Cultural Resource Specialist Lon Johnson is in the park archives.

[25] "Redesign of Apollinaris Spring," by Landscape Architecture Division, Yellowstone Plan No. 89.

[26] *A Yellowstone Album: A Photographic Celebration of the First National Park*, Roberts Rinehart (Boulder, CO) no date, p. 121.

[27] National Park Service, "Report of Work Done by the Sanitation Department for the Fiscal Year 1931: Season of 1930," in YNP Library, vertical files, "History-YNP-Structures," (Report). Yellowstone National Park Master Plan, 1933, p. 24 (last page in book) in map drawer 21, YNP Library.

[28] Information on the "Naming of Apollinaris Spring," October 11, 1963, in YNP Library vertical files, "Place Names," (Naming). See also the more extensive file "Apollinaris Spring, L50" in Box L-18, YNP Archives.

[29] Tim Hudson to Lee H. Whittlesey, May 1, 2002, e-mail communication. Hard copy in park history files.

[30] Leslie Quinn to Lee H. Whittlesey, personal

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Book Review

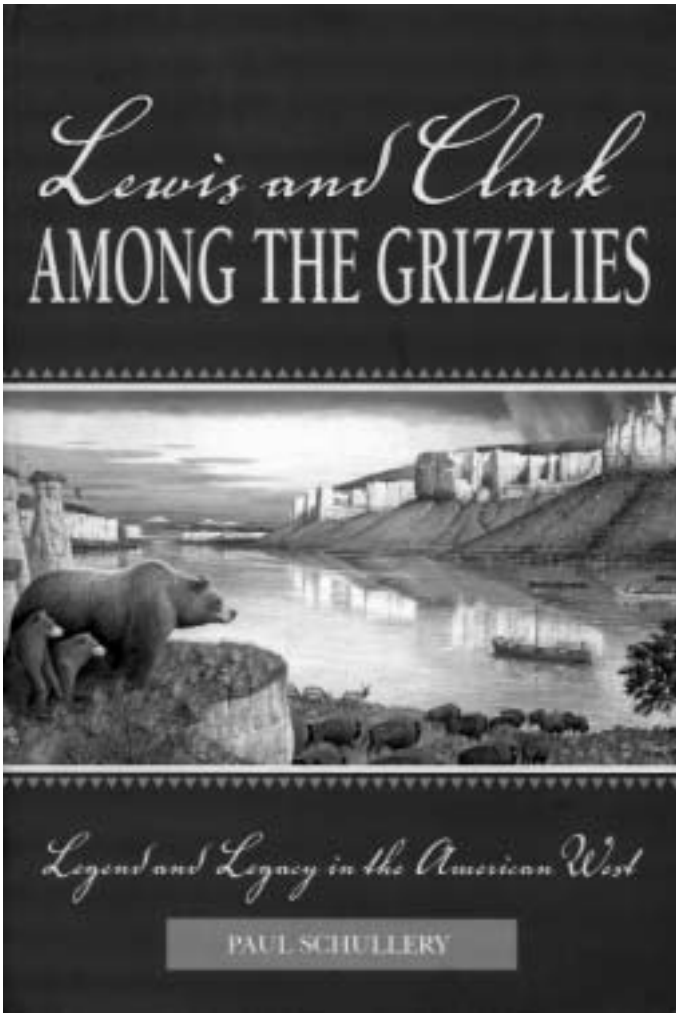
Lewis and Clark Among the Grizzlies, *by Paul Schullery*

by Alice K. Wondrak

Lewis and Clark Among the Grizzlies, (Falcon/Globe Pequot, 2002), Paul Schullery's brilliantly-timed rumination on the bear stories told by the Corps of Discovery, raises more questions than it answers. That is a good thing. With this work, Schullery not only compiles an impressive collection of the Corps's encounters with bears, but also reveals the archeology of the "bear story" as we have come to know and recognize it. Drawing on their own words whenever possible, *Lewis and Clark Among the Grizzlies* pulls us into the Corps's world without promising that we will see things quite as they did.

Schullery celebrates the journals as texts, but warns against treating them as conclusive evidence for what the Corps did or didn't see, or as a template for a West that we want to believe existed. The events of the trip have been filtered through far too many layers of perception through the years to be taken, as they sometimes have been, as "truth."

That in mind, two central themes emerge here, both derived from what Schullery refers to as Lewis and Clark's "extraordinarily durable aura of authority." First, by asking that we read the words they actually wrote, Schullery shows how the Corps's descriptions of bears (and of their encounters with them) have served as a skeleton ripe for fleshing out by storytellers of all kinds—from genetic classifiers to pulp fiction novelists, historians, and colloquial yarn-spinners—some of whom don't seem all that disparate. Perhaps the best example comes in Chapter 7, where Lewis recounts being chased into the Missouri by a "large white, or reather *(sic)* brown bear" which he believed wanted to kill him. Schullery observes that Lewis's tone, his narrative structure, and indeed, his misperceptions about ursine psychology helped shape the telling of bear stories for decades to come. Insightfully, Schullery acknowledges even his own tendency to try and make the words and experiences of the Corps fit within the construct of his own experience and understanding, and suggests broader possibilities (p. 191).



The second notion driving this book is that we cannot assume that the journals are precise and accurate indicators of either historical numbers or even the presence or non-presence of certain wildlife species in certain places. Unfortunately, Schullery himself eventually falls into this trap, grappling at length with the question of grizzly cross-section sample size evident in the journals. He finally speculates that "perhaps the highly conjectural population estimates we have been trying to make recede so far from reality that they become meaningless," only to back away from this quite reasonable assertion with an immediate "But I don't think so."

Exceptionally readable and peppered with Schullery's familiar wit, the book also accomplished a perhaps unintended goal: it made me want to go back and read the journals for myself. If its point is taken, this book should serve as a springboard for reconsidering some of the innumerable other ways in which two centuries of American storytelling have shaped and been shaped by the journals of Lewis and Clark.

Alice Wondrak is a writer-editor for the Yellowstone Center for Resources.
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The Yellowstone Field Research Expeditions

Winter Research in the Interior, Part II

by Thomas D. Brock

YNP ARCHIVES, COURTESY VINCENT SCHAEFER

Optical effects resulting from silver iodide seeding of an eruption of Old Faithful Geyser during the 1962 YFRE expedition.

Part I of this article was presented in the fall 2002 issue of Yellowstone Science. *The Yellowstone Field Research Expeditions (YFRE) took place in the Old Faithful and Norris areas for four weeks each winter from 1961 to 1971 under the direction of atmospheric scientist Vincent J. Schaefer of the State University of New York at Albany. They brought to the park a wide variety of scientists from disparate fields, each of whom stayed for one week.*

In this issue, we continue the description of the Yellowstone Field Research Expeditions, drawn from the annual reports of Vincent Schaefer by Thomas Brock, who, starting in 1967, participated in the expeditions.

Fifth Expedition
(January 5–February 2, 1965)

Although called the Fifth Expedition, this represented the sixth successive winter that Vincent Schaefer carried out research in the Old Faithful area. This was the first year of a new three-year National Science Foundation grant. The agreement with the National Park Service, whereby Schaefer was given responsibility for coordinating this winter research at Yellowstone, continued. "The isolation, natural beauty, unique atmospheric conditions, and good fellowship combine to make participation in the expedition an unforgettable experience," Schaefer reflected.

Forty-one participants were involved. For the first time, two participants from foreign countries took part (Japan and England). The group this time was heavy on the academic side, but there were also scientists from private and public research organizations. There were five graduate students, one undergraduate, and four high school seniors.

High school student participation. Because Schaefer had played a major role in establishing a National Science Foundation summer research participation program for high school students, he was strongly committed to integrating high school students into the expedition. The high school students were recruited by

George Wehmann, the local coordinator for the expedition, from the Idaho Falls school district, and selected on the basis of their academic records and personal interviews. Those selected were excused from school for the week they were at Old Faithful. Each high school student was assigned a specific routine duty such as keeping the daily weather observations, and was assigned as an assistant to a scientist. These students also carried out some research on their own, presumably under the direction of their scientist mentor. The students did such good jobs that they were all invited to participate the following summer in the Natural Sciences Institute operated by the State University of New York at Albany.

Atmospheric research. As in the past, a number of the research projects centered on atmospheric sciences, especially cloud physics. Because of the experience gained during previous winters, the cloud seeding experiments had acquired a degree of reliability that permitted a fair amount of predictability. The scientists were also better able to adapt to the various weather conditions that occurred.

Four separate sites in the Upper Geyser Basin had by now been identified as particularly favorable for cloud seeding experiments. These were Old Faithful, Blue Star Spring (near the Firehole River and downslope from Old Faithful), White Geyser (in the Myriad Springs area south of Old Faithful Inn), and Sawmill Geyser (near the Firehole River downslope from Castle Geyser). In addition, four observation sites downwind from these seeding sites were identified, based on how the flow of drainage winds influenced air motions.

Again, Schaefer emphasized in his report that Yellowstone was unique in providing isolation from artificial pollution sources, and hence of great significance for basic research in atmospheric science.

An interesting study was conducted this year by John S. Rinehart, Assistant Director for Research and Development of the U.S. Coast and Geodetic Survey. Rinehart used a portable seismograph to measure earth tremors generated during eruptions by Old Faithful Geyser.

This year there was a considerable increase in the number of biologists who participated in the expedition. Biologists were studying paleobiology, ecology of hot springs, fisheries, temperature control in marine mammals, and soil animals.

Radiotelemetry of large mammals. The most noted biologists, perhaps, were John and Frank Craighead, who were developing radiotelemetry techniques for following movements of large mammals in the park. The 1965 winter research saw the beginnings of an extensive program by these scientists on radio tracking of large mammals. During their week with the expedition, the Craigheads instrumented three elk with radio transmitters, including one with a temperature-sensitive transmitter. In addition, other animals of the Old Faithful elk band were ear-tagged or marked with plastic collars. The radio-instrumented animals were monitored throughout the winter and were tracked for the rest of the year. The Craigheads continued this work on the sixth and subsequent expeditions.

Sixth Expedition (January 4–February 1, 1966)

During this expedition, 41 individuals from 12 states and two foreign countries (France and Australia) participated in the winter activities at Old Faithful. More than half the participants were attending for the first time. High school students again participated, following the arrangements and protocols used the previous year. Although atmospheric research was again the principal focus of the expedition, increased biological work was carried out.

Air pollution problems. A troubling situation first encountered this year was a portent of things to come. According to Schaefer: "A disturbing amount of air 'pollution' was in evidence this year due to the considerable increase in numbers and use of snowmobiles [meaning the large snow cats] and smaller oversnow vehicles [now called snowmobiles]. Following a two-hour visit of nearly 40 of these vehicles in mid-January, the air remained polluted for at least 12 hours. The level of contamination is still low compared to urban areas and in one sense these occurrences are of considerable value, since they provide us with valuable information on diffusion of particles, air trajectories, and related aspects of airborne particles."

Among the reported progress this year was a study of heat flow in snow, a new method for measuring the rate of geyserite deposition in hot springs, the detection of seeding effects in the snow profile, the testing of new techniques for silver iodide

COURTESY ROGER CHENG

Tom Mee from the Cornell Aeronautical Laboratory, Buffalo, New York, conducts supersaturation studies with mobile instruments at Blue Star Spring, 1964.

production, and the effect of geyser eruptions on the pH of snow.

Snow fleas. Following up some work that had been done by another participant during a previous winter, Schaefer described some interesting observations on snow fleas. While digging a snow pit to measure the depth of hoar-ice crystals, Schaefer discovered high concentrations of snow fleas in the snow pack at a depth of 15–20 cm above the ground. The animals occurred in a very narrow zone less than 0.5 cm thick. This was at the contact point between the bottom of old snow and the top of the depth-hoar layer. Because the depth-hoar crystals grow by direct sublimation at the expense of the much smaller old snow particles, Schaefer hypothesized that impurities (organic or inorganic residues) adsorbed to or swept up in the snow crystals falling from the sky would be released in this region as the snow particles evaporated. Thus, at this location nutrients might be available as food for the snow fleas. He noted that when the insects were uncovered they were very active. Insects were found at this depth in every pit dug, with densities of at least 10,000 per square meter.

Desert Research Institute overflights. This year Schaefer arranged for overflights of Old Faithful by a team from the Desert Research Institute of Reno, Nevada. These flights, under Edwin X. Berry, were designed to accompany cloud seeding activities. The aircraft was a twin-engine Beechcraft equipped with external sensors for liquid water content, temperature, air speed, turbulence, and static pressure. The aircraft also carried a continuous particle-sampler, which was a moving tape that included markers so that the time when particles were collected could be correlated with other events. A photographic record of each flight was obtained from a 16-mm camera mounted in the nose of the aircraft that took one picture every three seconds. Although some data were obtained, the principal result of this work was to test the various pieces of equipment under the extreme weather conditions of Yellowstone National Park.

The aircraft and crew were based at Idaho Falls. Permission had been given to descend to an altitude of 500 feet, but no lower. Three overflights were carried out. Radio contact with the ground party was made and several penetrations of the plumes above geysers were made. Ice particles were detected high above the valley in clear air, but above the geyser plumes mostly water was detected. An interesting phenomenon observed on all three overflights was that most of the Firehole River valley was covered by ground fog except for the Upper Geyser Basin, which was quite clear.

In the most successful of the three overflights, the airplane was able to penetrate the plume of Castle Geyser at the time that it was being seeded. Not a single ice crystal was encountered, whereas water droplets of varying sizes were captured and measured. Excellent photographs were obtained from all three overflights indicating the height, temperature, and characteristics of supercooled or seeded cloud layers. Although the overflights were deemed by Schaefer to be successful, they were never repeated in subsequent years.

Radio telemetry of elk. John and Frank Craighead continued the research that they had begun during the 1965 expedition on tracking elk using radio transmitters. This year they were assisted in this work by Joel Varney, an engineer with Philco Corporation, who was designing and building their radio tracking equipment. The Craigheads checked on the elk that had been instrumented the previous winter, and used radio telemetry to study various behavioral phenomena of elk. Although there was still some checking and perfecting of equipment, they were also able to obtain good data on elk behavior. Among other things, they employed a transmitter probe that was implanted under the skin of the elk, permitting radio telemetry of the elk body temperature. Ambient temperature was recorded at the same time by another probe. They found that the elk body temperature ranged from a low of 93.7°F to a high of 98.5°F during periods when the ambient temperature ranged from 5°F to 35°F. They were also able to measure the effect on body temperature of changes in the activity of the animal. In one case, when an animal was cornered in deep snow, it became nervous and agitated, and the body temperature rose from 95.3°F to 97°F. Another result of radio tracking was the demonstration that in winter the elk made heavy use of dwarf mistletoe, a parasite on lodgepole pine, for food.

Studies on hot ground. An interesting study begun this year was that of Lee D. Miller of the University of Michigan. Miller had access to infrared air photographs of the park that showed the distribution of thermal areas. Although many of these were known thermal features, there were also a number of areas of hot ground that were not obviously thermal in summer. In winter, however, Miller was able to detect them by their absence of snow cover, and mapped them using a hand-held infrared thermometer. Some of these areas of hot ground had apparently only recently become hot, as vegetation appeared to be in the process of being killed or altered. Miller's work was another example of the value of winter research in the park. He continued this work over several more expeditions, and it became the basis for his Ph.D. thesis.

Seventh Expedition (January 10–February 7, 1967)

This was the third year of the second National Science Foundation grant supporting the expeditions. Forty-two individuals participated in the 1967 expedition; 33 from academic institutions, five from private, and four from public research organizations. As in 1966, more than half of the participants were newcomers to the expedition. There were six atmospheric scientists from Colorado State University, two attending each of three weeks of the four-week expedition. Another scientist came from England. There were nine graduate students, one undergraduate, and four high school seniors.

Unusually warm weather. The weather for the 1967 expedition was markedly warmer than average, as had also been the case with the 1966 expedition. Temperatures were above 0°C on three days, and dropped below -10°C only seven times. The warmer weather was accompanied by unusual cloudiness. At the start of the expedition, only two feet of snow were on the ground, but heavy snowfalls soon led to a marked buildup. By the time the expedition ended, there was five feet of

snow on the ground.

Although the warmer weather was not favorable for extensive cloud seeding research, there were sufficient cold mornings that some studies could be carried out. This year, for the first time, a continuous ice nuclei detector was operated, which provided an excellent record of the variability of such nuclei in the Yellowstone area. A number of allied studies using increasingly sophisticated methods involved measuring the growth of snowflakes and ice nuclei. More automatic recording apparati were now being used by various scientists, and the results were becoming increasingly quantitative. These changes may have reflected the much greater research support for atmospheric science by the National Science Foundation over the past five years, which itself was part of the substantial increase in research support by the federal government in reaction to the "cold war" with the Soviet Union.

Radiotelemetry of large mammals. The team of Frank and John Craighead, enlarged this year to four persons, continued their work of telemetering body temperatures of large mammals. Because their work on elk had been successful, they followed it up this year with instrumentation of a hibernating black bear. The bear's den had been located in November of the previous year, and the team visited it twice during their stay at the expedition. To reach the den, they traveled seven miles up the Gibbon River from Madison Junction by snowmobile and then, with difficulty, traversed the last leg on snowshoes, whereupon they immobilized the bear with a dart laced with anaesthetic. The telemeter collar radioed information on body temperature and pulse rate. Camping nearby, the team was able to record the body temperature of the bear for a 24-hour period. In general, the bear's body temperature varied directly with the ambient temperature of the environment. Tests showed that the radio signal could be received up to ¾ mile away from the den.

Hot spring microbes. Several microbiological studies were carried out in 1967. One researcher from the General Electric Company, interested in finding thermophilic microbes capable of digesting lignin, visited a number of steaming ground areas where wood was decomposing. Samples were taken for isolation of lignolytic bacteria in the laboratory. A research group from Fordham University made attempts to culture thermophilic algae from various hot pools.

This was the first year that I participated in the expedition. As part of my ongoing studies on the physiological ecology of thermal microbes, I visited sites in the Lower Geyser Basin (Firehole Lake Drive) where my summer research program was centered. Richard Guilmette, the ranger at Old Faithful, gave me a ride to the Firehole Lake Drive entrance, and from there I reached my study area on snowshoes. I was able to make temperature readings and collect quantitative samples of microbial mats for subsequent analysis at my university laboratory. The focus was on the changing thermal regimes of the hot springs from summer compared to winter, and on the ability of photosynthetic microbes to adapt to the much lower light intensities available to them in the winter (short days, cloudy conditions). The results provided an initial insight into the adaptation of thermal microbes to winter conditions, and provided the basis for more detailed studies in subsequent years.

Air pollution and other upcoming problems. Schaefer again noted the marked effect of snowmobiles on air pollution levels at Old Faithful: "As with all previous expeditions, the number of new research opportunities uncovered again increased. The most interesting of these involves the buildup in air pollution levels...occasioned by the ever increasing number of snowmobiles and skimobiles. These have increased by an order of magnitude during the past three years. While the local effect seems to disappear overnight, there is some evidence that we are now beginning to detect an increase in the 'background' level which is measurable."

Another worry noted by Schaefer: "...we have been assured that our present facilities will again be available to us next winter. If our cook-house is removed due to a re-alignment of roads which is contemplated for the summer of 1968, we have been assured that adequate facilities will be made available for subsequent years."

Schaefer was moving ahead with plans for another three-year grant proposal to the National Science Foundation. At the same time, he had initiated discussions with Superintendent John McLaughlin to develop a year-round research program. As Schaefer envisaged it, this would involve development of a permanent research laboratory in the Old Faithful area, preferably in the Myriad Springs area (south of Old Faithful Inn). According to his report, McLaughlin had encouraged him to solicit expressions of interest from scientists from various disciplines. The following summer, Schaefer asked John and Frank Craighead and I to meet with him and McLaughlin to discuss development of the year-round laboratory. Although Schaefer remained optimistic after the meeting, it seemed to me that the NPS was having second thoughts about the construction of private facilities inside the park.

Eighth Expedition
(January 8–February 6, 1968)

This was the first year of a new three-year grant from the National Science Foundation for the Yellowstone Field Research Expeditions. Forty-four individuals participated in the 1968 expedition; 30 from academic institutions, seven from public agencies at the federal level, and seven from industrial and other private organizations. Five participants were from outside the United States, two from Japan, two from England, and one from Ireland. Four high school students also participated.

In contrast to the previous two years, the weather this year was "ideal" for cloud seeding research. Except for a few isolated days of snowfall, the weather consisted of a series of cold, clear, windless days. There was a run of 16 consecutive days when cloud seeding researchers could carry out experiments. In addition to pro-

The Schaefer technique for catching and replicating snow crystals was used widely on the Yellowstone Field Research Expeditions. The crystals seen here are photomicrographs taken from replicas prepared on the 1962 expedition. All from the Yellowstone archives, courtesy Vincent Schaefer.

viding ideal conditions for carrying out various research studies, there were many "magnificent" optical effects.

Research facility developments. This year, several snowmobiles were made available for researchers, making a number of the studies much more efficient. Schaefer recorded, "We had resisted the urge to acquire such equipment for several years due primarily to the air pollution contributed to the test area...A noticeable change...started in 1965 when, for the first time, skimobiles began to appear in increasing numbers. During last winter hardly a day passed without a group of drivers of these noisy vehicles...In addition to the smaller vehicles, an increased number of the large snowmobiles were also noted. Their presence is manifest by much more noticeable plumes above the geysers, hot springs, and other moisture sources in the region...[but] thanks to the snowmobiles we were able to work over a very much larger area of the Basin than ever before and consequently obtained excellent records."

With the renewal of his National Science Foundation grant, Schaefer negotiated another five-year agreement with the National Park Service. As a result of this agreement, Schaefer was again designated to coordinate this winter research within the park. However, "In view of the large increase in daily visits by winter tourists to Old Faithful, we have suggested to Superintendent Jack Anderson that the main area of our field activities be shifted from the vicinity of Old Faithful to the Myriad Creek [Springs] area south of the Inn."

This year Schaefer reaffirmed his interest in developing a year-round research facility "as suggested last year by Superintendent McLaughlin. Representatives of nearly a dozen universities have been consulted on this subject and plans are now underway to further the establishment of such a laboratory." However, park officials temporized, and concrete plans for the laboratory never materialized. Instead, Schaefer shifted his interest to the possibility of a laboratory in one of the buildings of the old Union Pacific Railroad Station at West Yellowstone. Although this possibility initially seemed promising, it also came to naught.

Atmospheric research. The cloud-seeding researchers continued to develop and perfect methods for inducing ice nucleation. New cloud seeding agents were tested, and procedures for distributing them quickly through the atmosphere were refined. Other scientists studied the physics of snow, including heat flow. Detailed studies on the structure of snow crystals were carried out, using modifications of the 1940 Schaefer technique. One scientist had developed a device for photographing small particles, such as snowflakes, as they fell through the air, and spent his week testing and refining his equipment.

COURTESY ROGER CHENG

Researcher Edmond Holroyd photographs snow particles from inside his tent, 1968.

Radiotelemetry of large mammals. Frank and John Craighead again attended the expedition, working as before with engineer Joel Varney of the Philco Corporation. Field testing was carried out on new radio telemetry equipment. In preparation for this winter's work, the Craigheads had trapped a black bear in the Mammoth area in November, instrumented it with a radio collar, and released it in the Old Faithful area. However, the bear entered caves at the south end of Biscuit Basin, and the radio signal was lost. Because of this, they concentrated their work on continuous recording of body temperatures of radio-collared elk. However, the elk experiment failed, and as a substitute, range tests and skin temperature measurements were made on human subjects. Observations suggested that further research was needed to perfect the recording equipment.

Microbiology of boiling springs. This was the second year that I participated in the expedition. My work on the biology of hot springs had progressed extensively since the previous winter. Most importantly, I had shown the presence of living bacteria in boiling springs. I used my week at the expedition to continue studies on these bacteria. As a study area, I chose the complex of boiling pools and springs in the Castle Geyser area. At that time, the Grand Loop Road ran just in front of Castle Geyser, making this very public site unavailable for research during the regular tourist season. I carried out a number of studies on these springs, demonstrating that bacteria were not only present, but thriving.

Ninth Expedition (January 14–28, 1969)

Although the National Science Foundation had granted Vincent Schaefer a three-year renewal of the expeditions, this year funds were seriously curtailed (probably because of demands for federal money for the Vietnam War). Instead of four weeks, Schaefer was able to operate for only two weeks.

In 1969, there were also difficulties

with the bunk and mess hall facilities. With the upcoming new road construction, there were changes underway. The mess hall that had served so notably since 1962 was no longer available, and the park could provide only a somewhat smaller building. Also, this was to be the last year that the bunkhouse would be available, as it was slated for demolition.

Twenty-four scientists participated in the 1969 expedition, with 17 interested in cloud physics. Despite attempts to admit a number of graduate students, in the end only one participated. Also, because of curtailed funds and reduction in facilities, participation by high school students was eliminated.

THOMAS J. HENDERSON, ATMOSPHERICS, INC.

Vincent Schaefer.

This winter turned out to be a heavy snow year, and five feet of snow fell during the two weeks of the expedition. "Never in our experience of ten years at Old Faithful have the trees been so burdened with snow," wrote Schaefer. However, there were enough cold mornings that cloud seeding research could be carried out. Most of this research involved a quantitative study of seeding effects. Cloud seeding agents were silver iodide flares, liquid propane, liquid carbon dioxide, sodium chloride, a silver iodide/acetone mixture, and silver iodide dissolved in dimethyl sulfide. A variety of noteworthy visible effects were obtained, as well as many ice crystal replicas that could be analyzed later. Another area of research involved study of atmospheric electricity and various electrical effects occurring during geyser eruptions. The heavy snowfall also provided ample opportunity to observe various types of natural snow crystals.

The only biological work in the 1969 expedition was that of Frank and John Craighead, who continued their research on use of radio telemetry for the study of large mammals.

Plans for the future. "Funds are allocated for the tenth expedition in January 1970. Although a new five-year agreement was obtained from the National Park Service last year, there is some uncertainty at the present writing [May 1, 1969] whether facilities will be available next winter. Although the buildings we have utilized over the years are still very adequate for our purposes, we have been informed by Park officials that they will be demolished and burned this spring. If this is done and other winterized facilities are not provided to us, it is questionable whether we will be able to operate. We have a large list of persons wishing to participate in the 1970 expedition and are hopeful that some means will be found to again utilize the unique environment of the Upper Geyser Basin."

Tenth Expedition (January 6 and 7, 1970)

Because the facilities at Old Faithful were no longer available, Schaefer decided to drastically curtail the expedition. A few of the scientists who had worked at Old Faithful in previous years, and who were actively involved in cloud seeding research, were invited to participate in this abbreviated expedition. Because there were no facilities at Old Faithful, the group stayed three nights at West Yellowstone and went by snowmobile into the park on two successive days. One objective was to see whether this arrangement would permit adequate time for research.

In order to reach Old Faithful in time to conduct the planned research, the group rose very early and left West Yellowstone at 5:30 a.m., two hours before sunrise. This permitted arrival at Old Faithful at dawn. The first seeding was carried out at 7:30 a.m. The work involved testing a new silver iodide pyrotechnic device that was made by the Thiokol Company. The results were successful, but by 10 a.m. the air had become unstable and further work could not be done. The group spent the rest of the day touring various sites in the Upper Geyser Basin, and then returned to West Yellowstone.

On the following day, the group went to Norris Geyser Basin. Schaefer wanted to see how this area compared with the Old Faithful area for research purposes. It was clear by now that snowmobile traffic at Old Faithful was interfering with research and that if the expeditions were to continue, a new research site was needed.

During the one day the scientists spent at Norris, Superintendent Jack Anderson visited, and he and Schaefer were able to develop plans for a three-week program at Norris the following year.

Eleventh Expedition (January 13–February 3, 1971)

Although not anticipated, it turned out that the eleventh expedition was the last. Because facilities were no longer available at Old Faithful, the headquarters of the expedition were shifted to the employee housing area at Norris Geyser Basin.

The duration of the eleventh expedition was restricted to three weeks rather than four because it was not certain if the

new facilities would work out. A preliminary survey in the fall indicated that there would be no potable water; water had to be hauled several miles from the Gibbon River by snow sled. Also, toilet facilities were much more primitive than they had been at Old Faithful. Heating facilities were also uncertain. Wash water was obtained by melting snow.

It turned out that the worries about the adequacy of facilities were not justified. In fact, the facilities were nearly equivalent to those used at Old Faithful. There was a mess hall with bunkroom for six on the second floor, a dormitory with four beds, and a small apartment with four more beds. Sanitary facilities consisted of two pit toilets located about 100 feet from the buildings. These buildings were located about 1¼ miles from the research area at Norris Geyser Basin. At the geyser basin itself, a small warming room off the visitor center was also available.

Thirty-four individuals attended, representing 18 different organizations. There were also three Ph.D.-level graduate students working in atmospheric science, and one high school senior.

Norris Geyser Basin turned out to be very suitable for the sort of atmospheric research that Schaefer and his associates conducted. The moisture supply to the atmosphere was actually greater than at Old Faithful, and because it was confined to the relatively deep Porcelain Basin, the supercooled clouds lasted longer over the day. An additional factor emphasized by Schaefer was that Norris was free of the air pollution problems that were now plaguing the Old Faithful area.

However, access to the research areas was permitted only by foot, which was somewhat difficult because of the high snow pack of this particular year. In addition to the Porcelain Basin, the expedition had access to all other thermal areas of Norris, including Tantalus Creek and the geyser area that includes Echinus and Steamboat Geysers.

When the expedition began, the weather was quite cold and hence very favorable for atmospherics research. However, the temperature rose sharply soon thereafter, and precipitation occurred in the form of rain or snow. The weather remained unusually warm for the duration of the expedition. Despite this, some significant research was carried out.

COURTESY ROGER CHENG

Norris mess hall, 1971 expedition.

Schaefer concluded that with some minor modifications, the facilities available at Norris could be made superior to those previously used at Old Faithful. It seemed evident that when the eleventh expedition wrapped up, intentions were firm that the expeditions would continue into the indefinite future. However, this did not happen. According to Schaefer: "...my hope to continue the expeditions into the [19]70s was abandoned when I encountered a radical change in administrative policy on the part of the Park Service....[Further] The influx of as many as a thousand snowmobiles on a single day so polluted the air that we could no longer experience the supersaturated air and its purity...We [also] found it impossible to leave equipment in the field for extended measurements without running the danger of vandalism."

Conclusion

The Yellowstone Field Research Expeditions offered an unparalleled opportunity for scientists from a variety of environmental fields to conduct research in the cold, clean, environment of a Yellowstone winter. Very few of these scientists would have had the ability or initiative to develop research projects of this sort on their own. By providing the critical winter facilities (transportation, housing, and meals), Vincent Schaefer opened doors for many scientists. Although Schaefer's original motivation was to carry out his own research in cloud seeding, he worked selflessly to provide facilities for other scientists. In addition, he avidly promoted participation by college and high school students.

The progress reports in Schaefer's annual summaries by each scientist attest to the fact that they all found the expeditions exciting and profitable. Many scientists commented on the research seminars and the good fellowship that developed over the week. Scientists from diverse disciplines found themselves thrown together, living under somewhat adverse conditions. This created a bond that remained after the return to the home institution.

Over the 11 years that the expeditions took place, a total of 229 days of activity occurred in the park, well over a half-year of full-time work. The total number of participants was 328. Although not readily documented, it seems possible that Schaefer's winter expeditions may have pioneered overnight stay at Old Faithful, and

thus forged the way for the development of commercial winter use at that location.

Bibliographies of published papers, given at the ends of the annual reports, show that a large number of research studies owed their existence to the Yellowstone Field Research Expeditions. Even if a research study did not depend solely on winter facilities, it may have still benefited significantly. The research papers were published in reputable journals.

Reports of the Yellowstone Field Research Expeditions

All of these reports were written and compiled by Vincent J. Schaefer. They are filed in the Yellowstone Park Research Library at Mammoth Hot Springs in a vertical file under the heading, "Climate and Weather."

Final Report, 1961. Yellowstone Field Research Seminar. Publication Number 1 of Atmospheric Sciences Research Center of the State University of New York Albany.

Final Report, 1962. Second Yellowstone Field Research Seminar. Publication Number 5 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1962.

Interim Report, 1963. Third Yellowstone Field Research Expedition. Publication Number 13 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1963.

Final Report, 1964. Fourth Yellowstone Field Research Expedition. Publication Number 22 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1964.

Interim Report, 1965. Fifth Yellowstone Field Research Expedition. Publication Number 31 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1965.

Interim Report, 1966. Sixth Yellowstone Field Research Expedition. Publication Number 37 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1966.

Final Report, 1967. Seventh Yellowstone Field Research Expedition. Publication Number 45 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1967.

COURTESY ROGER CHENG

YFRE Research group, 1968. Thomas Brock, standing 5th from left, Lee Miller to the right of him. Kneeling, Joel Varley, Roger Cheng, and one of the Craighead brothers.

Interim Report, 1968. Eighth Yellowstone Field Research Expedition. Publication Number 68 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1968.

Interim Report, 1969. Ninth Field Research Expedition to Yellowstone. Publication Number 89 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1969.

Interim Report. 1970. Tenth Field Research Expedition to Yellowstone. Publication Number 140 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1970.

Final Report. 1971. Eleventh Yellowstone Field Research Expedition. Publication Number 141 of Atmospheric Sciences Research Center State University of New York Albany. May 1, 1971.

MICHAEL MILSTEIN

Thomas D. Brock began researching the microorganisms of Yellowstone hot springs in 1964. With his students and associates, he carried out a wide-ranging research program in the park in the 1960s and 1970s. He participated in the Yellowstone Field Research Expeditions in the winters of 1967 and 1968. Since his retirement from the University of Wisconsin at Madison he has continued to maintain his interest in Yellowstone. He is on the Board of the Yellowstone Association, and is a member of its Educational Services and Educational Products Committees.He is shown here taking a sample of thermophilic bacteria from a boiling spring in Yellowstone National Park.

Wildlife–Human Conflicts in Yellowstone

When Animals and People Get Too Close

by Tom Olliff and Jim Caslick

Introduction

It is widely known that bears occasionally injure humans in Yellowstone National Park. In fact, many of our current management practices (e.g., discouraging bear habituation and food conditioning, installing bear-resistant garbage receptacles, implementing strict food security regulations, and requiring backcountry camping in designated sites with poles to hang food) were introduced in a largely successful attempt to reduce the number of injuries that bears were regularly inflicting on humans prior to the 1970s.

While working as rangers in Yellowstone, we investigated several wildlife-caused human injuries and other wildlife-human encounters. We became interested in acquiring more than an anecdotal knowledge about which species of wildlife injured the most humans; where and when those injuries occurred; what caused the injuries; and whether such injuries might have been avoided. We also wanted to gain a better understanding of wildlife-human encounters that did not result in injuries.

To answer these questions, we reviewed the literature on bear-caused human injuries and analyzed Case Incident Reports (CIRs) provided by the park's Law Enforcement Office for bison-human encounters (1980–1999) and other wildlife-human encounters (1990–1999). Dr. Mary Meagher, retired park wildlife biologist, provided additional records of bison incidents that occurred between from 1963 to 1974.

Bison

It is a common misconception that the grizzly bear is Yellowstone's "most dangerous" animal. Statistically, that title belongs to the park's bison. During the 20-year period from 1980 to 1999, bison injured more of Yellowstone's visitors than did any other animal. During this period, bison charged and made contact with humans 79 times, an average of 3.95 per

year (the number of incidents each year ranged from 0 to 13). There were no injuries reported in 18 (23%) of the incidents. In addition to the 79 times that bison charged and made contact, bison charged but did not make contact with humans 16 times. For comparison, there were 24 bear-inflicted human injuries, an average of 1.2 per year during the same period (the number of incidents each year ranged from 0 to 5). Bison-inflicted injuries resulted in the death of one person during this period (in 1983), while bear-inflicted injuries resulted in the death of two humans (one each in 1984 and 1986).

Since 1978, all bear-caused human injuries have occurred in Yellowstone's backcountry. In contrast, every incident where bison charged and made contact with humans during 1980 through 1999 occurred in Yellowstone's developed areas or along roads. We know of one incident that was not documented in the CIRs, in which a bison charged but did not make contact with a group of backcountry skiers.

Between 1963 and 1974, seven people were gored by bison, including one human fatality in the Lower Geyser Basin in 1971, when a man was killed instantly while being photographed with a bison. No bison-human incidents were reported from 1966 through 1968, or in 1970, 1973, or 1979 through 1981.

We compiled a detailed summary of bison-human encounters that occurred between 1990 and 1999. In that period, 11 people were thrown into the air by bison for distances of up to 15 feet. One person was thrown against a parked car; one was thrown onto the bison's back where he was gored a second time as the bison twisted its head; one man was thrown 15 feet into the air, did a flip, and landed in a tree. A photographer lying on the ground was trampled by a charging bison, and told the investigating ranger that the bison then "sat" on him.

In addition to bruises, bison injuries to humans during that period included a variety of more serious injuries (see box).

Thirty-six bison-human encounters during this period occurred in summer; two in autumn; and three in winter. Many reports did not specify the sex of bison involved. Of those that did, 23 specified bulls and only one incident with a cow bison was reported. The cow, which had a newborn calf nearby, charged a jogger and struck her on the head and back with its hooves after the jogger "dove into the dirt."

Thirty-four reports provided details on what people were doing just before a bison charged. In 10 cases, they had approached to pose with or to photograph bison from distances of from two to 51 feet. Six people were within 10 feet of the bison when it charged. Two people were approaching within 20 feet to have a closer view, and two others were either petting or feeding the bison when it charged. In two other cases, bison charged after sticks or stones were thrown at them. In the 35 cases where the reporting ranger attempted to estimate the distance between the bison and human when the bison charged, the average distance was 28.5 feet.

We examined 29 CIRs to categorize any apparently unusual actions or warning activities by bison just before they charged. Bison "false-charged" in only one case, stamped feet in one case, and snorted in another case. In two cases, the bison shook its head before charging. Rolling on the ground (wallowing) immediately preceded two charges. In three cases, bison butted trees just before they charged toward humans. Tail-raising is commonly considered a sign that bison are agitated. We found that snorting, head shaking, foot-stomping, tree-thrashing, or wallowing may also be warning signals that a bison is about to charge.

Twenty-one reports included information on what a bison did immediately after its first charge. The bison stood over the downed human in only three cases, and then only for a minute or two. One person

ALICE WONDRAK

Two visitors approach a bison at an illegal and dangerously close distance in the Old Faithful area. May 2001.

Bison-caused injuries to humans, 1990-1999

a) puncture wounds to the: thigh (7), lower back (2), buttock (2), abdomen (1), groin area (1), leg (1), side (1), and chest (1);
b) lacerations to the: head (2), and thigh (1);
c) fractured: clavicle (1), humerus (1),and rib (1);
d) abrasion of the: arm (2), thigh (1),knees (1), and groin area (1);
e) injury to: wrist (1), pneumothorax (1), and elbow (1); and
f) broken: elbow (1), ribs (1), arm (1).

was head-butted back to the ground when she tried to get up, and another was gored several times while lying on the ground. Usually, however, the bison moved away and resumed grazing after the first charge. In some cases, a vehicle was purposely driven between a bison and a downed human, which may have prevented prolonged encounters. Occasionally, a charge was followed by a very brief period of tree-thrashing, snorting, foot-stomping, or rolling on the ground; this was reported in only three of the 38 cases. During an unusually long encounter that lasted about an hour, a bison charged a snowmobile and chased it four times for distances of up to 50 yards.

Surprise encounters with bison that resulted in charges included: a man with a flashlight walking on a lighted trail, a man returning to his car from fishing, a woman who came out of a dormitory door and did not see a bison behind a nearby fire escape, a boy standing in line at a restroom; a woman jogging on a trail, a hiker on a trail, a family sitting at a picnic table 100 yards from a wallowing bison, a woman en route to a restroom, and a woman using a phone in a telephone booth when a bison butted the phone booth. These "surprise" encounters apparently may occur almost anytime, anywhere.

Bears

Yellowstone's Bear Management Office has summarized bear-related human injuries and fatalities (Gunther and Hoekstra 1998, Gunther 2001). Their summaries show that human injuries from black bears have decreased from averages of 45 per year during 1931–1969, to four per year during the 1970s, and less than one (0.2) injury per year from 1980–1999. After 1970, 34 of 44 injuries caused by black bears resulted from visitors getting too close while attempting to feed, take pictures, or get better views of bears.

Injuries inflicted on humans by grizzly bears averaged about four per year during the 1960s, and decreased to about 1.5 per year during the 1970s, 1980s, and 1990s. Between 1963 and 1999, three grizzly bear-caused human fatalities occurred in Yellowstone, the most recent in 1986 when a male photographer too closely approached a female grizzly. The other two human fatalities (1972 and 1984) resulted from grizzly bear attacks on people at their campsites.

Coyotes

The earliest record we found of coyote–human interactions that possibly involved food-begging occurred in 1981 at Mammoth Campground, where a coyote bit a woman and a ranger shot the coyote. The next record is in 1990, when a coyote attacked a man who was skiing at Old Faithful. The coyote bit him several times in the face and legs before he used a ski to beat it away. The animal was shot by a ranger.

Between 1990 and 1999, there were 54 cases of coyote–human interactions. Fifteen of these cases involved intentional feeding of coyotes by humans, and 16 involved physical contact between coyotes and humans. Eight humans were injured during these incidents, with no human fatalities. Human injuries included coyote bites to arms (3), legs (2), face (1), back (human sitting) (1), and unspecified (2). There were four injuries to men, three to women, and one to a child (sex not specified). At least two coyote-human interactions were reported each year after 1990, with an average of five incidents per year. Maximum numbers occurred in 1990 and 1998 (eight incidents each year). There was no apparent trend in the frequency of these incidents.

Of the 16 cases involving physical contact between humans and coyotes, 14 were in frontcountry developed areas or near roadsides. One of the two backcountry incidents involved a coyote that had been trapped by a researcher. The other occurred during the winter along the Mystic Falls ski trail near Old Faithful.

Elk

Fifteen elk-human encounters were reported between 1990 and 1999. Contact was made in only one of these incidents; during autumn 1996, a bull elk charged a female visitor and "touched" her with his antlers in front of Mammoth Hotel. This encounter did not injure the visitor, but she fell into a steam vent while attempting to flee the elk and had to be rescued by park rangers. Visitors reported being charged by elk in seven of these incidents (including the one described above). Many of the encounters resulted in property damage, including tents (7) and a vehicle. In one case, an elk got his antlers tangled in wire. Park staff tranquilized him to remove the wire. Eight of these incidents occurred during autumn, five during spring, and one each occurred in winter and summer.

JUDY WONDRAK

Visitors approach a roadside black bear, summer 1971.

ALICE WONDRAK

Visitors feeding ground squirrels at the Gibbon Falls parking area...

ALICE WONDRAK

... a few feet from this sign warning them not to do so. Summer 2001.

Red Foxes

Food-begging by red foxes was reported in 1996 (four cases) and 1997 (one case), at Grant Village, Old Faithful, Tower Fall, and West Thumb. All of these occurred in developed areas. No physical contact occurred, and no human injuries resulted. In two incidents, the fox was live-trapped, ear-tagged, and relocated; another did not respond to pepper spray. One fox was shot by a ranger after many reports that it repeatedly approached visitors and employees, apparently begging for food. We received an additional verbal report (we did not find a CIR of this incident) that in 1997, in Mammoth, a red fox was trapped and euthanized after it bit a woman. The fox had previously been trapped and relocated three times that year.

Pine Marten

A pine marten jumped on a person when she tried to separate the marten from her dog, with no injuries reported. The marten was trapped by a ranger and died. The animal tested positive for distemper.

Moose

In July 1987, at Canyon Village, a screaming child ran toward a cow moose and her calf. The cow moose kicked the child, then left the area. The child received eight stitches.

In February 1993, a snowmobiler tried to pass a moose that had previously been observed making aggressive charges toward snowmobiles. As the snowmobile began to pass, both the moose and the snowmobile swerved in the same direction, causing a collision. The snowmobiler sustained a broken back. The moose broke a front leg and was shot by a ranger.

Mountain Lions

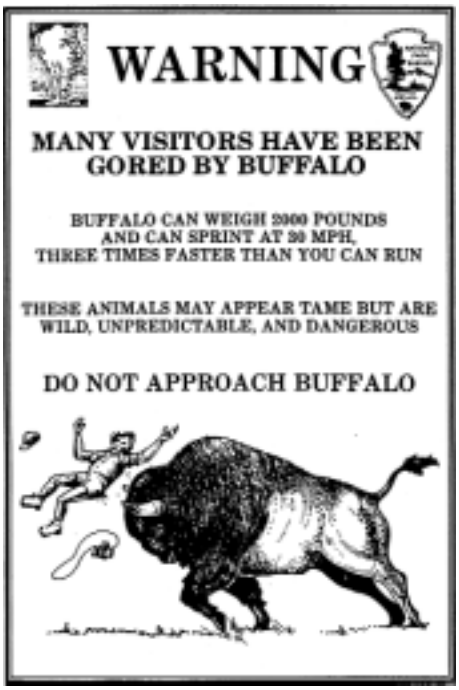
In 1998, a camper at Lower Blacktail reported that two adult mountain lions circled his campsite, blocked his path when he tried to leave, and remained in the area for six hours until he packed up and left.

Other Wildlife

Encounters between humans and some other Yellowstone animals are common but seldom result in injuries, so they go unreported. This is apparently the case for bats (one incident reported), ravens (one incident reported) and ground squirrels (one incident reported). The authors have witnessed or have been told about several unreported encounters between humans and each of these species.

Discussion

Can this information be used to reduce the number of humans that are injured by wildlife, and reduce the overall number of wildlife-human encounters? Certainly, injuries caused by bison can be reduced. Almost every person charged by a bison was much closer than the minimum 75 feet of separation required by regulation (remember, the average distance prior to the charge, in the cases where it could be determined, was 28.5 feet). If every visitor stayed at least 75 feet from bison, there would likely be very few injuries. The park has made major efforts to educate visitors that bison may attack people who invade their space, including a very graphic flyer handed out at park entrances; signs in campgrounds, developed areas, and along roadsides; articles in the park newspaper; and a visitor center exhibit that includes a video tape of several bison gorings and other encounters with people.



Graphic bison warning currently distributed to all parties entering the park.

These efforts appear to have helped. The numbers of bison-human contacts were reduced from highs of 13, 10, and 10 in 1983, 1984, and 1985 to 2, 5, and 1 in 1997, 1998, and 1999. It appears that with a single change in visitor behavior, most bison-caused human injuries could be avoided. A few surprise encounters like those described here are likely to continue to occur in the future.

Reducing injuries caused by bears will be much more difficult. Gunther and Hoekstra (1998) document the success of the 1970 bear management program in greatly reducing the number of bear-caused human injuries. They explain that current injuries most often involve surprise encounters between grizzly bears and backcountry hikers, concluding, "It will be difficult to reduce the frequency of this type of injury, especially if both backcountry recreational activity and the grizzly bear population…in YNP continue to increase."

In Yellowstone, most wildlife-human encounters, except bear-human encounters, occur in developed areas or along roadsides. This is not surprising, as only a small fraction of Yellowstone's visitors venture into the backcountry (Olliff and Consolo Murphy 2000). This leads us to speculate that wildlife habituation, and in the case of predators, food conditioning, may cause many of the wildlife-human encounters that result in human injury. Many reports of coyote encounters, for example, mentioned that habituation (18) and/or food conditioning (18) was a factor. Several of these incidents involved visitors' throwing food to coyotes. In seven other cases, coyotes grabbed objects including bags, a paint brush, a camera pack, a shirt, and a ball, in their mouths. Although we suspect that many of the ungulate-human encounters involved habituated animals, the CIRs did not mention habituation. Continued enforcement of Yellowstone's strict food-security regulations, in conjunction with continued prohibition of wildlife feeding, will likely help to keep the numbers of wildlife-human encounters low.

This summary of records provides only a flavor of circumstances and results when humans have encountered wildlife in Yellowstone. The case incident records certainly under-report human-wildlife encounters, especially encounters that do not result in injury. Although we regret human injuries and fatalities, we—like others who almost daily observe human-wildlife interactions— continue to marvel that there are so few humans injured here, considering the very large concentrations of both people and wildlife.

Acknowledgements

Laura Bittner and Edna Caslick helped to summarize the Case Incident Reports. Kerry Gunther reviewed the manuscript and offered helpful suggestions.

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Tom Olliff is Branch Chief for Natural Resources in the Yellowstone Center for Resources. He earned a B.S. in Forest Management from Auburn University in 1980 and a M.S. in Resource Conservation from the University of Montana in 1991. His publications include works on the impacts of recreationists on wildlands; control of non-native species; and the ecology of native threatened and endangered species. In his current position, he leads Yellowstone's Wildlife, Vegetation, Aquatic Resources, and Geology programs, which include some of the most high-profile and controversial natural resources in the National Park Service. He has lived and worked in Yellowstone since 1977, previously serving as a backcountry ranger, Snake River District Resource Coordinator, and the Branch Chief of Resource Operations.

NPS PHOTO

James W. "Jim" Caslick was a seasonal ranger in Yellowstone for three summers in the early 1950s. It was then that he met his future wife, "Eddie," a college student working for the summer at Hamilton's Store at Fishing Bridge. Jim earned M.S. and Ph.D. degrees at Cornell University, majoring in in natural resources management. He was a federal wildlife biologist with the U.S. Fish and Wildlife Service and U.S. Forest Service for 15 years, and then returned to Cornell as research and teaching faculty for 18 years. Now retired, Jim and Eddie spend their winters volunteering in national parks—first in Grand Teton, and now, for the 14th consecutive winter, in Yellowstone. They summer near Ithaca, New York, and Powell, Wyoming.

COURTESY JIM & EDNA CASLICK

Passages

John Thomas "Tom" Tankersley

by Lee H. Whittlesey

Tom Tankersley, Yellowstone's former Historian (1989–1993) and Assistant Chief of Interpretation (1993–1997), died on November 9, 2002, after an extended battle with lung cancer.

In 1988, Tankersley, a career employee with the NPS, left a permanent job as District Ranger at Independence NHP (Pennsylvania) to take a seasonal interpretation job in Yellowstone, simply because he had always wanted to work here. His first summer in Yellowstone was exciting, because it involved the big fires of 1988. He spent time that summer as a fire information interpreter. From October 1988 to August 1989, Tankersley served as a subdistrict interpreter. In late 1989, he accepted the permanent position of Historian, taking it so he could work with Yellowstone's archives and library operation. Following the fires, he reorganized the archives in order to plan for the addition of that huge amount of new data.

NPS PHOTO

Tom Tankersley in the Yellowstone archives, 1993.

In 1993, Chief of Interpretation Ron Thoman tapped Tankersley to become Yellowstone's Assistant Chief of Interpretation, and in that position Tankersley handled much of the division's training and organization. He was especially talented at coordinating large events, such as the NPS's 75th anniversary celebration and the 100-millionth-visitor-to-Yellowstone festivities. In 1995, he coordinated the Native American "blessing" ceremony for the park's new wolf reintroduction.

Prior to coming to Yellowstone, Tankersley had a long career in park interpretation and park history. Born and raised in Williamsburg, Virginia, he became a musician and volunteer in 1963 at age ten for the Colonial Williamsburg Foundation and worked there for ten years. He studied Mass Communications at Virginia Commonwealth University, and finding himself fascinated by the Civil War, Tankersley joined the NPS in 1974 and spent two years as an interpreter at Richmond National Battlefield (Virginia). He then did a brief stint as an interpreter at Independence NHP (Pennsylvania) before moving to George Washington Birthplace NM (Virginia) as a Supervisory Park Technician.

Desiring experience with collections, he moved to Maggie L. Walker NHS (Virginia) as a Museum Technician (1979–1983) and then accepted a position as Chief Ranger and Acting Unit Manager at Chalmette NHP (Louisiana) (1983–1985). In 1985, he moved to Jean Lafitte NHP (Louisiana) as Interpretive Specialist and then back to Independence NHP (Pennsylvania) as Interpretive Specialist and District Ranger (1986–1988).

Leaving Yellowstone in 1997, Tankersley became Interpretive Planner at Harper's Ferry Service Center (West Virginia), where he served until his death in 2002. He spent 13 of those months at Petersburg National Battlefield as Chief of Interpretation. At the time of his death, Tankersley was working for Harper's Ferry Service Center on long-term park plans for Saratoga NHP, the White House, Wrangell-St. Elias NPP, and other parks.

Tankersley hired me to work for him as a Museum Technician in Yellowstone's archives in 1993. I remember him as a go-getter, an excellent supervisor, and an easy-to-like friend. He was the best I've ever seen at gaining people's confidence when he ran large meetings. And he was a superb interpreter and historian.

It is a testimony to Tom's energy and exuberance that he had so many hobbies. He regularly participated in Civil War reenactments and Revolutionary War events, and he was a member of a group of musicians that was so skilled at fife and drum playing that they appeared in movies and made professional recordings. He became a member of the Board of Directors of the Make-A-Wish Foundation of eastern Virginia; hence his family's request that donations be made to that organization in lieu of flowers. For information, visit *www.wish.org.*

Lee Whittlesey is the Historian for Yellowstone National Park.

Remembering Donald E. White

by Robert O. Fournier and L.J. Patrick Muffler

One of Yellowstone's most distinguished researchers and staunchest supporters, Donald E. White, passed away on November 19, 2002 in Portola Valley, California, after a long illness. His wife, Jo, three daughters, and three grandchildren survive him. According to John Varley, Director of the Yellowstone Center for Resources, it was Don White, more than anyone, who put Yellowstone's geothermal protection "on the map." It was his and former park superintendent John Townsley's Congressional testimony that gave Yellowstone protection under the Geothermal Steam Act's amendments in 1970. Based on his global research, Don was the first to warn the NPS how easy it would be to "turn off" geysers and hot springs with even minimal exploitation.

Don White was born in 1914 in Dinuba, California. He began studying geology as an undergraduate at Stanford University in the early 1930s, and went on to obtain a Ph.D. from Princeton University in 1939. He then joined the U.S. Geological Survey, where he worked as a research geologist until he retired in 1986. Don's first assignment for the USGS was as the antimony commodity specialist, studying deposits in Alaska, Mexico, and Idaho. In the course of examining drill core from the Yellow Pine antimony mine in Idaho, he identified previously unrecognized scheelite, a mineral composed of oxides of calcium and tungsten. This discovery led to development of a deposit that produced 40% of the U.S. tungsten supply in World War II.

In 1945, Don began study of the hot springs at Steamboat Springs, Nevada, utilizing information provided by many types of scientific investigations, including targeted drilling into the hydrothermal system. The information provided by the research drilling left Don with a passionate interest in the detailed behavior of geysers and hot springs, leading to his classic 1967 paper on geyser activity, "Discharge of thermal water and heat from Upper, Midway, and Lower Geyser Basins, Yellowstone National Park."

ROBERT FOURNIER

Donald White at the Y-3 USGS drillhole site in 1967.

In 1960, Don was the spark that ignited USGS scientific studies of the diverse types of hydrothermal activity in Yellowstone. He obtained funding for, and led the USGS research drilling in the park in 1967–68. These investigations produced a unique three-dimensional data set documenting the temperature, pressure, fluid geochemistry, and hydrothermal minerals in the upper few hundred meters of Yellowstone's hydrothermal systems, led to a robust hydrologic framework for geyser systems, and allowed objective science to be brought to bear on the issue of preserving natural geyser activity in those places where geothermal development might occur.

For nearly four decades, Don had a dynamic and pervasive impact on the geothermal and geochemical communities in the U.S. and throughout the world. He made outstanding contributions not only through his personal scientific originality and distinguished scholarship, but also through his scientific leadership. As the principal organizer and first chairman of the Working Group on Water-Rock Interaction, he had an important impact on modern international geochemistry. The International Symposium on Water-Rock Interaction, still held every three years, is testimony to Don's vision of the importance of water-rock interaction in virtually all geological processes from magmatic to meteoric. He received many prestigious awards in recognition of his achievements and impact on the scientific community, including Penrose medals from both the Geological Society of America (1984) and the Society of Economic Geologists (1992). These are the highest awards for scientific excellence given by these societies; and at the time he was only the fifth person to have been awarded both medals. He was elected to the National Academy of Sciences and was a Fellow of the American Geophysical Union.

Don was a mentor and friend to many young geologists, such as ourselves, who had the good fortune to come into personal contact with him. These included not only USGS personnel, but also members of the National Park Service, such as the late Rick Hutchinson, and foreign geothermal researchers from many countries. He was always generous and unselfish in sharing his time and ideas with us all. Through his many publications and through the scientific meetings that he instigated, he also had an influence on and was an inspiration to hundreds, even thousands, of geothermal investigators from around the world. Perhaps most importantly, he loved Yellowstone, and he loved science. We are all fortunate that he was able to bring these two loves together.

Robert Fournier and Patrick Muffler are distinguished U.S. Geological Survey scientists (ret.) who contributed greatly to the understanding of Yellowstone's geothermal system.

2002 Christmas Bird Count

by Terry McEneaney

On December 22, 2002, the Yellowstone Christmas Bird Count (YCBC) was conducted in the Gardiner, Montana, and Mammoth, Wyoming, areas. This YCBC marks the 30th year for this traditional winter bird survey.

The 2002 YCBC tallied a total of 36 bird species and 1,624 individual birds. The exceptionally mild winter weather conditions believed to be associated with the Pacific Ocean El Nino weather system, coupled with drought conditions, resulted in slightly above average number of species and individual birds observed. Temperatures during the 2002 YCBC ranged from 20-32ºF, with 0-3" of snow, depending on the elevation. River edges were not even frozen.

Wintering birds

Two new species of wintering birds were detected during the YCBC. A Green-tailed Towhee was found on count day along the Gardner River near Mammoth, Wyoming. A Brewer's Sparrow was found during count week (December 21) at the confluence of the Yellowstone and Gardner Rivers near Gardiner, Montana.

Records

Several bird records were tied or broken during the 2002 YCBC. One American Wigeon and one Prairie Falcon were detected during the count, which tied previous records set in 1984 and 1996; and 1988, 1997, and 2000, respectively. Records were broken for four species on count day. A total of eight Downy Woodpeckers were found, doubling the previous record of four set in 1980. Thirty-two Black-capped Chickadees were tallied, with the previous record having been 31 individuals in 1994. The previous record of four Northern Flickers (set in 1987 and 2001) was broken this year, when six were found during count day. And lastly, 57 Cedar Waxwings were found this year, compared to the old record of 53 set in 1998. A record for count week was broken when 14 Gray Partridge were observed. The previous record had been one individual, found in 1997.

Unusual sightings

The mild winter, coupled with extended drought conditions, had obvious effects on Yellowstone's plants, mammals, and birds. Most noticeable was the heavy juniper berry crop. However, many of the berries were dehydrated due to the low fruit moisture content caused by the drought, which forced Bohemian Waxwings to be selective and more spread out than normal. Only 514 of these birds were detected on count day.

The most significant mammal find during the 2002 YCBC was an active Uinta ground squirrel detected on December 22 near the Mammoth Hotel. Very few elk migrated out of the park this year due to the mild winter conditions. Only 69 Common Ravens were detected during the 2002 YCBC, marking the lowest number of ravens detected in at least 30 years of conducting YCBCs. The low hunter harvest during the regular elk hunting season in the Gardiner area played a major role in raven distribution; these corvids were not concentrated near traditional food sources such as gut piles discarded by hunters. They were also seen feeding on an abundance of foods not normally available this time of year.

Another surprise was the paucity of Black Rosy Finches. Typically, they are mixed in with Gray-crowned Rosy Finches, but zero Black Rosy Finches were found among the 180 Gray-crowned Rosy Finches tallied this year. This marks only the sixth time in the 30-year history of the YCBC, that a Black Rosy Finch has not been detected. The last time this occurred was in 1988.

Summary

In conclusion, a total of 96 species have been recorded on the YCBC (98 species with the YCBC and count week combined) during the 30 years the count has taken place. This year, excessively mild winter weather conditions resulted in slightly above average numbers of bird species detected, and slightly above average numbers of individuals observed. However, experience continues to show that colder temperatures and above average snow depths are the optimum conditions for finding the greatest bird richness and abundance during the YCBC. Participants are reminded of these factors when deciding on attending future YCBCs. Some people enjoy searching for rare birds. Others just learning the basics of bird identification is a thrill in itself, while many look forward to the exercise and/or social aspects of this festive event. Whatever the calling, the Yellowstone Christmas Bird Count tradition, and the fun associated with it, continue.

Details on past Yellowstone Christmas Bird Count methods, results, and summaries can be found in the Winter 2001 and Winter 2002 issues of Yellowstone Science. For information on specific numbers of birds tallied this year, contact park ornithologist Terry McEneaney at terry_mceneaney@nps.gov.

NEWS & notes

Last of Original Restored Wolves Killed by Geode Pack

The last of the original wolves reintroduced to Yellowstone in 1995 was found dead on New Year's Eve, in an area known as Blacktail Deer Plateau, in the north-central section of the park. He was apparently killed by members of the Geode wolf pack. The eight-year-old male, known as #2, was among the original 14 wolves captured in Canada and transferred to Yellowstone as part of the federal government's reintroduction program.

Number 2 was credited with establishing the first new pack in the park—the Leopold pack—in 1996, and is believed to have fathered eight litters of pups. His mate, #7, was killed last May [see YS 10(3)]. Wolf biologist Doug Smith believes that #2 and #7 may have contributed more to the wolf restoration than any other pair in the park; they had one litter every single year. At least 29 pups from the pack survived beyond the first year, and the pack constantly numbered about a dozen animals. They never went outside the park, and the pack's size only varied by two or three wolves. Some left to form other packs, including the Swan Lake and Cougar Creek packs.

"He'd been through a lot," said Smith. "There were no wolves when he pulled through the gate of the park. Now there are 148." Number 2 was captured in Alberta as a pup, along with other members of what was known as the Crystal Creek pack. A year after being released in Yellowstone, he had left his former pack and joined with a female known as #7, forming a pack named after famed ecologist Aldo Leopold, who in 1944 advocated reintroduction of wolves in Yellowstone. Wildlife managers initially thought it would take three or four years of importing wolves from Canada to establish the northern Rocky Mountain population. But only two years were needed, partially because of the success of #2 and #7. "They had a tremendous impact on the introduction in the ecosystem," according to Smith.

Smith said the wolf apparently had recently lost his role as the Leopold pack's dominant, or alpha male, was driven out by other pack members and had wandered alone most of the time until his death. He said it was not a surprise #2 was killed after losing status in the pack. "All wolves are aggressive to other wolves that aren't part of their pack," he said. "Without a territory or pack, he was vulnerable to attack...He was a mammoth wolf with one of the biggest, bushiest tails I've ever seen," Smith added. "But he was old, 8 years old, and a step slower."

NPS PHOTO

Number 2 (far left) in acclimation pen, 1995.

USFWS Denies Protection to GYE Trumpeter Swan Flock

On January 28, the U.S. Fish and Wildlife Service announced that a petition seeking Endangered Species Act protection for trumpeter swans in the Yellowstone ecosystem presents insufficient evidence to establish that they should be listed as threatened or endangered under the Act.

After an evaluation of available information, the Service determined that the petition, filed by the Biodiversity Legal Foundation and the Fund for Animals, does not contain substantial information to proceed with a more in-depth status review. The petition asked the Service to declare the "tri-state flock" of trumpeter swans near Yellowstone National Park in Wyoming, Montana and Idaho as a "distinct population segment" under the Act.

The Service's Distinct Vertebrate Population Segment Policy, published in 1996, stipulates that a population segment must be both discrete and significant to qualify for listing under the Endangered Species Act. As such, a population's physical, physiological, ecological, and behavioral characteristics must be markedly different from other members of the same species.

The Service's finding indicates that the tri-state flock of trumpeter swans—a group of largely non-migratory swans that breed and winter in and around Yellowstone National Park, in Wyoming, Montana, and Idaho—interacts with and is not significantly different from the rest of the Rocky Mountain population, which inhabits areas in and near the Rocky Mountains in the United States and Canada.

The Service's petition finding is published in the Federal Register. Copies and background material can be downloaded from the Service's web site at *http://mountain-prairie.fws.gov/birds/trumpeterswan*.

Requests for copies of the final rule and economic analysis should be submitted to the Regional Director (ES), U.S. Fish and Wildlife Service, P.O. Box 25486 DFC, Denver, Colorado 80225-0486.

2002-2003 Winter Count of Northern Yellowstone Elk

The Northern Yellowstone Cooperative Wildlife Working Group conducted its annual winter survey of the northern Yellowstone elk population on December 24, 2002. A total of 9,215 elk were counted, including 6,897 elk (75 percent) within Yellowstone National Park and 2,318 elk (25 percent) north of the park boundary. Biologists used four fixed-wing aircraft to count elk through the entire northern range during the one-day survey. The northern Yellowstone elk herd winters between the northeast entrance of Yellowstone National Park and Dome Mountain/Dailey Lake in the Paradise Valley.

This year's count of 9,215 elk was less than the 11,969 elk counted during December 2001. According to Yellowstone National Park wildlife biologist P.J. White, the long-term trend in counts of northern Yellowstone elk suggests that their abundance has decreased since 1988, even in light of this year's poor counting conditions. Factors contributing to this decrease likely include predation, drought-related effects on pregnancy and calf survival, periodic substantial winter-kill owing to severe snow pack (e.g., winters of 1988-89 and 1996-97), and human harvest during the Gardiner area late hunt. That hunt was designed to reduce elk abundance outside Yellowstone National Park so that elk numbers do not cause long-term changes in plant communities or decrease the quality of the winter range. According to Tom Lemke, biologist for Montana Fish, Wildlife, and Parks, the number of elk permits for the Gardiner area late hunt have been reduced from approximately 3,000 in 1997 to 2,200 this winter as total elk numbers and migrations outside the park have decreased.

Poor counting conditions this year likely contributed to an under-count of the actual number of elk in the northern Yellowstone population. Lack of snow cover created a brown background on the landscape and made elk difficult to detect. Also, elk were widely dispersed at higher elevations owing to the lack of snow pack and mild winter. An estimate of the extent of the under-count of elk is not available because current survey methodology does not enable researchers to adjust for differences in factors (snow cover, habitat type, group size, elk behavior) that influence our ability to detect elk within and among surveys. A similar low count of 9,456 elk was obtained in 1991, while 14,829 elk were counted during good counting conditions in the previous year (1990) and 12,859 elk were counted during the following year (1992).

The Working Group, comprised of resource managers and biologists from the Montana Fish, Wildlife, & Parks, National Park Service (Yellowstone National Park), U.S. Forest Service (Gallatin National Forest), and U.S. Geological Survey-Northern Rocky Mountain Science Center, Bozeman, will continue to monitor trends of the northern Yellowstone elk population and evaluate the relative contribution of various components of mortality, including predation, environmental factors, and hunting.

NPS PHOTO

Patchy snow conditions can make aerial counts difficult, as elk can be hard to differentiate from their surroundings.

Easements Protect GYE Lands

The Nature Conservancy has acquired the rights to two conservation easements that will help protect critical wildlife habitat in the GYE. The first, donated by Roger and Cynthia Lang of Bozeman, covers the northern 6,830 acres of the Sun Ranch; acreage that forms the Wolf Creek watershed and the surrounding bench running from the Madison Range to the Madison River. The watershed is one of the most important wildlife corridors in the Madison Valley and the Greater Yellowstone Ecosystem. The agreement, in which the Langs essentially donated the development value of that portion of the ranch, commits the property to being managed as a ranch, and not to be subdivided, in perpetuity.

The Sun Ranch, a working cattle ranch, is involved in a number of projects that address issues of ranch economics, land stewardship, and wildlife and livestock management. The ranch is home to Conservation Beefä, a program of The Nature Conservancy and Artemis Common Ground that pays a premium for grass-fed beef raised on ranches that commit to high quality land stewardship.

In Montana's Centennial Valley, TNC has purchased conservation easements on three Huntsman ranch properties. The

easements on the Brundage Lane and Corral Creek properties, west of Red Rock Lakes National Wildlife Refuge, cover 1,270 acres of grazing land, and the second phase easement on the Alaska Basin property, on the valley's east end, covers 1200 acres.

With the latest transactions, almost 13,500 acres of private lands in the valley are covered by conservation easements. In addition, many of the valley's private landowners are working with TNC and the U.S. Fish and Wildlife Service on a variety of projects aimed at improving their lands for ranching and wildlife. Conservationists view the area as the best linkage zone for grizzly bears and wolves to migrate from the Greater Yellowstone ecosystem to the Selway/Bitterroot in Idaho and to the Rockies in Canada.

MHS Offers Bradley Fellowships

The Montana Historical Society offers up to two James H. Bradley Fellowships every summer to graduate students, faculty, and/or independent scholars pursuing research on Montana history. The Fellowship stipend is $2500. The recipient of the award is expected to be in residence for four weeks between June 1 and October 31. Fellows are expected to make use of the MHS's collections and to submit a written report upon completion of the research. Bradley Fellows also agree to submit an article based on the research for possible publication in the Society's quarterly journal, Montana The Magazine of Western History, within one year of their residency.

Award Criteria: 1) suitability of research to the Society's archival, library, or museum collections; 2) applicant's experience and training; 3) potential of the project to make a significant contribution to historical scholarship on Montana; and 4) potential of the project to produce an article-length publication.

Applications must include a cover letter, a project proposal not to exceed three double-spaced pages, a 2-3 page resume, and at least one letter of recommendation. The proposal should indicate what material in the MHS collections the applicant intends to consult. Montana Historical Society employees and previous Bradley Fellows are not eligible to apply. Applications must be postmarked no later than March 1, 2003, and sent to the Bradley Selection Committee, Montana Historical Society, P.O. Box 201201, Helena, MT 59620-1201. Email: mhslibrary@state.mt.us or call (406) 444-2681.

Announcement of the award will be made in early April. For more information about the Montana Historical Society and its collections see www.montanahistoricalsociety.org.

Elk Vaccination EA Released for Comment

On December 9, 2003, the U.S. Fish and Wildlife Service released an Environmental Assessment for the Implementation of the Wyoming Game and Fish Department's Proposed Interim Vaccination Program for the National Elk Refuge in Teton County, Wyoming.

The EA describes the proposal and assesses its potential environmental effects. A draft Compatibility Determination accompanies the EA. Public comments on both documents were accepted and considered until January 15, 2003.

Under its proposal, the State of Wyoming would begin vaccinating calf and cow elk on the National Elk Refuge every winter from early 2003, after winter feeding begins, until a decision is made on the comprehensive management of bison and elk, which will occur upon completion of the Environmental Impact Statement (EIS) for the National Elk Refuge and Grand Teton National Park bison and elk management plan. The signing of the EIS record of decision is scheduled for February of 2005. The decision on the bison and elk management plan EIS could potentially continue these vaccination strategies or replace the interim plan with another disease management strategy. Copies of the EA and draft compatibility determination were distributed to interested parties currently on the mailing list for the bison and elk management plan EIS and are also available at: http://mountain-prairie.fws.gov/ea/infopackets/nationalelk Copies and further information is also available by contacting the National Elk Refuge at (307) 733-9212.A final decision was expected by January 27, 2003.

Greening Conference Announced

Yellowstone National Park officials announce the "Under the Big Sky Greening Conference," to be held from June 11–13, 2003, at Big Sky, Montana. This will be the third "greening" conference in six years.

The park prides itself in being a national leader in the areas of sustainability and environmental conservation through such partnerships, and has partnered with two Montana grassroots organizations to help sponsor the conference. Ethanol Producers And Consumers (EPAC) and Headwaters Cooperative Recycling Project (HCRP) will co-host this event. Additional major sponsors include the U.S. Environmental Protection Agency, the U.S. Department of Energy, the State of Montana, Department of Environmental Quality and Unilever Corporation.

The conference will focus on the expanded production and use of biofuels such as ethanol and biodiesel; regional recycling and composting opportunities; a variety of pollution prevention topics; and the latest technologies in environmental stewardship. Other conference highlights include a display of alternatively-fueled vehicles focusing on future modes of transportation, and a wide variety of vendor and sponsor exhibits.

The three-day event will culminate with the dedication of a newly-constructed regional composting facility located near West Yellowstone, Montana, followed by an interpretive tour to Old Faithful using alternatively-fueled vehicles. For more information on the event, please contact:

Shirley Ball, EPAC, (406) 785-3722; Kathy Jackson, HCRP, (406) 431-1247; or Jim Evanoff, Yellowstone National Park, (307) 344-2311.

A Look Back

From the Yellowstone Archives

In 1958, the Kiekhaefer Corporation, maker of the Mercury outboard motor, trundled a speedboat and several of its motors around to several National Park Service sites, where they were photographed in front of some of America's most famous icons, including Mt. Rushmore, Old Faithful, and the bears of Yellowstone Although the art quality of some of these shots makes them irresistibly appealing in the visual sense, Garrison was less than pleased with the image of bear feeding when he received a set of the proofs. He instructed his assistant to draft a letter to thank Kiekhaefer for the photos and ask for a few prints, but also to "courteously call att'n to…pls don't feed bears!" Kiekhafer representative John Cox wrote back to say he has glad Garrison had liked the pictures, but failed to address the bear feeding question.

What we want to know is, which is so enthralling—Old Faithful Geyser, or that shiny new Mercury

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NPS PHOTO

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