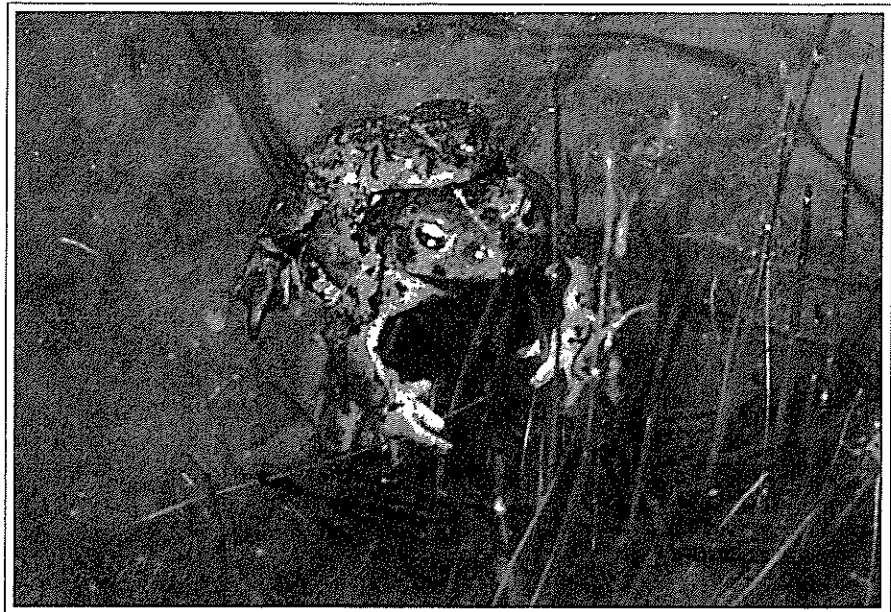




Figure 8. Six breeding sites monitored since 1991. Each site hosts two to four amphibian species.



Boreal toad (Bufo boreas boreas), subspecies of the western toad. Bumpy skin with large elongated glands behind the eyes, stocky body, short legs, blunt head, size ranges from 0.5 to 5 inches long. Olive-green, brown, or gray or brown, usually with a light stripe through the middle of the back. Distinctive musky odor. Males have a dark thickened area on the upper surface of the thumbs. Calling during breeding or when handled is a soft, birdlike chirping, produced intermittently and irregularly. Breeds in Yellowstone in shallow areas of ponds, lakes, river backwater channels, and slow streams, often in water with a mild thermal influence and almost always with relatively high conductivity and high pH. Toad skin is toxic but ravens have learned how to kill toads and consume only their insides. Adults range widely across meadows and forests and overwinter in burrows or cavities.

park. In 1991, moved into action by reports of amphibian declines from numerous colleagues, I (Charles Peterson) collaborated with Koch and Corn to initiate investigations of the status of Yellowstone amphibians.

Our first task was to refer to a database, compiled by Koch while a student at Idaho State University (ISU), which includes all known records for amphibians in the greater Yellowstone ecosystem: museum records, field observations from scientific literature and unpublished studies, and sighting records from the park and other sources. From the database, and with the help of Yellowstone resource managers, we selected six amphibian breeding sites in the park where amphibians still existed for a pilot monitoring program (Fig. 8). Since 1991, these have been surveyed three or more times per year to record species occurrence, to observe life history characteristics, and to learn about annual variation in reproduction.

A number of other amphibian projects have taken place in the past few years. Since 1993, the Herpetology Laboratory of ISU has conducted surveys and reported amphibian and reptile occurrence in several areas where management activities were planned, including roadside zones along 95 miles of park roads slated for widening and possible realignment. Steve Hill and Robert Moore of Montana State University (MSU) surveyed many ponds for amphibians in Yellowstone's

northern range in 1993. Hill also conducted research for his M.S. degree on the population ecology and natural history of tiger salamanders at Ice Lake. In 1995, *Amphibians and Reptiles of Yellowstone and Grand Teton Parks* was published, providing a field guide for amphibians in all their life stages as well as a summary of information from previous studies. Through a volunteer-based backcountry amphibian atlas project started in 1997, we are beginning to document amphibian occurrence in remote areas of the park where no one has previously looked for amphibians or reptiles. ISU graduate student Jeremy Hawk is investigating relationships among disease-causing bacteria and water chemistry at boreal toad breeding sites. Wendy Roberts, a researcher at MSU, is investigating how tadpoles may influence the productivity and structure of pond ecosystems.

From these various studies and efforts,

we have learned much about the natural history, habitat associations, distribution, and status of Yellowstone's native amphibians. The good news is that three species appear to be widespread and locally common to abundant (Fig. 9). Boreal chorus frogs loudly announce their existence in May and June at many park wetlands, and we frequently find their tadpoles. Columbia spotted frogs in all their life stages are often encountered during surveys as well as by hikers, and they are probably the park's most abundant amphibian. The blotched tiger salamander appears to have a rather spotty distribution, but is very common in the pothole lakes of the northern range. Although historical and recent records for salamanders are much fewer than those for chorus frogs and spotted frogs, this is likely influenced by the relative difficulty of finding them. Adult salamanders spend most of their time underground, and their larvae are often concealed in

aquatic vegetation.

The news is less rosy for another amphibian. Boreal toads are widespread in distribution across the ecosystem but relatively rare in most areas. While metamorphosing toads are abundant at a few breeding sites such as the one near Yellowstone's South Entrance, our surveys have turned up few new breeding sites. Amphibian surveyors infrequently encounter adult and juvenile toads. The scarcity of toads appears to be a significant change from the past. Forty years ago, Fred Turner and Charles Carpenter, researching in Yellowstone and Grand Teton respectively, both characterized toads as common. Although the evidence for declines is largely anecdotal because quantitative historical data are lacking, toads appear to be substantially less widespread and abundant than they were formerly. Boreal toads (or closely related species) have suffered declines across the species' former range in the western United States. Populations in Colorado and southern Wyoming are candidates for listing under the Endangered Species Act. The reasons for the widespread decline of toads are not understood; no single cause capable of explaining the declines has been identified.

There are rare records in the ecosystem of two other species, the northern leopard frog and the spadefoot "toad" (which is

toad-like but not a true toad). Leopard frogs have never been documented in Yellowstone, but they are rarely seen in Grand Teton National Park and breeding populations were recorded there in the 1950s. Just two records exist for spadefoots in Yellowstone; one of these is from 1889. So much of Yellowstone remains to be surveyed for amphibians that finding unlikely and unexpected species still exists as a tantalizing possibility. The discovery of one particular amphibian here, however, would not be received as good news. Bullfrogs have been introduced in many areas of the western United States, with very negative consequences for the native amphibians on which they prey.

Declining Amphibians?

The number and distribution of chorus frog and spotted frog observations are initially reassuring but tell us little about possible trends. Recalling our experience at Lodge Creek where historical quantitative data fortunately exist, is it possible that significant reductions in population sizes have occurred but we can't perceive them? Given that nearly every species of the genus *Rana* in western North America has experienced local or regional declines in recent years, what if spotted frogs are just starting to decline here in

Yellowstone? How long would it take to notice such a decline? How serious is the suspected decline of boreal toads in greater Yellowstone, and is the decline intensifying?

Answering these questions is important for Yellowstone National Park and also may be essential to understanding the causes of declines and their relative importance elsewhere. After nearly a decade of investigations, it appears that multiple causes are at work—there is not likely to be a primary cause, as was the case with declining raptorial birds and the pesticide DDT. Several hypotheses for amphibian declines are on the table, including: increased mortality from excessive ultraviolet radiation due to ozone thinning; diseases and immune system failures; climate change affecting critical aspects of breeding and larval development; widespread effects of pesticides and other chemicals; and unnatural levels of predation or other problems resulting from introduced animals such as non-native trout and bullfrogs. Identifying the locations and rates of amphibian population decline would help clarify the relative importance of these potential causes and may lead to the identification of new hypotheses, perhaps even to finding an unexpected primary cause.

Amphibian populations are notorious for their fluctuations, making the determination of trends dauntingly difficult. Researchers have variously reported that 20 to 100 years of monitoring reproduction might be necessary to understand whether a particular population is truly declining. Recapture rates have to be quite high to produce population estimates that are accurate enough to make useful comparisons. There are seldom enough resources to monitor an area with

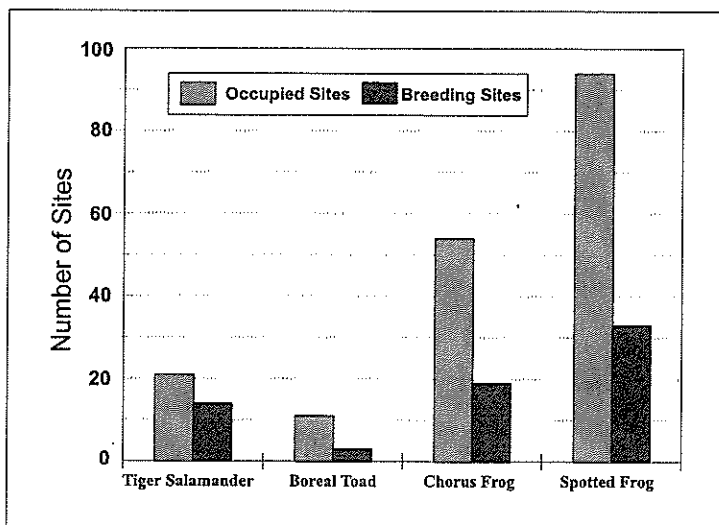


Figure 9. Number of occupied and confirmed breeding sites located during surveys for amphibians and reptiles along 95 miles of Yellowstone National Park roads, including the sections Tower to Northeast Entrance, Tower to Canyon, Mammoth to Madison, Madison to Biscuit Basin, and Arnica Creek to Little Thumb Creek.



Blotched tiger salamander (*Ambystoma tigrinum melanostictum*).

the detailed approach applied at the Lake Lodge study area, where we studied a population throughout the active season across its range. In addition, the handling and marking of many individuals entails some risk to the health of amphibian populations.

Recommendations for Studying and Conserving Yellowstone's Amphibians

Grappling with these questions, and with a sense of urgency inspired by documented amphibian declines elsewhere, we think that there are four main tasks on which to concentrate. First, systematic amphibian surveys of the park and adjacent public lands are needed. These should include revisiting all sites with historical records and systematic sampling of representative areas on a sub-watershed basis. From such surveys, we can determine if changes in distribution have occurred, map current species distributions, determine if there are areas where amphibians are scarce or missing, and better define habitat associations.

Second, we need to expand monitoring efforts. The past eight years of monitoring six Yellowstone sites have been very valuable for learning about monitoring techniques, variability in observation rates, and many aspects of Yellowstone amphibian life histories. We are currently analyzing the data for specific information about possible changes or trends in relative abundance. But to understand if amphibians are declining or not in the park, the number of monitored areas needs to be larger, probably on the order of 20 to 40 sites chosen randomly from a vari-

ety of suitable and marginal habitats. Rather than focusing on single breeding sites, monitoring should encompass complexes of potential habitat, thus allowing for spatial shifts in breeding sites that may occur when environmental conditions change. The target of this kind of monitoring is species presence, reproduction, and recruitment (survival of the young as evidenced by the presence of juveniles). With a sufficient number of well-distributed monitoring areas, we would be able to perceive if populations are disappearing or increasing in number, providing the basis for recognizing park-wide trends in amphibian abundance.

A third emphasis of amphibian conservation should be to track the fate of populations in areas where management issues exist—such as in the vicinity of the park's developed areas, near roadside ponds and sewage treatment areas where exposure to pollutants is possible, and during habitat or wildlife restoration projects involving wetland and aquatic areas. Surveys and monitoring should be conducted before, during, and after management actions that may affect amphibian populations. Concern for and awareness of amphibians is higher now in Yellowstone than ever before, and sincere attempts have been made to obtain information and incorporate it in planning. If combined with follow-up monitoring and the application of lessons from one project to another, this adaptive management approach could contribute significantly to the conservation of amphibians and their environments (including other animals). Insights garnered from successes as well as failures could be

useful far beyond Yellowstone's borders.

Finally, the number and scope of natural history studies and research projects should expand. Recent advances in genetics, microbiology, amphibian diseases, and population biology are providing tools that can greatly advance the understanding of amphibians in their natural environments.

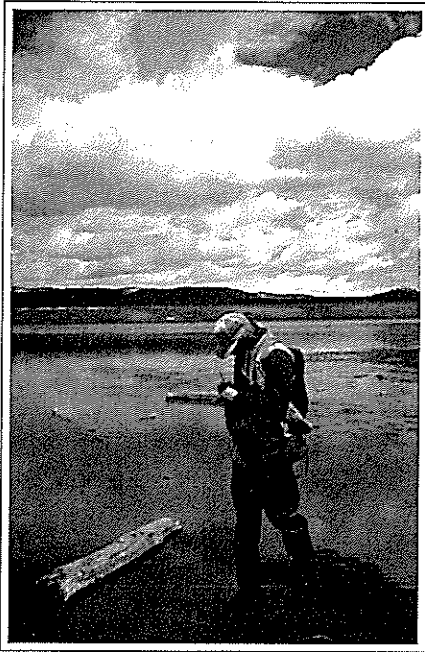
Amphibians in the Yellowstone Landscape

Among Yellowstone's assortment of magnificent mammals and birds, amphibians are admittedly easy to overlook—few tourists ask where they can see a spotted frog or listen to chorus frogs! Nevertheless, when you investigate wet and muddy areas at the right times, the park seems to pulse with amphibian life. A visit on a warm, early June evening to the mouth of Pelican Creek will astound you with a tremendous concert, produced by large numbers of Yellowstone's tiniest adult vertebrate, the boreal chorus frog. On a walk around a pond on a sunny July day, you may see scores of spotted frogs, flashing bright salmon color from the undersides of their hind legs as they leap into the water. When boreal toads metamorphose, the ground at some sites is literally blanketed by vigorous toadlets, barely the size of a fingernail. On rainy summer nights, some people have witnessed mass migrations of hundreds or thousands of tiger salamanders on the move from breeding pools.

What does this abundance of amphibian life mean for the Yellowstone ecosystem? Larval amphibians, which consume algae, detritus, and tiny invertebrates, exist in such large numbers in some ponds that they may alter the pond community structure. When they metamorphose and emerge from the ponds, amphibians provide one of the few biotic mechanisms for moving energy and nutrients from eutrophic water bodies to the terrestrial environment. Adult amphibians consume an enormous variety and amount of invertebrates (mainly insects) during the active season. In turn, larval and adult amphibians provide prey for a large array of animals, including aquatic predaceous insects, snakes, fish, birds, mammals, and other amphibians. Amphibian body



Boreal chorus frog (Pseudacris maculata).



Chuck Peterson monitoring spotted frogs and boreal toads at Indian Pond.

size, which is larger than most insects and smaller than most rodents, means that amphibians occupy an important link in the food chain. As ectotherms, amphibians are extraordinarily efficient in converting energy into biomass, which then becomes available to predators; in fact they are more than ten times more efficient than birds and mammals in converting the food they consume into growth.

The reported world-wide declines of amphibian populations is often portrayed as a symptom of declining environmental health, with alarming connotations for human health. But reductions in the diversity and abundance of amphibians also have grave implications and direct, immediate consequences for many other wildlife species. The "silence of the frogs" (a phrase coined by the *New York Times Magazine* in 1992) is a silence heavy with foreboding. May it not descend on Yellowstone.

It's Just a Frog...

"Kermit!" shouted a high childish voice, and we knew the roadside wetland we were scouting held at least one frog. A distant moose was instantly forgotten as the young tourist's family gathered around to share her delight in observing the tiny

creature with the fearless wide-eyed gaze and mysterious powers of transformation.

Acknowledgments

The number of park personnel who have helped with amphibian studies is impressive—amphibians have more friends than expected! We especially thank those whose consistent support and interest has been the backbone of recent research and monitoring efforts: Stu Coleman, Craig McClure, Dave Price, Dan Reinhart, and John Varley. Reinhart's help was an essential ingredient in the Lake Lodge spotted frog project. Many Yellowstone people joined in field work or reported observations, including Roger Andrascik, Denise Culver, Karen Kitchen, Tom Oliff, Rick Swanker, Jim Sweaney, Jennifer Whipple, and McClure, Price, Reinhart and their staffs. Lee Whittlesey assisted in archival research. Mary Hektner, Beth Kaeding, Ann Rodman, and John Sacklin incorporated amphibians in planning and data compilations. We are grateful to those who facilitated permits, accommodations, and logistics, including Rene Farias, Bob Lindstrom, Terry McEneaney, and Jim Owen.

Ted Koch's inspired scholarship, field work, and infectious energy have been central to recent advances in understanding, conserving, and appreciating Yellowstone's amphibians. Paul Stephen Corn was instrumental in setting up initial investigations and has been a consistent source of assistance and information. Fred Turner, besides providing inspiration from his early work, made two trips to Yellowstone to advise us. We are indebted to our dedicated volunteers: especially Char and Dave Corkran, Marc Hanna, and Roger Harm. Merlin Hare provided invaluable assistance with computers, equipment, and graphics.

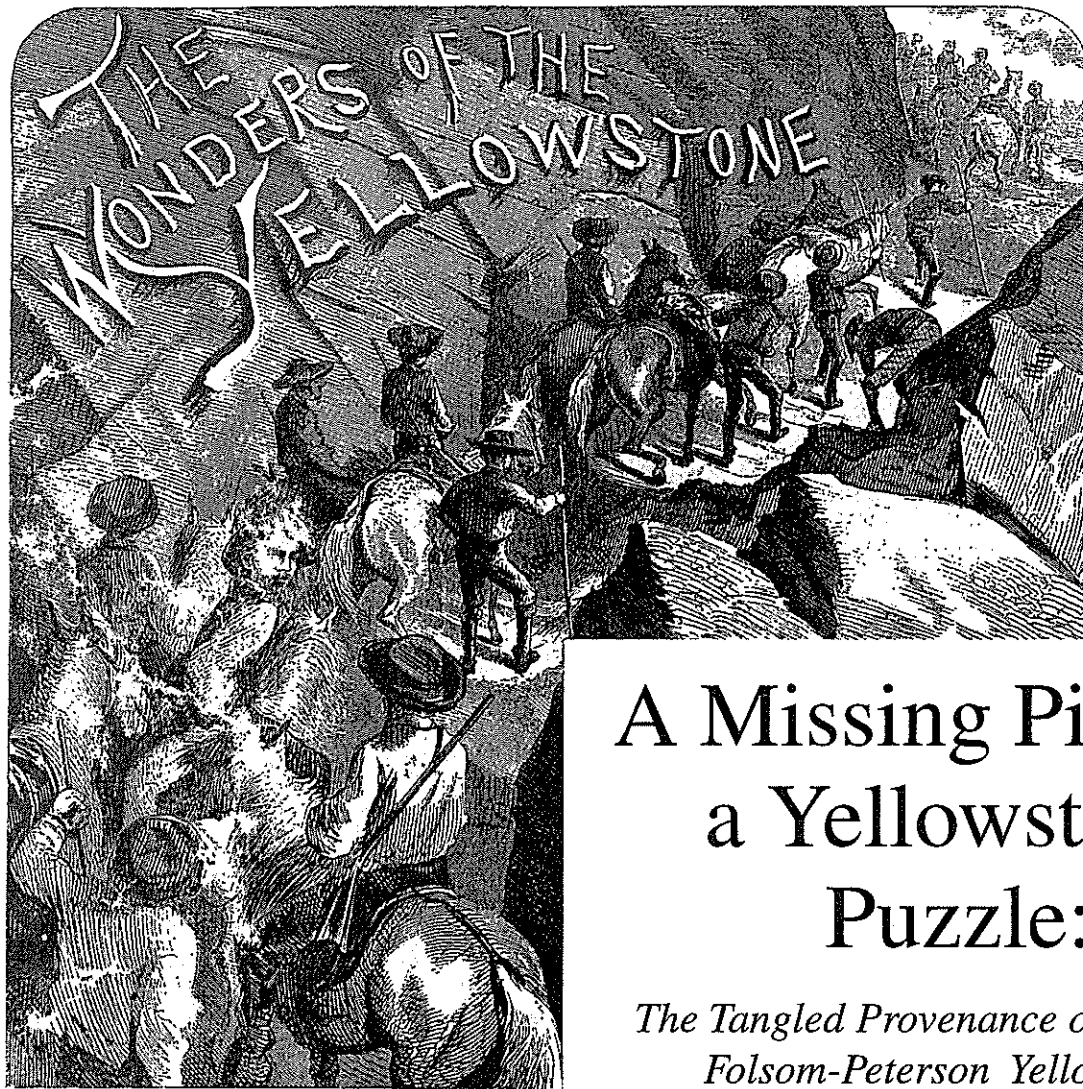
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Debra Patla is a research associate of Idaho State University. She has been conducting amphibian research, surveys, and monitoring in greater Yellowstone since 1993, including completion of her M.S. research project on the Lake Lodge spotted frogs. Dr. Charles Peterson is professor of zoology in the Department of Biological Sciences at ISU. He also serves as curator of herpetology at the Idaho Museum of Natural History, Pocatello, and as a co-chair of the IUCN/SSC Declining Amphibian Populations Task Force for the Rocky Mountains. Chuck has been investigating amphibians and reptiles in the ecosystem for the past ten years. Debra and Chuck come to work unintentionally disguised as fishermen with waders, nets, and fishing vests, always ready for an impromptu discussion about amphibians with tourists who ask "How many did you catch?"





A Missing Piece of a Yellowstone Puzzle:

*The Tangled Provenance of the Cook-
Folsom-Peterson Yellowstone
Expedition Diary*

by Kim Allen Scott

The definitive exploration of Yellowstone National Park began in 1869 with the journey of three friends, Charles W. Cook, David E. Folsom, and William Peterson, who visited the region on their own to investigate its rumored wonders. Two subsequent expeditions in 1870 and 1871, undertaken with official government support, completed the scientific reconnaissance of Yellowstone and laid the foundation for its establishment as a national park in 1872. The men who participated in the latter two explorations had both the desire and the means to publicize their discovery narratives to a wide audience, but fire, neglect, and mishandling have all combined to somewhat

obscure the record of the Cook-Folsom-Peterson journey.¹ This essay will attempt to unravel the complicated story of their expedition chronicle, identify what may very well be the earliest draft of the manuscript extant, and present for the first time a section from the draft that had been omitted when Cook attempted to reconstruct the original composition in 1922.

Folsom, an engineer employed by the mining hydraulic works at Diamond City, Montana, and his two friends, Cook and Peterson, began their exploration of Yellowstone on September 6, 1869. For the next four weeks they traversed the country, measuring the waterfall at the

head of the Grand Canyon, visiting the northern shore of Yellowstone Lake, and lingering in the Lower Geyser Basin, all the while recording their observations in a memoranda book. Upon their return during the winter of 1869–70, Cook and Folsom apparently collaborated on preparing for publication a narrative from their diary. A writer named Clark, who had met Cook the previous year in Diamond City, requested a copy of their manuscript and permission to seek out a publisher. Cook mailed the article, but in spite of Clark's best efforts, several of the nation's leading magazines rejected the story, allegedly due to the skepticism of the editors over some of the phenomena

described.² Clark finally convinced the proprietors of the *Western Monthly*, a Chicago, Illinois, literary periodical, to accept the piece in the spring of 1870, but the resulting publication belies the allegations that eastern editors found the descriptions of the country too incredible to repeat.

"The Valley of the Upper Yellowstone" appeared in the June 1870 edition of the *Western Monthly* under the byline of Charles W. Cook.³ Comparing the heavily edited text with what has survived of the submitted manuscript⁴ shows that the *Western Monthly* editors restricted most of their paring to the grammatical voice, rather than the substance of the report. Cook and Folsom had originally written the text with an introduction in the first person past tense to describe their preparations for the trip, but then abruptly changed to a combination of present and past tense voice once they embarked from Diamond City on September 6. To further confound readers the original manuscript began to refer to all three participants only by their initials; "C" or "Cap" for Charles Cook, "B" for William Peterson, and "D" for David Folsom, so that it was unclear who was telling the story. To clarify the story's narrative continuity, the *Western Monthly* altered the manuscript to read entirely from the point of view of one person, a writer they assumed to be Charles W. Cook. Other textual alterations in the *Western Monthly* article had more to do with relevancy than credulity. Cook, Folsom, and Peterson all shared the frontiersman's dislike for native peoples, and the two encounters the party had with Shoshoni Indians during their journey were described in language that did little to advance their chronicle of exploration. *Western Monthly* apparently chose to omit these portions in order to focus on the article's main thrust of describing the countryside.

Although Cook and Folsom might have been dismayed at having their text substantially altered when it appeared in print, they just as likely felt secure that their accomplishment in setting forth the first comprehensive description of the Yellowstone country would win them lasting fame. Folsom later recalled providing the original diary memoranda book

and a map he had prepared to Henry D. Washburn⁵ and other members of the exploration party being formed in the late summer of 1870, but he could not have known that by so doing he would help obscure the record of his own group's efforts. When the published results of the Washburn-Langford-Doane expedition began to appear in 1871, no mention was made of the 1869 reconnaissance by Cook, Folsom, and Peterson. The reserve stock of the June 1870 issue of the *Western Monthly*, along with the original manuscript, burned in a fire which consumed the publisher's Chicago headquarters on September 4, 1870. As a result, only the issues of the magazine which had been sent to subscribers survived, and any demand for extra copies generated by subsequent explorations of the park simply could not be met.⁶

Although it is not at all clear what became of the memoranda book they had carried on the expedition,⁷ both Cook and Folsom kept incomplete duplicate copies of their literary effort. Folsom donated his copy of the *Western Monthly* to the infant Montana Historical Society, in hopes that the scarce magazine would at least be preserved, but again fire intervened to obscure the record. All of the precious documents gathered by the Society burned in the disastrous Helena, Montana, fire of January 9, 1874, including Folsom's contribution.⁸ The explorers made no further attempt to publish the piece, and by 1894, when Nathaniel P. Langford decided to reprint the *Western Monthly* article in pamphlet form, he erroneously assumed that his personal copy of the magazine was the only one extant.⁹ Langford's reprint, a limited edition of 500 copies, attempted to set the record straight regarding the importance of the 1869 journey, and graciously recognized the Cook-Folsom expedition as contributing to the establishment of the park in 1872.¹⁰ Unfortunately Langford chose to credit the article to Folsom alone, probably because the two had become well acquainted over the years.¹¹ When Langford's version was reprinted in 1904 he once again credited the authorship to Folsom.¹²

However, that same year another writer took up the matter with a resolve to reprint the original text of the joint diary.

Before accepting an appointment on the faculty of Montana Agricultural College in 1904, Victor K. Chesnut, a chemist and botanist for the United States Department of Agriculture, had been in the state preparing reports on indigenous poisonous plants.¹³ During his investigations in 1903, Chesnut happened to call at the sheep ranch of Charles W. Cook near Unity, Meagher County, Montana. Cook, a spry 64 years old, took a liking to the botanist and during their visits he described his 1869 trek through the park. Perhaps Cook thought Chesnut's ties to the academic world would help result in the long-delayed publication of the original manuscript he and Folsom had prepared 33 years earlier, because he turned over his only copy of the document to Chesnut for transcribing. Chesnut took the handwritten pages back to his office in Bozeman where he carefully typed a verbatim copy and then, on February 23, 1904, he took the transcript to Helena, Montana, where he introduced himself to David E. Folsom. By that time Folsom had become somewhat embittered by the twisted fate of the diary's publication history. He told Chesnut he felt that Langford in particular had plagiarized his work in the latter's 1871 articles in Scribner's and gave no credit to the ear-

George Mueller



Above: Charles W. Cook. Left: Illustration from "*The Wonders of the Yellowstone*," Scribner's Monthly 2(1):May 1871. This article told of the Washburn-Langford-Doane expedition in 1870, which had much more publicity than the Cook-Folsom-Peterson expedition the previous year.



Above: Superintendent Albright, Charles Cook, and Anne Anzer of the National Editorial Association during the 50th anniversary ceremony of the park's establishment. Right and following page: Missing pages from the diary.

lier expedition.¹⁴ Folsom became excited by the possibility of publishing the original piece in its entirety and carefully went over the transcript Chesnut left with him, making corrections based on his own version of the manuscript. He mailed the corrections to Chesnut with a copy of Langford's 1894 pamphlet, indicating where the page breaks occurred in the Western Monthly's version of the story so that the missing portions at the end of Chesnut's transcript could be replaced with the exact wording which had been published in 1870.

Folsom's hopes of seeing the original narrative in print proved groundless because Chesnut never got around to publishing the manuscript. Lacking historical training and pressed by other official duties, Chesnut laid aside his transcription for the balance of his tenure at Bozeman. In 1907, he left for Washington, D.C., where he took a new job with the USDA.¹⁵ He never returned the manuscript to Cook and apparently soon forgot all about the matter. Cook's handwritten original remained in Chesnut's old office for another nine years until, on the afternoon of October 20, 1916, it was consumed by a conflagration that gutted the Chemistry building on the MSC campus.¹⁶ Once again fire had intervened to destroy the record of the Cook-Folsom-Peterson expedition, but fortunately Chesnut had retained the transcript he had prepared in 1903.

In 1922, grand preparations were underway to observe the 50th anniversary

of Yellowstone National Park's founding, and 82-year-old Charles Cook had been approached by his son-in-law, Lewistown, Montana, attorney Oscar O. Mueller, to participate in the observance by again attempting to publish the long-neglected record of the expedition. Cook, of course, could not amplify the Western Monthly version without his handwritten manuscript. After Cook told him about Chesnut's involvement, Mueller wrote the botanist at Washington to see what had happened to the document. "I was very much surprised...to learn that the Folsom-Cook [manuscript account] of their historic trip was not deposited in the Montana Historical Library," Chesnut wrote back to Mueller, "I should have sent it there myself but when I left Bozeman in 1907 or 1908 I turned it over to [Montana Agricultural College] President James M. Hamilton together with a typewritten copy to be sent to the library. The [manuscript] was not complete but Mr. Cook could find no more at that time."¹⁷ Mueller, thinking half a loaf would be better than none, pressed Chesnut for a copy of his transcription, corrected by Folsom: "...I have decided to have you send me a typewritten copy of the copy of the manuscript you have, as it may be a long time in locating the others here in Montana, if [that is even] possible...Mr. Cook has no [other] copy of the manuscript and your copy may be the only means of receiving [the] same."¹⁸

While Chesnut set his wife to copying the precious transcription in his possession, Mueller doggedly pursued the trail of the original draft. He tried contacting James Hamilton to find out if he still had the document. When no reply came he confronted Hamilton in a Lewistown hotel lobby but Mueller reported years later that "all I could get out of him was evasive answers."¹⁹ Chesnut tactfully attempted to backpedal, pointing out that he did not distinctly remember giving the document to Hamilton. He suggested Mueller contact Professor Edmund Burke, Chesnut's former office mate at Bozeman, but that inquiry only confirmed the likelihood that the 1916 chemistry building fire had consumed Cook's original manuscript.²⁰

Once Oscar Mueller had possession of the typed transcript prepared by Chesnut's

wife, he realized the goal of publishing the complete text could still not be achieved. Chesnut's transcript, as corrected by Folsom, consisted of only 29 pages, ending just as the explorers made plans to leave Lake Yellowstone on the afternoon of September 25, 1869; it had none of the important description of the party's journey through the Lower Geyser Basin. Eager to help Mueller now that his incomplete transcription appeared to be the earliest surviving copy of the manuscript, Chesnut made the following deduction in a letter to the attorney:

The original manuscript was given, so Mr. Folsom told me, to General Washburn. I wonder what became of that? Mr. Folsom must have had a copy of that? Mr. Folsom must have had a copy of the amplified diary, however, in making his corrections on the copy I sent him! Possibly he then had the original. I have written to his son to find out the facts of the case.²¹

While Mueller continued to press his father-in-law Cook to search his house for the missing pages of the manuscript and also wrote to David Folsom Jr., Chesnut rifled through his own files in Washington to see if he could find any pages of the original manuscript. "I have come across a page or two of the manuscript I got from Mr. Cook," he wrote Mueller on May 14, 1922. "It is in what I take to be his own handwriting and it covers the trip around the lake, but it does not give the most interesting part."²² Chesnut went on to explain that he had made a photographic copy of the leaves and attempted to transcribe them but had temporarily misplaced the typescript.

Mueller must have been too preoccupied with preparing for the semi-centennial observance at the park and tracking down David Folsom Jr.²³ to complete the manuscript because Chesnut's discovery seems not to have made an immediate impression. Almost a month later Mueller responded:

Every bit of this that can be produced will be of assistance to me in getting the Diary completed and hope you can send me a copy. I can then with the assistance of everything available get Mr. Cook to complete it, but at his age and over half a century having elapsed, will need all the notes possible to be secured

We crossed the river to the west side and went back to the lake; here the timber became dense and the ground uneven making it very difficult travelling. A little past noon we came to a small grassy opening upon the opposite side of which was a beautiful little lake separated from the main lake only by a sand-bar which the surf had thrown up across the narrow neck which formerly had connected them. We saw several of these formed in like manner. This was about one thousand yards across and was nearly round. Large flocks of geese and ducks were feeding upon the shore or floating gracefully upon its smooth surface.

Beyond the lake the timber arose tall and straight and, to appearance, as thick as the cane in a southern swamp. This was one of the many beautiful places we had found fashioned by the practiced hand of Nature that man had not desecrated. It looked so inviting with its cooling shades and its rare opportunities for hunting and the bright vision of a supper upon fat ducks, that we, with common consent, decided to remain here until the next morning.

The writer's visions of supper began to melt after an hour's unsuccessful attempt at killing game. We had been shooting at a species of Diver whose motion we at

last learned was quicker than the swiftest ball. But this knowledge cost us some time, labor, and several rounds of cartridges. We then turned our attention to the more timid but less active species with better success.

The next day our road was difficult in the extreme. We attempted to travel along the lake shore but the jutting rocks extending into the water at frequent intervals compelled us to abandon it for the timber which was very thick, interlaced with fallen trees and underbrush. Through this we wound our tedious way on pack horses frequently getting wedged between trees or caught by overhanging boughs. After an eight hour's drive, in which we travelled about eighteen miles, we camped on the shore in timber without grass. There we could see the steam that arose in large masses from the many hot springs at the head of the lake about eight miles distant.

An early start and delightful travelling brought us to the head of the lake where we prepared to remain a day in order to rest our horses and view the springs as they differed greatly from any we had previously seen and possessed many points of pleasing interest. They were stretched along the shore of the lake for a distance of about two miles and extended back of it about five hundred yards and into the lake for as many feet.

in order to be sure that it is accurate. I would like to know whether or not you are absolutely sure you did not get all of the Diary from Mr. Cook?²⁴

Mueller may not have immediately realized that the leaves Chesnut had found continued the narrative beyond the point where his own transcript ended. The pages that Chesnut had found described the portion of the route through September 28, describing in more detail their investigations of the lake shore up to the West Thumb. In any event, Mueller continued to work with Cook to both prepare a new manuscript for publication and to arrange for Cook's participation in the park's semi-centennial celebration on July 16, 1922. When he finally got a reply from David Folsom Jr., Mueller unhappily reported to Chesnut, "I have received from Mr. David Folsom Jr. a copy of the diary, but [it] is identical to the one that you sent me and presumably a copy from the copy you sent Mr. Folsom Sr. [in 1904.]"²⁵ Chesnut felt moved to explain himself when he sent Mueller a photograph of the

first handwritten page he had found. "No, I am sure that I didn't get all of the [manuscript] from Mr. Cook," he wrote. "There must be some at his house and I hope Mrs. Mueller will be able to locate it. It is very difficult to read this particular piece that I found, so it was on that account that it was not copied. I haven't been able to decipher it all yet."²⁶

For some reason, Victor Chesnut never sent the original leaves he had found to Oscar Mueller and only mailed the attorney a negative photographic copy of the first page, which consisted of 191 words describing the explorers' decision to remain at the lakeshore on the night of September 25, 1869. Mueller assumed this to be the last vestiges of the original he would be able to locate, and turned it over to Charles Cook, who completed the reconstructed chronicle by referring to the *Western Monthly* for all the information from September 26 to the end of the journey on October 10, 1869. Mueller seemed satisfied with his transactions with Chesnut, probably because he be-

lieved the latter's contacts with Yellowstone National Park Superintendent Horace Albright and concessionaire Jack Ellis Haynes had finally secured his father-in-law the recognition he deserved as a member of the first comprehensive exploration of the park.²⁷

Mueller submitted Cook's final compilation of the diary to Haynes on September 13, 1922. Initially Mueller thought the Montana Historical Society would publish it and only wanted Haynes to proof the manuscript, but Haynes convinced the attorney to let him print it in the *Haynes Bulletin*, a house organ of very limited circulation.²⁸ The "Reconstructed Diary of the Cook-Folsom Expedition in 1869 to the Yellowstone Region" appeared serially in four consecutive issues of the *Haynes Bulletin* beginning in December 1922, with a preliminary statement by Cook that explained how the chronicle had been mishandled in the past.²⁹ But again circumstances would rob the old explorer of widespread recognition for his achievement. After

The ground gently sloped to the lake, in places down to the boundary, while at others the white chalky banks stood fifteen feet high, the waves having worn the rock away at the base leaving the surface extending over, in some instances, twenty-five feet. It was a calcareous deposit formed by the cooling water precipitating its mineral. There were several hundred openings here of all sizes, and for the most part they were nearly round, the biggest being about seventy-five feet across. They appear like deep pools or wells of great depth slightly enlarged at the top. The water had a pale violet tinge and was very clear, enabling us to discern small objects fifty or sixty feet below the surface. In some of these vast openings would appear at the side as the slanting rays of the sun lit up these deep caverns. We could see the rocks hanging from the roof, on the channeled and water-worn (?) side, and the rock strewn floor almost as plainly as if their haddried and we were traversing its silent chambers.

Many of them had a rim or base of stone extending in several inches, even with the surface of the water similar to ice hanging on the edge of a basin in a cold day. These borders were wrought into all manner of fantastic and beautiful shapes and covered with a frost

work so delicate that the slightest touch would deface it. They were intermittent-flowing or boiling as the case might be at irregular intervals. The greater portion of them were perfectly quiet while we were there although nearly all of them gave unmistakable evidence of frequent activity.

Some of these would quietly settle for ten feet while its nearest neighbor would as quietly raise until it overflowed its banks and sent a torrent of hot water sweeping down to the lake. At the same time one near at hand would send up a sparkling fountain two feet in diameter and twelve feet high which would fall back into its basin which would remain partially full, the motion of the water being caused only by escaping steam. It would then perhaps instantly settle only to raise and discharge its water in every direction over its rim.

Haynes had published the piece, the Montana Historical Society made other plans for their 1923 edition of Contributions and more than 40 years would pass before the exploration chronicle would again appear in print.

In 1965 park historian Aubrey L. Haines turned his attention to the Cook-Folsom-Peterson expedition record. Having access to all the previous published versions and a recently discovered reminiscence credited to William Peterson, Haines masterfully attempted to unravel the complicated story of the exploration narrative by interlocking passages from the four published versions, their supplemental text, and the Peterson reminiscence. Although Haines had access to a typescript of Folsom's version of the diary up to September 25, 1869, it had no substantial differences from Cook's text in the Haynes Bulletin³⁰. When Haines' book, *The Valley of the Upper Yellowstone*, appeared in print, it seemed as if the last word on the Cook-Folsom-Peterson expedition had been said³¹.

However, in 1979 a small collection of

papers from the files of Victor K. Chesnut were donated to the Special Collections department of the Montana State University Library. The accession contained all of the letters Chesnut had received from Oscar Mueller, the 1904 transcript that David E. Folsom had corrected, supplemental notes, the photograph of the first faded leaf, and, most importantly, four additional pages of transcription that Chesnut had deciphered from the original leaves discovered during his 1922 search through his files. He had misplaced them when he sent the photographed page to Mueller, and after the Haynes Bulletin published Cook's reconstruction Chesnut probably thought no more about them.³² The additional text, some of which was included or paraphrased in the 1870 *Western Monthly* article, appears here for the first time and includes the expedition's detailed description of the West Thumb geyser basin.³³

The tangled provenance of the Cook-Folsom-Peterson expedition diary is an unfortunate case of editorial omission, well-intentioned mishandling, and fiery

demise. The discovery of this additional puzzle piece may not be the last word, however, since the location of the memoranda book the men actually carried on their journey has yet to be accounted for, along with those faded leaves that Victor Chesnut neglected to return to Charles Cook in 1922.

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