

This stark description of the field work does not convey the underlying sense of excitement we often felt when the early camera points were first rediscovered. Part of this was simply opening a window into the past: many retakes showed virtually no change—the pioneer photographer would have been perfectly at home looking through the viewfinders of our cameras. Other scenes provided such stunning contrast that even we at first doubted that the replication was correct. But there was more to it, including such personal thoughts as: Why did you, my photographer predecessor, select this particular scene? Did you too hear elk bugling in the distance, or note grizzly bear tracks in the meadow?"

— *Yellowstone and the Biology of Time*, M. Meagher and D.B. Houston, 1998.

the same; these are soil-determined, topoedaphic sites—the longer-term controls are moisture, aspect, and the kinds of soils that have formed. Those meadow patterns tend to persist, no matter what the state of the forest. I remember Doug and I sitting up on the hillside watching the 1976 Arrow Fire. The elk would come back into the smoke to graze—the Bambi syndrome has no validity. Food and sex are the driving forces because otherwise you don't live and you don't procreate. Animals by and large conduct business as usual, even in the face of an event such as fire. The Arrow Fire is the one you can see from the road where the trail goes into Grizzly Lake. The photos we use are taken from the edge of Obsidian Cliff, up high—that's one of my favorite series. We had no idea who took the first photograph in the 1880s. You could see Beaver Lake already silting in. When it was retaken, there was that early 1970s view of the forest, but then it burned in 1976. With all the downed trees, enough time had gone by that it re-burned hot in 1988. It's now a pretty barren-looking hillside, but eventually, of course, there will be a forest there again.

YS: One photo that I recall was from Mammoth looking toward Bunsen Peak and the amazing change is the number of Douglas-fir grown up in the foreground of the picture. Douglas-fir encroachment is one of the more dramatic changes in the northern part of the park. Doug talked about this in *The Northern Yellowstone Elk*.

MM: It seems to be. We're getting more into a post-Little Ice Age climate, and that means that especially where there is an altitudinal zonal transition anyway, there will be some encroachment as those tree zonal changes take place.

YS: That same point relates to the often tossed-around notion of fire suppression; you and Doug comment in *Yellowstone and The Biology of Time* on whether or not it was truly effective and led to a bigger fuel buildup in 1988, or whether there's a distinct difference in its effectiveness on the northern range versus the Central Plateau of the park. Largely that debate comes from little things written in some historical records to suggest that there were fire suppression efforts, but, no, they really weren't effective.

MM: I think when I'm retired, I'd like to go back to doing environmental history because I would bring the biological perspective to the historical information and do more detail on some of these topics. Bill Romme and Don Despain document a major fire episode from roughly 1732 to 1750. Cathy Whitlock, a superb paleoecologist, was able to validate that and take the fire record back further. It makes excellent biological sense to say that on the volcanic plateau, you were dealing with a very long fire interval, because you simply didn't have the burning conditions. There was a fuel build-up, but a natural one. We humans, be the effects good or bad, tend to be very arrogant in accepting credit. "We have done all these disastrous things"—and there's no question we've done some, but you might say we're kind of a bump on the surface, when you start thinking in terms of geologic and even biological time; 1988 was basically a function of the Little Ice Age. Yet our ability to have influenced fire suppression on the northern range would

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have been greater than on the Central Plateau.

YS: Another change often commented upon is the absence of cottonwood tree regeneration in the river bottoms.

MM: I can look at an early USGS photograph of Lamar Valley, knowing we were at the end of the Little Ice Age but see that there weren't many cottonwoods then. If anything, on a few specific sites, cottonwoods may actually have colonized since. For reasons we may not understand, the Lamar Valley may not always be cottonwood habitat. And yet if you go around to the other side of the Absarokas, where there have been some fires and a different climatic regime, the cottonwoods came in so thickly on some sites you can't walk through the young trees.

YS: In your new book, you mention beaver as another agent of change; you comment that critics have talked a lot about the large herbivores on the northern range, and imply that the smaller animals' herbivory is under-appreciated in this controversy. It was fascinating to see a picture of a place where today there's barely water—a site out near Wraith Falls—but in the old photo it was flooded. It was marvelous in a way, but it points out the ephemeral nature of some of the waters and/or the beaver.

MM: Last year was the year that underscored that stream hydrology systems (and much else, biologically) are often determined not by the usual, but by the events, the *extremes*. Did you ever see a beaver dam here that would hold in a spring like 1996? It's been interesting to walk places like Blacktail Deer Creek, where the water was over the banks in places that I'd never seen it in 37 years. It was just one of those years; if there had been bank-denning beaver there, high

water would have taken out some of those bank dens as well as any dams. I've seen it high in other years, but this was the most extreme expression that I have seen.

Coming out of the Little Ice Age—knowing that the Little Ice Age was at its most extreme here toward the end—we had to have had some pretty hellacious spring runoffs in this place; they'd rip out willows as banks washed. Certainly there are places in the park where more willows could grow, but is the lack of willow anything that is wrong, or is it simply our preconceived human notion of how things ought to be? I don't think we understand willows well in this place, which means we don't understand beaver. I don't think we're going to understand either one without addressing the stream hydrology and the extremes that we get. We simply do not have, with site-specific exceptions, what I would call good beaver habitat in this place.

"Slippery Shibboleths": Limiting Ecological Processes

YS: I liked your quote of Graeme Caughley's: "A plant-herbivore system is not simply a vegetation suffering the misfortune of animals eating it." When we get into a discussion of herbivory in the park, there is a faction out there who likes to view it that way: it's a one-way system; the poor plants are suffering at the teeth of those eaters. One of your lessons in the book is "if it's simple, be careful"—as in your discussion of the difference between ecological and economic carrying capacity and how those interpretations have influenced various critics of policy, particularly on the park's northern range.

MM: We borrowed the term "economic carrying capacity" from Graeme Caughley. Economic carrying capacity basically is range management, where you are interested in maximum sustained yield. To do that you maintain a somewhat lower, younger age structure and higher biological productivity because you're cropping all the time. Ecological carrying capacity is a constantly varying number, and your standing crop—in other words, your biological base—is normally higher than would occur with economic carrying capacity, unless you have a ma-

JOR PERTURBATION in the system.

YS: In *Yellowstone and The Biology of Time*, you talk about "conserving animal-plant associations," which might

mean intervening, as opposed to "giving expression to the processes," which would mean not intervening, and a third option of combining the two while placing emphasis on the expression of processes. You go on to say, "By defining acceptable limits to the ecological processes of interest, we produce an operational definition of 'natural' that is appropriate for the beginning of the 21st century." It sounds as though bison management falls into that category, where we're going to have to put some limits on a process.

MM: Frankly, free-ranging bison—and, I sometimes think, I myself as a biologist—we're both anachronisms; the modern world doesn't exactly have a place for either of us. Bison are curious; for many people they're an icon, a wonderful symbol, but the reality is we humans have so taken over the earth that we really don't want to live with them except when they're tidy and fenced and in preserves. We're going to have a tough time allowing the processes that bison represent because they are truly nomadic. They are always on the move and that means they use the landscape in a way, say, the northern range elk would never do. Any population will fill up its habitat if allowed to do so and look for more, and that's exactly what the bison are doing, recognizing that we have changed the energy dynamics. If they could adapt to new winter ranges outside the park, they'd be home free. But we have man-made boundaries and the modern world doesn't want free-ranging bison outside Yellowstone Park.

YS: Is that what you meant when you talk about setting limits? In the post-Leopold years, many people have interpreted Yellowstone's policy as being one of no limits. You and Doug mention the "much abused" term, "natural regulation."

MM: I think that a lot of people have

"The most important message from this photographic study is that the Yellowstone landscape is, above all else, magnificently dynamic—there is no "correct" or "pristine" fixed state to which the Park ecosystem should be held, even if this were possible. In this sense the past serves only as a limited guide to the future because the intensity and frequency of the processes driving ecosystem dynamics change."
—*Yellowstone and the Biology of Time*, M. Meagher and D.B. Houston, 1998.

extrapolated and changed the meaning. Perhaps this is a spinoff from the notion that there was a policy pronouncement from on high that said natural regulation could and would prevail inside the park. We [Glen Cole and staff] were looking at it from the standpoint of feedback mechanisms, and the extent to which those feedback mechanisms would impinge on the ungulate populations. I've said natural regulation (as we first attempted to understand it in terms of feedback mechanisms) resulted in the Pelican bison wintering herd being naturally regulated for a period of some 50 or more years within both that time frame and a geographic frame. They aren't any more. We have changed the parameters. Feedback mechanisms are there, but what we have done by providing a snow-packed system of roads in winter has offset and negated many of those feedback mechanisms. It's a question of energetics. By using the snow-packed roads for travel between foraging sites, the bison expend a lot less energy, and so there are more of them.

We have an environmental gradient that is dictated by the Absaroka Mountains on the park's east boundary, and an animal species that is very stolid by temperament. If bison behaved like elk or deer, they couldn't eat enough to fuel that huge body. That is why they could so totally adapt to using the winter road system—it's very energy efficient, and they like to aggregate, so they move to do so. We can't change those fundamental behavioral factors, but by superimposing an energy-efficient road system across that environmental gradient, we are going to continue to drive the changes in bison distribution that we now have.

YS: You're referring to Yellowstone's winter road management operation?

MM: I'm not trying to say snowmobiles

are good or bad—it is the road system and not the level of human use that is the issue. Prior to the winter road system, bison mortality in Pelican Valley appeared at least in some years to be very much density independent. Roughly a couple of hundred would survive the toughest winters, partly because of the thermal areas. It didn't matter if there were 200 more bison than that or 500 more; they died. I suspect that such events were major when bison were truly nomadic on the Great Plains, rather than this sort of attrition cropping. You had drought in the southwest over hundreds of square miles, so animals simply starved to death in large numbers, or they drowned in the rivers, or ice storms took them—those kinds of things. We have historical accounts for some pretty impressive mass starvations. Also, we know that bison were in western Mexico, Arizona, and New Mexico just about the time European man arrived. Bison there disappeared, probably naturally, with climate change as the Little Ice Age waned.

I think the bison population and what it's been doing with this road system gives insight into what bison were as a fascinating product of their own evolutionary history that we would not see otherwise, because most bison are fenced. I'd like to examine the accumulated bison data from this standpoint; my title might be, "Free Ranging Bison in a Limited World," and I might add, "A Test of Natural Regulation," to put in the buzz words.

YS: When we get back to the idea of setting limits, would you view them as very specific limits for specific management issues, or for specific species? Some people might say, "Aha! She's saying go back to the idea of carrying capacity."

MM: You're raising a very good point. No, I'm not saying that, and if ultimately "carrying capacity" becomes a management decision, then I would hope it is done case by case, with great care and a certain amount of flexibility, because if we regulate animal numbers, we will affect the system. Bison now represent an ecosystem change just as lake trout do; I would say they're equivalent, although people aren't horrified at bison, because I think we have a notion that with

native species, more is better. It's not, if it represents a system change in a park managed as a natural area. No system is open-ended.

In most temperate climates, even though summer range is important in terms of quality and productivity, you might say it's winter that keeps the lid on. We have negated that in this case, so the bison population is fully occupying its summer range in a functional way, the way they use the landscape. We have more bison than the winter range can accommodate—no matter what the number is. Emigration and colonization, or what would become colonization for new winter ranges outside the park, is being prevented by removing bison at the boundaries. At what point do we say that we're getting some major ecological impact that we would not have, if we had not changed the system? You're dealing with very fundamental energy relationships, with and without the road system, and what we've done is change those energy parameters. If you simply cut out the road system, you would re-impose the energy costs. But because bison have developed new destinations, they would still attempt to go certain new places, and they might do so successfully. They would have to pay the energy costs of making those moves, and eventually the system would begin to shift back. But there are some problems attendant with that. Part of the new dynamics of the system will be introduced species of plants, and that is one of my concerns, because those plants tend to come in on highly disturbed areas.

Our problem is we live in human time, and we like things "status quo." Speaking purely as a biologist, I would shut down the human-caused system change, which is the winter roads, and I would go in and kill a lot of bison, because that would hasten reversing the changes we have caused.

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Wolves, Humans, and Bison Behavior

YS: Since there's been so much in the news about wolf restoration, the question arises, are wolves likely to exert any influence on the bison?

MM: I don't think so. The view on what wolves might do to bison has been extrapolated from a couple of northern bison populations, simpler systems in which there is very little alternate prey. Wolves, too, are products of their evolutionary history, and they are going to live in the most energy-efficient fashion they can. That doesn't mean that they won't occasionally take a bison. If walking carrion is right out there, wolves will take it if they can, but if there is an easier food source, and elk are numerically and distributionally much more prevalent, then that's what wolves will take primarily. I see bison as perhaps contributing now and then to the welfare of wolves, but I do not see wolves as having much effect on bison.

YS: Isn't there very limited evidence of predation on bison by other animals here—grizzly bears and lions and coyotes?

MM: I heard of one instance when apparently coyotes took a bison yearling, but I think it already had a broken leg and was trapped in downed trees. [Ed: *There has been no documented predation by mountain lions and few reports of grizzly bear predation on Yellowstone bison.*] Any meat eater will take the most energy-efficient, suitable source of food—that's very different from affecting the population. As I think about what the present bison population has been teaching me about this truly nomadic species, always on the move—take a bite, take a step—and I read historical accounts, thousands drowning in the Missouri River and so on, I suspect that a feature of this species is to increase at biological maximum, and then climatic events, not predators, knock them down.

YS: People ask a lot about habituation in the bison, or their "tameness," because bison have become statistically more dangerous to humans in the park than even bears. A lot is made about the number of people who walk right up and practically try and pet one and get gored

or something. I remember the first time I was in upper Pelican Valley. I happened to pop over a hill and create a little bison stampede unintentionally, because I didn't know they were there. They were so unused to seeing humans in that area that they just took off running. I remember thinking, "Oh, *wild* bison!"—different from the ones we tend to see down by the roads.

MM: Well, people often mistake habituation for tameness. Habituation appears to have a strong geographic element. If you walk on the sidewalks in Mammoth and mind your own business, unless an elk cow has a brand new calf stashed on the far side of you, they're quite tolerant. They're very habituated to vehicle traffic, to the normal patterns of people use. You're much safer if one moves toward you while you are sitting there than if you violate its space and walk up with your camera and shove it up against the animal's nose. As we have more bison and more tourists, we have an increasing injury rate. It's not because anything has changed with the bison.

Depending on the evolutionary history of the species, some animals are much more tolerant in the open, while others may tolerate a certain distance from humans if escape cover is not too far away. The time of year makes a difference, and whether they have young, and the animal's sex and age. I think of these big bison bulls as kings of the range—if you're that big, it's not very energy efficient to spook at every little thing. What is here that can

take one of those guys unless it's dying on its feet—why should it run from anything? But it isn't tame, and that's where tourists get into trouble—that swinging head has 2,000 pounds behind it. I remember the first human fatality caused by a bison in the park—I didn't see the victim, but he had taken a horn dead center and died in about three minutes. All the bull did was a short charge, but a swinging head can do major damage if a horn gets you in soft tissue.

There's a facet of human psychology that I think helps set the stage for some of the interactions. I talked with a psychologist who commented that if an animal will let you approach, you may regard that as a validation that you're a good guy, that you wouldn't dream of hurting the animal, and somehow the animal knows that. My view is that something's happened to human wariness, because even if the animal really were tame, if it weighs 2,000 pounds and it sidesteps, it will squash you.

YS: I've heard you comment that you can really only herd bison where they already want to go.

MM: Absolutely. It is this stolidity that made bison so vulnerable to modern rifles. They were equipped to deal with the direct impingement of, say, the wolf. They're very agile when they want to be, very strong, very quick at kicking. That's why people who have used heel-nipper type cattle dogs have sometimes lost their dogs. Bison don't spend a whole lot of energy running away from things.

Questions for the Future

YS: In the introduction to *Yellowstone and the Biology of Time*, you touch upon the long-term controversy about ungulates and Yellowstone's northern range. But basically you say, here's a hundred sets of photographs—readers should look at them and decide whether the range is unacceptably changed.

MM: We built as large a collection as we could; we thought we had as representative a selection as possible, and did not need to visit every single site that could have been re-photographed. There are many sites for which we'd love to have photographs, but no early photos existed, as far as we know. What you see is what you got. If you can see certain trends, then that should suggest something.

YS: You mention in the book that you are still haunted by some of the old Yellowstone photographs because you couldn't find the locations from which they were taken. Are you going to keep looking?

MM: Well, I don't know—"keep looking" has a time frame too. I don't know if I'll be around long enough. Someday Dave Stradley and I will both hang it up, and that day isn't too far off. But I had hoped, in this last round of re-takes, to take some new photos for somebody else's future. Doug felt the same—he took a photograph looking down Cache Creek, because Cache burned hot in 1988. We've agreed we're going to come back in a hundred years and retake that!

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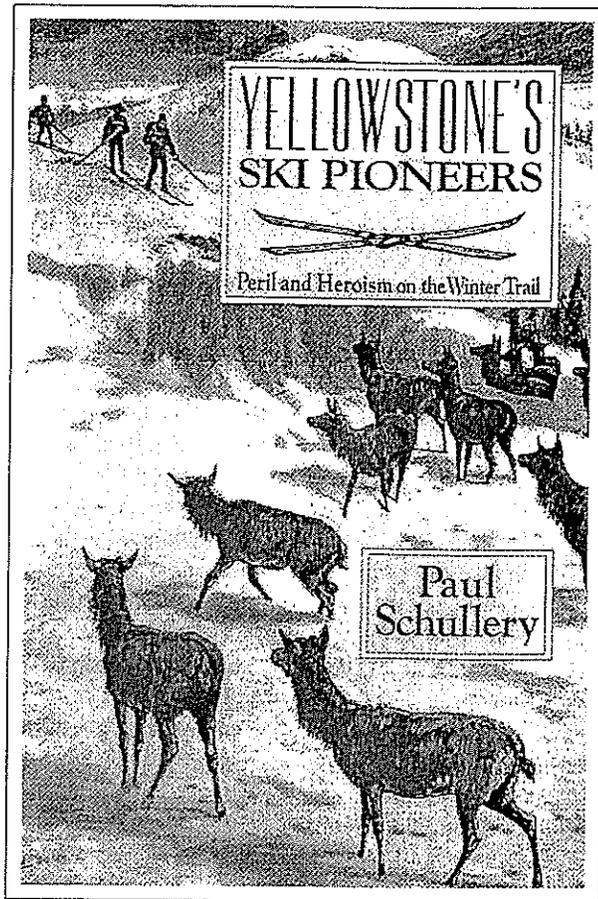
Book Review

Yellowstone's Ski Pioneers: Peril and Heroism on the Winter Trail by Paul Schullery. High Plains Publishing Company, Worland, Wyoming, 1995, 158 pages. \$8.95 (softcover).

In February 1996, I woke up in the Cold Creek Cabin, a 16-mile ski from the nearest road, pulled on my clothes, and stepped into the night. There was no moon—the night was pitch black, punctuated by the pinpricks of distant stars. The mercury had plummeted to a brutal -40°F. Nothing moved. The deep quiet of the wilderness was broken by an occasional popping sound. I felt sure we were alone, but the popping sounded vaguely like distant rifle fire. I stood, shivering, and listened long enough to realize that I was hearing the sound of xylem in nearby lodgepole pine trees freezing and exploding.

My companions and I had spent the last two days skiing up the Lamar River; the next day, when the temperature warmed up to -25°F, we would set out over Mist Creek Pass into Pelican Valley, continuing a tradition started by the army almost 110 years before: the winter ski patrol. This tradition, as well as other ski adventures and wildlife stories, is chronicled in Paul Schullery's book *Yellowstone's Ski Pioneers: Peril and Heroism on the Winter Trail*.

A keen observer and adroit chronicler of Yellowstone's wildlife, employees, defenders, and destroyers, Schullery has lived and worked in Yellowstone for much of his adult life, including stints as a park naturalist, park historian, and science writer. In *Yellowstone's Ski Pioneers*, he lets the protagonists tell their own stories, then fills in the blanks to help the reader interpret the social climate and attitudes of those times. What emerges is a picture of Yellowstone as a much more isolated, remote, and potentially dangerous place than we know today. In 1872, when the park was established, the nearest town was several days travel away in the winter. Summer visitors were rare, and poachers were the primary winter visitors. Ungulates were slaughtered wholesale by hide hunters and poachers, who often left whole carcasses to rot, typical of the wildlife destruction occurring through-



out the American West in this era. General W.E. Strong wrote in 1875:

One hunter will frequently kill from twenty-five to fifty of these noble animals in a single day. Over four thousand were killed last winter by professional hunters in the Mammoth Springs Basin alone (page 14).

As winterkeepers began to live in the park's interior and travel to Cooke City increased, the winter wonders of Yellowstone found chroniclers following two celebrated trips in 1887. Lieutenant Frederick Schwatka, a veteran of Arctic expeditions and dogsled adventures in Alaska, put together an expedition accompanied by F.J. Haynes, the official photographer of the Northern Pacific Railroad, who took the first known photos of Yellowstone in winter.

Misinformed about winter conditions in the park, Schwatka loaded his men down with heavy equipment which he planned to haul on toboggans pulled by the men and in a wagon. The skis used at that time were described by "Uncle Billy" Hofer as being nine feet long, one inch

thick, and weighing about ten pounds. The skier used a seven-foot pine pole to arrest his descents and provide balance.

Even with these difficulties, the plan might have worked, but 1887 brought the hardest winter that many western settlers could remember, with many cattle freezing or starving to death. After leaving Mammoth on January 5, Schwatka's party had to abandon the wagons at Swan Lake Flats. His men struggled with the toboggans for another four miles, camping at Indian Creek. The temperature that night fell to -37°F. The next day was worse: the party made only two miles. Exhausted and ill after reaching the Norris Hotel on the third day, Schwatka rested while his men explored the Norris Geyser Basin. He left with the party for Old Faithful the next day, but made only four miles before giving up and returning to Norris with three of his men.

Haynes refused to quit; with three other men he pushed on to Old Faithful, where they spent five miserable days huddled in a tent waiting out a severe storm. When the storm broke, Haynes took 21 photos of the Upper Geyser Basin. After return-

ing to Norris and travelling to Canyon, Haynes and his party headed for Yancey's Hotel via Mt. Washburn on January 23. Stranded in a blizzard, they dug a snow pit, built a fire, and spent the night joking about their situation and trying to stay warm. The next day was little better; although they had not reached Yancey's by nightfall, they kept going rather than camp in the treeless country north of Mt. Washburn. After reaching the hotel the next afternoon, they spent three days eating weak broth and recovering from their ordeal. As newspapers around the country trumpeted their achievement, Haynes and his crew became heroes. The winter expedition was the beginning of Haynes' long and distinguished association with the park.

Less than a month later, "Uncle Billy" Hofer and a companion began a 225-mile circumnavigation of the park from Gardiner to Old Faithful, along the east side of Shoshone Lake to West Thumb, across Yellowstone Lake to Fishing Bridge, then to Canyon, over Dunraven Pass to Tower, and back to Mammoth. Sponsored by *Forest and Stream* magazine and informed by its editor George Bird Grinnell, Hofer's trip was probably the first serious attempt to survey winter wildlife and conditions inside the park. (Hofer's wilderness travelling skills, wildlife observations, and winter conditions recordings are reported in *Yellowstone Science* 2(4):12-15.)

By 1887, army scouts were making winter trips into the park to protect wildlife from poachers. In 1890, Captain Frazier Boutelle built the first six "snowshoe cabins" for poaching patrols. The forerunners of today's backcountry cabins, 19 of these cabins were scattered around the park by 1900. (None remain; the park's oldest extant cabin, at Buffalo Lake near the west boundary, was built about 1912).

The need for winter ski patrols created a new challenge for the army: teaching soldiers how to ski. Lewis Freeman described the ordeal:

As each new garrison comes into the park, the early winter witnesses rare sport in the new soldiers learning the use of the ski. They grow as enthusiastic as a lot of children with new sleds. The favorite slide,

both for beginners and old hands, is from Capitol Hill... Falls? Of course there are falls, terrific ones at that, but no one seems to mind. Imagine 160 pounds of man, going at the rate of half a mile or more a minute, suddenly dashed to the snow with two stiff, flat, nine-foot inch pieces of ash tied to his feet and ankles as emergency brakes. And they stop him, too. Lucky he is if some erratic slider from above does not ride him down before he can regain his footing. (pages 79-80)

With extreme temperatures, chance of avalanche, and little prospect of rescue, winter patrols were inherently dangerous. By 1907, a "little red book" outlined procedures for safe patrolling:

No trip will be made on snowshoes by less than two men...wise precaution must be exercised to prevent separation of the party...During the winter duty period, patrolling and scouting will be constantly carried on, and when camps are made they will, if possible, be selected so as to be hidden from poachers who may be in the park. Patrols and scouts will avoid the regular trails as far as possible, and will vary their different trips as much as the character of the country will allow. (page 84)

The first winter patrol casualty occurred in March 1894 when an army private apparently got lost after leaving Riverside (on the Madison River near the west boundary) enroute to Old Faithful for the mail. His remains were found a year and a half later, 10 miles from where he was last seen, and in the wrong direction from where he was headed.

We were reminded again this March of the dangers of wilderness travel during winter. Rick Hutchinson, long-time park geologist, intrepid backcountry traveler, and a friend and colleague, was buried and killed in an avalanche near Heart Lake, along with a visiting associate, Diane Dustman.

One of my favorite chapters in the book is "The Capture of the Notorious Poacher Howell." George Anderson, who became acting superintendent in 1891, was determined to rid the park of poaching even

though it carried no serious penalty. After learning that Edgar Howell, a local hunter and poacher, was poaching bison in Pelican Valley, Anderson sent a search party to find and arrest him in 1894. Scout Felix Burgess' story of how he captured Howell, as told to Emerson Hough for a *Forest and Stream* article, is pure backwoods poetry. Less than two weeks later, Rep. John Lacey from Iowa introduced the "Lacey Act" "to protect the birds and animals in Yellowstone National Park, and to punish crimes in said park..." (page 108). It remains one of our most important pieces of legislation for protecting wildlife.

Schullery's book is not only entertaining, but informs our present situation, giving an especially good perspective on bison, political boundaries, and natural regulation policies today. Early army scouts, soldiers, and gamekeepers built corrals, trapped wild bison, and imported domesticated bison to augment a herd that had dropped to between 25 and 50 animals by the late 1890s. Perceptions of wildlife and management policies have shifted radically since that time; the evolution continues as the bison remain at the center of a controversy over free-ranging wildlife.

Yellowstone's Ski Pioneers helps to place the role of present-day park management in perspective on the 125th anniversary of Yellowstone National Park. It interprets our history and provides insights into how and why park policies have evolved. It tells good stories, often coming straight from the men involved. This is a good book with which to curl up on a cold winter night. Consider it a "must read" for anyone interested in wildlife conservation and policy or winter travel in the park.

Tom Olliff has worked in Yellowstone since 1980 and currently serves as the park's resource operations specialist and backcountry coordinator. He has broken trail on numerous ski patrols and recreational ski trips. While somewhat envious of Uncle Billy Hofer's experiences, he enjoys today's smaller skis, lighter equipment, and the comfort of backcountry patrol cabins.



Transition Time for Wolves and the Wolf Project

Two years after the start of a historic restoration effort, at least 45 wolves are freely ranging in and around Yellowstone. Another five wolves remain temporarily penned, and are due to be released later this spring: Nine pairs or family groups are being regularly monitored, while biologists await evidence of more pups being born in April and May. Wolves reside in the Lamar Valley and Blacktail Plateau areas of the northern range, but also wintered in the Thorofare, Pelican Valley, and Heart Lake areas of the park.

In late March, biologists picked up a mortality signal on the alpha male of the Soda Butte pack. One of the original wolves brought from Canada and released in 1995, wolf #13 was noted for his distinctive blue pelage. Though thought to be quite old even when first released, he surprised observers by fathering pups in both 1995 and 1996. After spending the winter with four other wolves in his pack around the Heart Lake Geyser Basin, he died there, probably of natural causes.

Yellowstone's Wolf Project Leader, Mike Phillips, has announced that he will leave the park in June to work for Turner Enterprises, where he will be in charge of endangered species restoration programs on Turner's many properties across the United States. Mike leaves with the project ahead of schedule and under budget; we wish him good luck with his next professional challenge.

A Harsh Winter for Yellowstone Bison

The successful recovery of Yellowstone's bison from near extinction a century ago has come at a price. A pre-winter population of about 3,500 animals was large enough to look for new range beyond the park's boundaries, especially when snow thwarted foraging at higher elevations and increased road grooming for oversnow vehicles encouraged bison emigration. Because some bison carry brucellosis, a bacterial disease that infects many wild and domestic animal species, the U.S. Department of Agriculture (USDA) threatened to revoke the "brucellosis-free" status of Montana's livestock. (See *Yellowstone Science* 3(1):15-16).

A long-range bison management plan jointly prepared by the NPS, the U.S. Forest Service, and the State of Montana, with the cooperation of the USDA Animal Plant Health Inspection Service, is scheduled for public review in mid-1997. An interim plan called for bison entering Montana along the park's north boundary to be either captured and shipped to slaughter or shot. Bison along the west boundary were to be captured and tested; those testing positive would be shipped to slaughter and those testing negative would be released.



Because this winter's heavy snowfall led to bison leaving the park in unprecedented numbers, the consequences of the interim plan have been more drastic than anyone anticipated. Efforts to haze bison back into the park proved ineffective because of the large number of animals present and severe weather conditions, while repeated hazing depleted the bison's precious energy and fat reserves. As of April 2, 1,080 bison had been taken to slaughter or were shot because they could not be captured or were injured in the capture facility. As a result of the combined effect of management removals and natural winter mortality, the

Yellowstone bison population is now estimated to be between 1,200 and 1,500.

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Norman Bishop, who spent the last decade of his career as a Resource Interpreter for Yellowstone's science and resource management programs, retired on February 28, 1997. Norm's career spanned 40 years with the National Park Service, including assignments at Rocky Mountain, Death Valley, and Mount Rainier national parks. His educational efforts to interpret wolves and their natural and cultural roles in greater Yellowstone engendered great popular support for the wolf restoration program.

Northern Range Research Reports Available

Available in May from the Yellowstone Center for Resources are: *Yellowstone's Northern Range: Complexity and Change in a Wildland Ecosystem*, a book on the history of research and management in northern Yellowstone, home to one of the world's largest herds of elk and long the subject of controversy, and *Effects of Grazing by Wild Ungulates in Yellowstone National Park*, which contains 22 technical publications summarizing recent studies that have been peer-reviewed by scientists. Much of the research was completed by scientists from agencies other than the National Park Service, by independent contractors, and by scientists from universities located across the United States.

Grazing effects have concerned scientists and park managers since the 1920s. The issue has been complicated by changing environmental and social conditions, as well as by differences in park management objectives compared to those of wildlife and range managers outside of wildland settings.

Yellowstone's northern range provides ecologists with one of the world's most exciting natural laboratories for studying the processes that shape wildlands and native grazing systems. A summary of the publications regarding the northern range will be featured in the next issue of *Yellowstone Science*, 5(3).