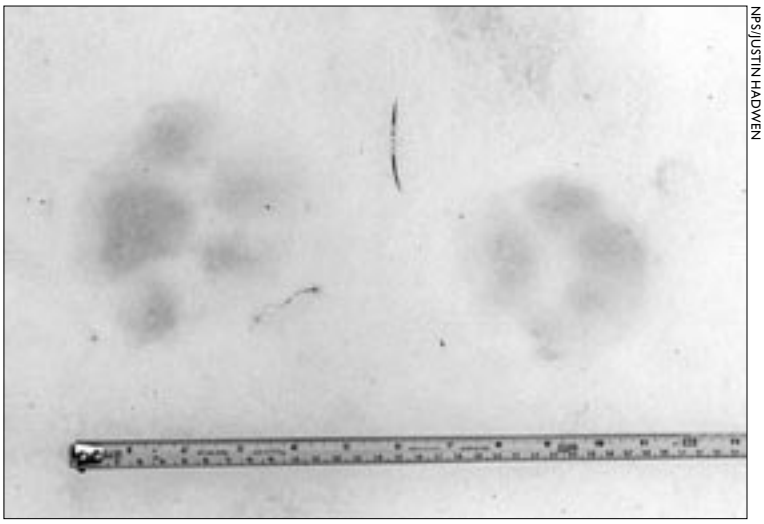
YELLOWSTONE SCIENCE

volume 13 • number 2 • spring 2005

The Elusive Lynx

Snowshoe Hares

Yellowstone's First General Store



NPS/JUSTIN HADWEN

People are lucky even to see Canada lynx tracks in the snow.

It's a Sign!

SIGNS OF SPRING, signs of life, signs of Yellowstone's elusive critters—sometimes that's all we see. It's amazing that of the roughly three million annual visitors to Yellowstone, almost none ever sees a lynx—a mid-sized carnivore! After four years of intense study specifically seeking out the cat, no actual sightings were made. Instead, confirmations of the cat's presence were made on tracks and DNA analysis of hairs snagged from baited lures. Lynx have been able to survive here almost under the radar.

This paucity of sightings highlights an important statistic—likely only 1% of species in the park have been identified and classified. In a place like Yellowstone, where more than 200 researchers are hard at work each year, that may seem surprising. But the park covers a vast landscape, and we're just beginning to look in certain areas, for example, the thermal areas, where it is believed that the vast majority of thermophiles (heat-loving microbes) remains unknown.

Yellowstone National Park is a protected place—development is tightly regulated and wildlife safe from hunting—making it a haven for the reticent and rare. It provides refugia for species such as lynx, which reside in only two other places in the U.S. (northwest Montana and the Cascade Range of the Pacific Northwest).

Yet the park lacks critical baseline data and monitoring programs on many species. Lynx studies were undertaken primarily because funding became available after the cat was listed as threatened under the Endangered Species Act in 2000. Often, it is funding or passion that drives the focus of research efforts. In the case of lynx, it was both. The park's hostile winter environment is not conducive to comfortable conditions for researchers. The lynx crews winter-camped, skied, and snowshoed to search for signs of the cat. These hardy researchers have added significantly to our current knowledge of lynx populations and their habitat in the park. The ongoing research of Karen E. Hodges and L. Scott Mills on the park's snowshoe hares dovetails nicely with the results of the lynx study, adding essential habitat information—where you find hares, you are more likely to find lynx. Bob Goss's article on the history of the park's first general store also delves into a relatively unexplored aspect of the park's story.

One study at a time, researchers are increasing the body of knowledge that exists about Yellowstone and the Greater Yellowstone Ecosystem. I am excited to serve as the new editor of *Yellowstone Science,* a journal intended to share the results of some of these studies. Keep your eyes open this spring, and you, too, may get a glimpse of something extraordinary.

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a quarterly devoted to
natural and cultural resources

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on the cover:
Snowshoe hare and Canada lynx.
Photos © Karen E. Hodges and Maggie Purves.

NPS

A boreal forest with a well-developed understory. This habitat is favored by both snowshoe hares and lynx.

FEATURES

DEPARTMENTS

News & Notes


NPS/CHARLES D. RAFKIND

John Varley (left) and Mike Soukup, NPS Associate Director for Natural Resources (right) at the ceremony.

John Varley Wins Director's Award

In March 2005, Yellowstone Center for Resources (YCR) Director John D. Varley accepted the Director's Award for Natural Resource Management for 2004. John was recognized both for recent accomplishments and for the scope of his contributions to the National Park Service (NPS) through the course of his 30-year NPS career.

In 2004, John Varley initiated or led two significant natural resource stewardship initiatives: Yellowstone's Molecular All-Taxa Biodiversity Inventory (MATBI), and the development of the NPS Servicewide Benefits-Sharing EIS. The Yellowstone MATBI represents the first step toward solving one of Yellowstone's thorniest and longstanding resource stewardship issues: despite a century of near-heroic efforts, scientists have still only identified and classified possibly 1% of species in Yellowstone. In this prototype MATBI, bio-samples taken from Yellowstone Lake will undergo nucleic acid extraction and microbial diversity analyses to construct a tree of life that will include bacteria, *Archaea,* microscopic eukaryotes, and small metazoans. This has become John's career signature: take the best elements of a great idea, such as the Great Smoky Mountains ATBI, inject a large dose of the latest, cutting-edge science (in this case, using genetic rather than classic morphological characteristics to classify life forms), and develop a product that is so fresh that it stands to revolutionize the way the NPS carries out its resource stewardship mission.

John also served in 2004 as the co-project leader on the NPS Servicewide Benefits-Sharing EIS, a document that analyzes NPS options to benefit from research conducted in parks. The concept of "benefits-sharing" is new to the NPS, and would allow parks to receive financial benefits if legally permitted research activities become commercially valuable, such as in the case of Taq polymerase, an enzyme derived from a Yellowstone microbe that is an essential component of the DNA fingerprinting process. The Benefits-Sharing EIS could harness the power of science to assist the NPS to meet our mission for resource stewardship and preservation, and to help correct a longstanding disconnect between scientists, entrepreneurs, and park managers. The NPS's course on these issues could have implications throughout the U.S. and in many other nations.

With these accomplishments, John Varley caps his career as an acknowledged leader of resource stewardship within the NPS, a position he has earned by pushing for innovative new resource programs. John has led several remarkable resource initiatives, including restoring the gray wolf to Yellowstone and the northern Rocky Mountains, putting the 1988 Yellowstone fires into an ecological context, and being the primary architect in the 1970s for radical changes in Yellowstone's fishing regulations, many of which have been adopted nationwide. John has firmly established science and research as a foundation for resource management in the park through the creation of the YCR, the organization of the Biennial Scientific Conferences on the Greater Yellowstone Ecosystem, the collaboration between YCR natural and cultural resource staff, and the establishment of a research permit coordinator to serve the park. John has also developed the most aggressive and professional resource publication program in the NPS, which has produced many large milestone reports and books, as well as *Yellowstone Science*.

The thread that runs through all of these accomplishments is John's passion for science and talent for applying scientific solutions to resource stewardship problems. In each of the above cases—and others that range from rare native plants to grizzly bears, bison to Indian wickiups—John has let the science lead the way. He has used it as the most fundamental platform to improve resource preservation, and in doing so has changed public attitudes, enabled the positive evolution of park and Service policies, and facilitated the park's ability to initiate actions to solve real-time resource problems. In the three decades John has been associated with Yellowstone's resources, he has earned a legacy that few will ever claim: he has made a lasting change in the way the NPS conducts resource stewardship.

Errata

In the winter 2005 issue of *Yellowstone Science,* 13(1), the photo of the wolves arriving in the park on page 9 should have been credited to Diane Papineau. The quote attributed to Aldo Leopold on pages 4 and 45 should have been credited to Stanley P. Young and Edward H. Goldman, authors of *The Wolves of North America*. We regret these errors.

YS

Snowshoe Hares in Yellowstone

Karen E. Hodges and L. Scott Mills

ALL PHOTOS COURTESY KAREN E. HODGES

This snowshoe hare is starting to turn from its brown summer coat to its white winter coat.

WHEN PEOPLE THINK of "Yellowstone wildlife," the most immediate images that spring to mind are likely bison, elk, wolves, and bears. But Yellowstone National Park also acts as a haven for scores of other species, some of which are more elusive and rarer than these bigger animals. For example, Canada lynx (*Lynx canadensis*) occur in Yellowstone, but with very low numbers (see article by Murphy et al. in this issue of *Yellowstone Science*). Canada lynx were listed as threatened under the Endangered Species Act in 2000, and researchers across the country began more intensive work on them as the listing was developed. Because historic records showed that lynx occurred in Yellowstone, park biologists wondered how many lynx the park could support. Lynx are specialist predators on snowshoe hares (*Lepus americanus*), and it is clear from previous research that insufficient hare densities mean no lynx. We therefore initiated snowshoe hare studies in Yellowstone, in part to assess what the prey base was for lynx.

In undertaking this research, we were basically asking one of the fundamental questions in ecology: what determines the distribution and abundance of a species? Prey species, like snowshoe hares, can respond to physiological limits (e.g., climate variables), food abundance, presence of competitors, and predator abundance. In Yellowstone, we knew snowshoe hares occurred; people saw them periodically, and the presence of lynx was another sure indicator. But we knew nothing about what habitats snowshoe hares used in the park, how abundant they became in the best habitats available, or what factors were shaping where they occurred. We knew from previous research, by ourselves and others, that snowshoe hares respond strongly to understory structure; they like dense cover close to the ground or snow surface. Dense understory is even better when accompanied by reasonably thick overstory cover. Given the dramatic fire history of Yellowstone, we speculated that some of the stands regenerating after the 1988 burns would be good for hares: the dense, regenerating trees could provide

excellent understory cover, and in some places the trees were getting tall enough to impair hunting raptors.

Our goals with this research were therefore simple: we wanted to identify where snowshoe hares were in Yellowstone, how large their populations were, and whether areas regenerating after the 1988 fires provided good habitat for them. In 2004, we were provided with another opportunity to address the impacts of fire on snowshoe hares. The large East Fire in 2003 burned three study areas that we knew had contained hares during our previous surveys. We re-sampled these areas in 2004 to find out whether snowshoe hares persisted there immediately after the fires.

Our results clearly show that snowshoe hares are uncommon in Yellowstone.

We also wanted to address some of the temporal dynamics of snowshoe hares in Yellowstone. In the northern forests of Canada and Alaska, snowshoe hares have stunning population cycles every 10 years, with peak abundances dramatically higher than low abundances. Researchers still are not certain whether snowshoe hares cycle in southern portions of their range, like the Rocky Mountains and Yellowstone. So far, we have three years of data on snowshoe hares in Yellowstone—too short to answer the cycle question definitively, but a good start along the way.

We approached our questions with a mixture of field techniques. We used some live-trapping with mark/re-capture estimation, one of the best methods for estimating densities of small mammals. We also used pellet counts—that is, surveying a forest stand by counting all snowshoe hare pellets on 50 to 100 small rectangular patches of forest floor. Our other work in Yukon Territory and Montana, as well as work by other research groups, has shown that pellet counts provide a pretty good indicator of snowshoe hare relative abundance in different forest types. These pellet surveys are fast and easy compared to trapping, enabling us to sample many more stands than we could with trapping alone. During the three years we have surveyed so far, we sampled some locations in each year to get an idea of how snowshoe hare populations change with time, and sampled many areas once only, to see how hares are distributed.

We chose to survey a variety of stand types across the entire park. Because biologists have been studying snowshoe hare habitat use for a century, we were able to immediately target the most likely sites. Areas with well-developed understories (e.g., saplings, shrubs) typically have the most hares, and mature forests with well-developed canopies also usually support snowshoe hares. Good bison habitat was out of the picture for hares: open forests and meadows are simply not used by this forest-dwelling herbivore, so we did not need to sample there. We used Yellowstone's GIS maps of habitat types to select lodgepole pine stands of differing stages, ranging from the stands regenerating after the 1988 burns to mature stands with lodgepole understories. We also targeted forest stands containing Engelmann spruce and subalpine fir, because there was some speculation in the literature that hares would prefer these more boreal trees to the lodgepoles.

Our results clearly show that snowshoe hares are uncommon in Yellowstone. The highest densities we recorded were less than one hare per hectare; densities above 0.5 hares per hectare were rare in the park. There was no evidence of snowshoe hares in the majority of the stands we surveyed. In our

All of these areas burned in the 1988 fires. Fire severity and regeneration patterns are very different. The center picture is of a site with one of the highest snowshoe hare densities seen in Yellowstone.

Snowshoe hares are more likely to use stands with boreal characteristics.

first year, we trapped in 13 large stands, and caught snowshoe hares in only four of them—for a total of 13 animals. In contrast, when we did similar trapping in northwest Montana in the same year, we caught over 250 individuals, and had some stands with hare densities of two to three hares per hectare. The snowshoe hare pellet surveys confirmed this picture of Yellowstone. Over half of the more than 60 stands surveyed had no pellets or only one pellet present. Only six stands had enough pellets to indicate a reasonable resident hare population. Even on these best plots, the pellet counts were quite low, reflecting small numbers of hares. Yellowstone simply is not good snowshoe hare country.

So where do we find snowshoe hares in Yellowstone? We divided our sites according to whether they had fewer or more than five pellets present per survey. This pellet count value is quite low, corresponding to hare densities of roughly one every ten hectares. Below this number, we suspected that hares may have been traveling through a habitat but were not resident. Hares can produce 400 to 700 pellets per day, so when we sampled a 20-hectare area and found fewer than five pellets, it means hares basically aren't using the stand. In Figure 1, we show that the more boreal habitat types of spruce-fir and LP3 (a mixed canopy of lodgepole, spruce, and fir) were the most likely to have snowshoe hare pellets present. In contrast, only a quarter of the lodgepole-dominated young stands that were either regenerating after the 1988 fires (LP0) or that had a lodgepole canopy and understory (LP2) had reasonable evidence of snowshoe hares. Snowshoe hares are more likely to use stands with boreal characteristics.

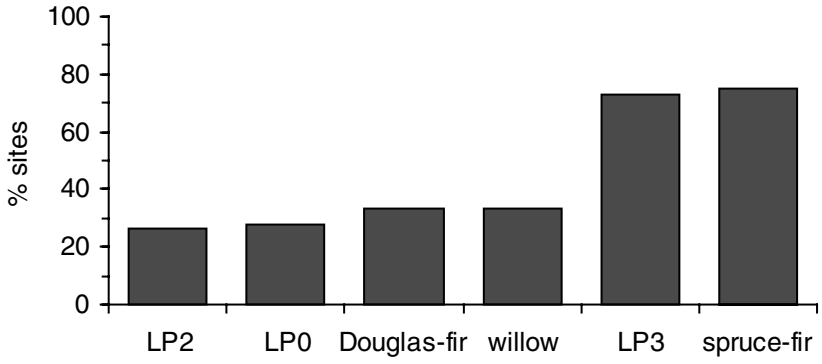

Figure 1. The percentage of each habitat type with more than five snowshoe hare pellets per survey (i.e., >0.06 pellets/plot). LP is lodgepole. LP0 sites are stands regenerating after the 1988 fires. LP2 stands have a canopy of lodgepole with some understory trees. LP3 has a mixed canopy of lodgepole, spruce, and fir. "Willow" refers to three riparian areas we sampled, one of which had some pellets; the other two did not.

The photos above and right show a mature stand before and after the 2003 East Fire.

We obtained a slightly different view of what makes the best Yellowstone habitats for snowshoe hares when we considered the stands where we trapped snowshoe hares or where we observed the highest pellet counts. We caught the most hares on an LP0 site near Madison Junction and on an LP2 site near the South Entrance—a pattern that held true for all three years of trapping. For pellets, our top six sites—which were substantially better than all the rest—were a Douglas-fir site, two post-1988 regenerating stands, two LP2 stands, and one LP3 stand. These sites were scattered throughout the park, from the Gallatin Mountains to the East Entrance, meaning there is not a cluster of good sites in the park. Pellet counts on these sites ranged from 0.47 pellets per plot to 1.44 pellets per plot, which corresponds roughly to hare densities of one hare per four hectares to one hare per 1.5 hectares. We think these stands support the highest hare densities we have seen in Yellowstone because they have some of the best mix of understory and overstory cover; we are currently analyzing our data on vegetation structure in more detail. Curiously, no spruce-fir stands made it into our top list of sites, even though three quarters of the spruce-fir stands we sampled had more than our cutoff of five pellets.

So far, there are no clear temporal patterns for the sites we sampled in all three years. Some sites stayed constant from year to year, while others showed slight year-to-year variation in the pellet counts. Our trapping data have also not shown any clear patterns through time. These data do not yet allow us to distinguish whether hares cycle in Yellowstone or not, because even in populations that cycle dramatically, there can be two-to-four year periods with little change in numbers.

Our results from the sites that burned in the 2003 East Fire are clear. We surveyed three stands (Douglas-fir, spruce-fir, and an LP3) in 2002 and prior to the fire in 2003. All three had high pellet numbers before the fire; indeed, the Douglas-fir stand showed our third-highest pellet count in Yellowstone. The 2003 fire burned all of these stands completely, leaving no green vegetation. In 2004, unsurprisingly, none of these sites had any sign of snowshoe hares.

Our work in Yellowstone has confirmed the general pattern of snowshoe hare habitat studies from elsewhere, in that dense stands are much more likely to support hares than open stands. We were surprised to find that snowshoe hare densities were so very low. Even the best stands we have found in Yellowstone support far fewer hares than can occur further north in the Rockies (i.e., our Montana sites) or in the truly boreal forests of Canada and Alaska.

We think snowshoe hares in Yellowstone are probably quite mobile, for two reasons. First, we found some snowshoe hare pellets in almost all of the locations that had reasonable understory cover, which suggests that snowshoe hares are able to colonize these sites even if they are surrounded by very poor habitat types. Second, about a quarter of our sites had one to four pellets present, suggesting a snowshoe hare had been there, but likely did not stay for long. Snowshoe hares in Yellowstone may therefore be behaviorally different than hares that live in better habitats.

Our data about snowshoe hares' response to fire indicates quite clearly that fire initially destroys habitat, and that the regeneration pattern is the key ingredient for whether snowshoe hares will use a burned area or not. A substantial proportion of the stands burned in 1988 have regenerated with low tree densities. These stands are essentially useless for snowshoe hares and, we suspect, will remain useless until a canopy has formed with a second story underneath. For now, the trees are simply too thin on the ground. In contrast, regenerating stands where saplings form fairly continuous cover (e.g., branches are touching and trees are reasonably tall) are currently supporting some of the highest hare densities we have observed in Yellowstone. These stands are certainly good now, but we are not sure how long they will remain of high quality. As the trees increasingly compete with each other, loss of lower branches and the deaths of some saplings may make these stands less and less appealing to snowshoe hares. This process will take years or decades, however, and hares may well start to find other good habitats as these decline.

What do these patterns mean for lynx? The most obvious implication is that Yellowstone is unlikely to support large lynx populations. Even the snowshoe hare hotspots had very few individual hares in them, so any lynx present in the park probably have to travel widely to find prey consistently. Still, a wide range of places had hare pellets within them, so a traveling lynx might encounter a snowshoe hare that was also traveling to find better habitat. We suspect that lynx in Yellowstone may make more use of alternative prey (e.g., squirrels, grouse, maybe even carrion) than do lynx in areas with many more hares.

YS

Dr. Karen E. Hodges is an assistant professor of conservation biology at Okanagan University College in Kelowna, British Columbia. **Dr. L. Scott Mills** is a professor of wildlife biology at the University of Montana.

Between them, they have researched snowshoe hares for over 15 years, and worked on the population dynamics and habitat use of small mammals for over 35 years. They have been studying snowshoe hares in Yellowstone since 2002.

The Elusive Canada Lynx

Surveying for Yellowstone's Most Secretive Threatened Carnivore

Kerry Murphy, Tiffany Potter, James Halfpenny, Kerry Gunther, Tildon Jones, and Peter Lundberg

CINDY MERNIN

This rare photo of a Canada lynx in Yellowstone National Park was taken near the Lake Hotel by Cindy Mernin, who saw the cat or its tracks various times in that area during 1971–75.

YELLOWSTONE National Park visitors who have seen gray wolves and grizzly bears roaming park wildlands can justifiably consider themselves fortunate. Luckier still are those who have seen one of the some 30 cougars that traverse the park's rocky haunts. But the crowning jewel of a Yellowstone mammalogist's list is the Canada lynx (*Lynx canadensis*), owing to its affinity for heavy forest cover, rareness, mystique, and adaptation to deep snow.

Among the three wild felids that reside in the park—Canada lynx, bobcat (*Lynx rufus*), and cougar (*Puma concolor*)—the lynx shows the most morphological specialization. Adult bobcats and lynx are similarly sized at 8–14 kg, and both have a short, bobbed tail, ear tufts, and a prominent facial ruff. However, the lynx has longer legs than a bobcat, and the rear legs of a lynx appear longer than its front legs, lending a stooped appearance. Lynx feet can be larger than a cougar's, and twice the size of a bobcat's. These adaptations allow lynx to exploit habitats with deep, uncrusted snow.

The lynx is primarily associated with boreal forests in Canada and Alaska. In the U.S. Rocky Mountains, the species occurs in cool, moist, coniferous forests, including boreal forests that extend as peninsulas into the continental U.S. or occur as discrete islands. These environments typically support heavy snowpack and snowshoe hares (*Lepus americanus*), the lynx's principal prey. Snowshoe hares require dense conifer or deciduous shrub thickets for food and cover from predators. In suitable habitats in Canada and Alaska, snowshoe hare populations fluctuate up to 25-fold over 8–11 year periods. In the continental U.S., snowshoe hares likely cycle much like their northern counterparts, except that peaks and lows of hare abundance in the south are not as great as in areas north of the U.S.–Canada border. Consequently, lynx in the continental U.S. do not appear to show strong fluctuations, and their life history characteristics are similar to those of lynx populations at northern latitudes during the low periods of the hare cycle.

In 2000, the lynx was federally listed as a threatened species in the conterminous U.S., primarily because national forest plans lacked adequate regulatory mechanisms to protect the species. Sightings information from Yellowstone National Park files, the U.S. Forest Service, state wildlife agencies, and other sources suggest that the lynx has always existed in the Greater Yellowstone Ecosystem (GYE).

Very little is known about the historic numbers and distribution of lynx in Yellowstone. Early writers dating from the late 1800s noted that lynx were present, but their estimates of parkwide numbers were highly subjective and varied widely, ranging from "about 10 individuals" to "quite common." The park archives contain several reliable photos of lynx, and the Smithsonian Institution in Washington, D.C., contains a single skull, dated 1895. Park files contain records of 73 direct or indirect (tracks) observations of lynx made by park visitors or employees from 1887 to 2003. In addition, there are 34 references to lynx (tracks or direct observations) in ranger logbooks found in the Yellowstone National Park archives, dating 1895–1926, including references to at least six individuals trapped or shot in the park. Collectively, Yellowstone historical records suggest a parkwide distribution. However, sightings data are difficult to interpret—lay park visitors and untrained park staff may misidentify look-alike species, such as bobcats, and have difficulty correctly distinguishing lynx tracks from those of cougars.

Recent threatened status for lynx and lack of survey data in the park underscored the need for basic information on this

ecologically and aesthetically important species. Inventory data are essential to avoid adverse effects of park management activities, such as road reconstruction, and to support joint conservation planning efforts among federal and state agencies. In response to the dearth of information, we undertook a parkwide survey from 2001 to 2004 with the objective of documenting lynx distribution in the park.

Identifying Lynx Habitat

We began by identifying areas in the park most likely to support lynx, i.e., prime habitats (PH)—a recommendation of biologists we consulted who had lynx survey experience. This approach allowed us to direct more search effort to where we thought lynx and their prey might occur, and avoid spending time in marginal habitats.

We identified PHs based on their potential to support snowshoe hares using the scientific literature, advice of experts, our own experience, and cover types described and digitally mapped in the park (Figure 1). We classified PHs as high quality: Engelmann spruce (*Picea engelmannii*), subalpine fir (*Abies lasiocarpa*), and lodgepole pine (*Pinus contorta*) stands in climax, late, middle, or pygmy (wind-blown and snow-free) successional stages, and riparian shrubfields; medium quality: stands listed above that were mixed with non-forest areas; and low quality: aspen (*Populus tremuloides*) stands, and mixed whitebark pine (*Pinus albicaulis*), Douglas-fir (*Psuedotsuga menzeisii*), and selected other lodgepole pine stands. Lodgepole pine stands in early successional stages, typically supporting trees of less than 180 cm in height, that regenerated on sites burned between 1977 and the present, were eliminated as PH because snowpack typically reduced horizontal and vertical cover available to snowshoe hares. This category included Yellowstone forests burned in 1988. We also eliminated the park's northern winter range, because researchers conducting cougar population studies had already surveyed it for felids from 1987 to the present. We did not survey in grasslands, talus fields, or krummholz (stunted forest at treeline), because they lacked abundant cover.

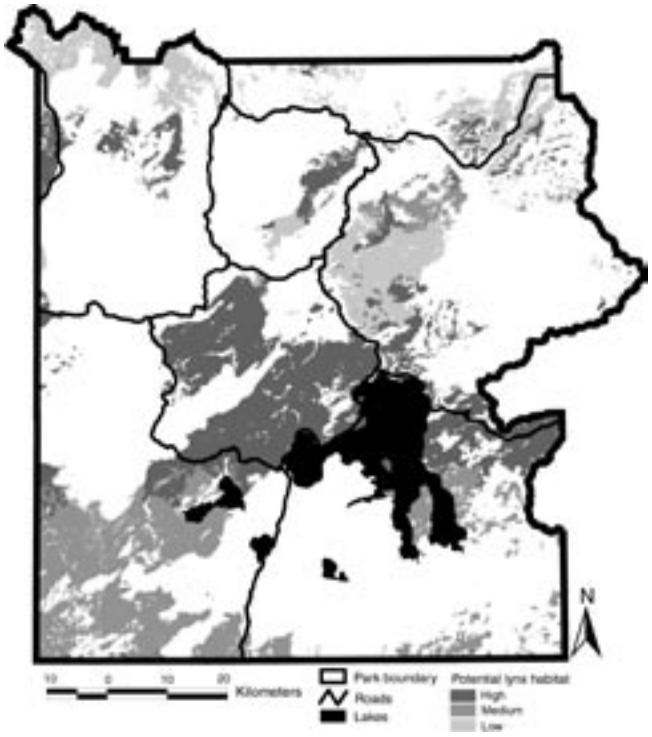

Figure 1. Prime habitat (PH) for lynx identified in Yellowstone National Park, 2001–2004. See text for basis of classifying PH.

Detection Methods

We used two methods to detect lynx: snow-tracking surveys conducted in winter on skis, snowmobiles, and from airplanes; and hair-snare surveys conducted in the summer. Because lynx tracks might be confused with bobcat or cougar tracks, personnel received six hours of classroom and field instruction annually on the identification and documentation of lynx sign and data collection procedures. As part of the training, we identified tracks and other lynx sign in northwest Montana, where lynx are radio-collared in a research project managed by


NPS/JUSTIN HADWEN

Lynx tracks at a walking gait, travelling through a spruce forest, a typical habitat for this cat in the northern Rockies.

the Rocky Mountain Research Station (U.S. Forest Service). Project personnel also received training on deployment of hair snares and data collection prior to the summer field season.

For winter work, we identified geographic sectors of the park based on their characteristic range of elevation, soils, and overstory vegetation (Figure 2). Starting locations of 33 snow-tracking surveys, all in PH, were chosen based on their accessibility to park roads or ski trails and the absence of avalanche hazards (Figure 3). Surveys were classed as "formal" or "informal," based on the timing of recent snowfall and type of data that were collected. Formal surveys were conducted at least 12 hours after a snowfall, but only tracks left within the last 24 hours of the survey were tallied. The 12-hour rule was designed to allow tracks to accumulate following the last snowfall; the 24-hour rule ensured that counts of tracks would be limited to short, standardized time periods. The formal data we recorded included information on rare carnivore tracks, such as those of lynx or wolverine (*Gulo gulo*) and other common carnivores such as coyotes (*Canis latrans*), tracks of their prey (e.g., snowshoe hares), cover types, and snow-tracking conditions encountered along transect segments. Informal surveys were conducted when the 12-hour rule precluded a formal survey, or when we prioritized transect distance over detailed survey data. Backcountry rangers who were trained in track identification often conducted informal surveys. To increase snow-tracking effort, we also used snowmobiles to conduct formal and informal surveys along groomed park roads, a technique used by biologists from the Montana Department of Fish, Wildlife and Parks, to monitor forest carnivores. Finally, we used airplanes and helicopters to survey very remote PHs for lynx tracks, a technique used in Alaska. Flights occurred at least 24 hours after a new snowfall. When feasible, we landed helicopters to examine and document tracks of rare carnivores.

We recorded standard information such as UTM location, time, habitat characteristics, and weather and snow conditions where sign of lynx or other rare carnivores was encountered. Tracks of carnivores were documented using measurements, plaster casts, and photographs. We also collected hairs along tracks and from bed sites and stored them in vials for DNA-based identification at the Carnivore Conservation Genetics Laboratory at the University of Montana, Missoula. The reliability of rare carnivore tracks was rated as "definite" if the species' identity was verified by DNA tests and all gait patterns and print measurements were supportive of lynx presence; "probable" when nearly all gaits and prints were supportive, but some aspects of tracks were non-interpretable and/or non-supportive (no usable DNA); and "possible" when most interpretable evidence suggested lynx presence, but details of prints or gait patterns were consistently unclear (no DNA). We collected scats for DNA-based species identification and to identify prey items.

During four winter seasons, we completed 103 formal snow-tracking surveys ranging from 1 to 23 km in length, totaling 563 km, and 136 informal surveys ranging from 0.4 to 90 km in length, totaling 1,051 km (Figure 4, pg. 12). Combining formal and informal data, surveys totaled 1,614 km over four winters. Surveys were widely distributed across park sectors and occurred under uncrusted snow conditions

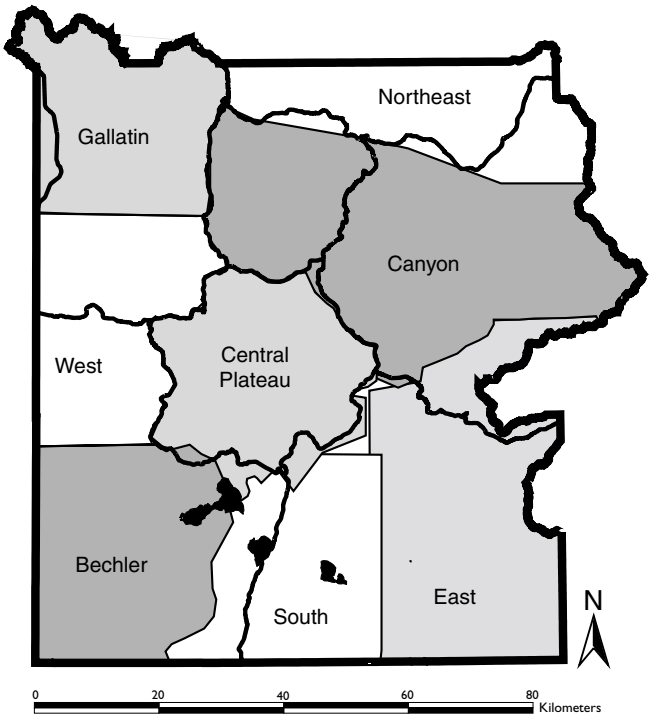

Figure 2. Canada lynx habitat sectors, Yellowstone National Park.

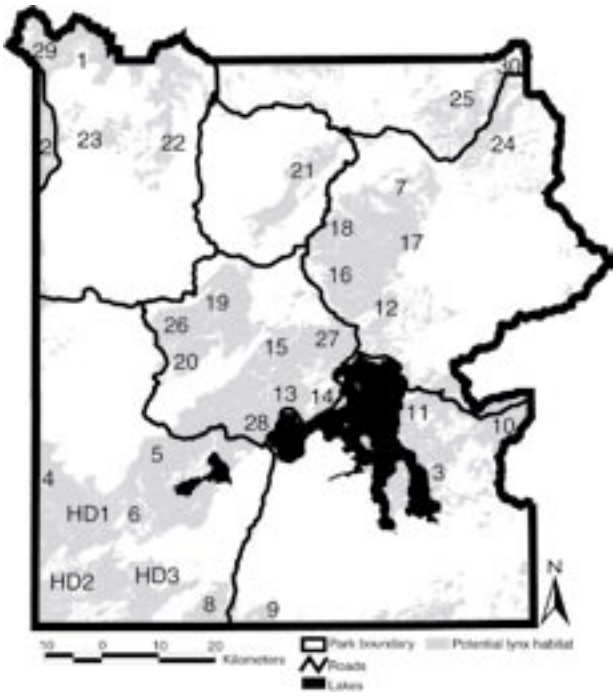

Figure 3. Locations (starting points) of ski-based snow-tracking surveys, Yellowstone National Park, 2001–2004. HD sites are locations of helicopter drops.

that consistently revealed animal tracks. As the study progressed, we decreased snow-tracking efforts in the Bechler sector after encountering little snowshoe hare sign, but increased efforts in the East sector, attempting to re-verify lynx first detected during winter 2001. During 2004, we focused nearly all winter effort there, attempting to document lynx numbers and their sex and age characteristics. We also completed 41 snowmobile-based surveys totaling 749 km, and six in aircraft totaling 693 km.

To detect lynx with hair snares, we used two approaches for establishing sets of hair sampling stations, called "transects," across the landscape (Figure 5, pg. 12). First, we deployed transects on a single, 14×14-mile grid (196 mi^2) located on the east side of Yellowstone Lake, following the guidelines of the National Lynx Detection Protocol (NLDP), developed by the U.S. Forest Service in the late 1990s. Transects were spaced at 3.2-km intervals and consisted of five stations spaced at 100-m intervals. Stations contained a hair snare nailed to a tree 46 cm above the ground, with visual (aluminum pie plates) and scent lure attractors (beaver castor oil and other ingredients) hung from nearby tree limbs. Hair snares consisted of a 10×10-cm square of carpet containing nails inset to snag and hold animal hairs, such as those of cheek-rubbing lynx; a scent lure; and dried catnip, a common attractant for cats. Stations were deployed, and then checked twice at two-week intervals for visits by animals. Hairs were collected from the hair snare, the tree supporting (or trees growing near) the snare, or from the ground, and then stored in a vial with desiccant for subsequent identification based on visual (dissecting scope) exam of hair follicles or DNA-based techniques. All survey materials, including nails and flags, were removed from the field following the second check for hairs. The grid was deployed from early summer to early fall, 2001–2003. Because some of the transects occurred in remote areas and could not be maintained

(continued page 12)

Conservation Challenges of Managing Lynx

by John R. Squires

Yellowstone National Park is hallowed ground when it comes to wildlife in America. The very word "Yellowstone" conjures up images of grizzly bears digging tubers, bands of elk dotting the landscape, and gray wolves pursuing elk along the Lamar River. However, Yellowstone also provides habitat to one of the rarest cats in the continental United States: the Canada lynx (*Lynx canadensis*). The image of lynx stalking the forests of Yellowstone is absent from most people's minds because the cat is rarely observed and its life history is poorly understood in and around the park.

In March 2000, the U.S. Fish and Wildlife Service (USFWS) listed *Lynx canadensis* as a threatened species in the contiguous U.S. under the Endangered Species Act. The USFWS concluded that management actions of federal agencies may threaten lynx or their habitat, and that inadequate regulatory processes were in place to address the species' needs. The listing of lynx as a threatened species requires that federal agencies consider how their management actions may impact lynx populations. This often places land managers in the difficult position of having to assess how their activities may impact lynx based on limited information concerning the species' ecology and management needs.

A fundamental need when managing lynx and other rare wildlife is to understand historical changes in a species' distribution. Biologists are far less concerned when a species' distribution is characterized by well-connected groups of individuals with expanding population numbers as compared to few individuals in highly fragmented groups. Thus, understanding any recent changes in the distribution of lynx is important to their conservation. Accomplishing this task is difficult, given the cat's highly secretive nature, large home ranges (about 200 km^2 for males and 90 km^2 for females), and low densities (Squires and Laurion 2000). Biologists confront this difficult issue by applying several different research tools.

Archival and library research of lynx trapping records, observations, and museum specimens from the late 1800s to the present documented that lynx were present in 24 states. The greatest number of detections (>20 detections each) were in Idaho, Maine, Michigan, Minnesota, Montana, New York, Washington, Wisconsin, and Wyoming (McKelvey et al. 2000). Lynx were documented in 10 states as late as the 1990s. These results suggested a widely distributed population. However, recent snow-tracking and hair snagging studies indicate that lynx populations are fairly restricted in the western U.S. Western populations (areas with documented reproduction) are currently found in three regions: northwestern Montana, north-central Washington, and in the Greater Yellowstone Area (GYA).

The GYA supports the southernmost, non-introduced population of lynx in the U.S. Lynx from Canada were recently reintroduced in Colorado, and some of the reintroduced females produced kittens last year. This bodes well for lynx in Colorado, but it is too early to tell whether the reintroduction will result in a persistent population. In the Midwest, biologists thought that lynx were extirpated from Minnesota by the 1990s, but recent sightings, DNA evidence (scats and hair samples), and radio-telemetry studies have documented that lynx are back in the northern portion of this state.


CINDY MERNIN

Lynx tracks in Yellowstone near the Lake Hotel, winter 1973–74.

Hopefully, ongoing surveys throughout the region will document if lynx expand their range to neighboring Midwestern states. The easternmost population of lynx in the contiguous U.S. resides in northern Maine. Little is known regarding the number of individuals that are present in the native populations in the contiguous U.S. However, these populations may support few individuals (Aubry et al. 2000).

We know from basic principles of conservation biology that small, relatively isolated populations are generally at greater risk compared to large, contiguous populations. Thus, it is important to know how lynx populations interconnect. Genetic similarities among lynx from Alaska, Canada, and Montana suggest that individuals move throughout this northern region (Schwartz et al. 2002). This notion is supported by trap records indicating that lynx populations in the contiguous U.S. may be periodically augmented by animals from Canada (McKelvey 2000). However, we do not understand the extent of this potential augmentation.

The GYA is the only place in the contiguous U.S. that apparently supports a lynx population that is not immediately adjacent to the Canadian border. There are currently too few genetic samples or trap records from lynx in the GYA to rigorously evaluate the relationship of these animals to other populations. The GYA may be large enough to support a persistent population in relative isolation, or there may be interchange from populations in Montana and Canada.

Bob Oakleaf, of the Wyoming Game and Fish Department, first radio-collared a male lynx that became known as "George" in 1997. Oakleaf's goal was to shed light on the movements of lynx in the GYA and to better understand their habitat use patterns. In 2001, staff from the wildlife unit of the Rocky Mountain Research Station, located in Missoula, Montana, helped Oakleaf replace George's conventional collar with a satellite transmitter that could better document his movements throughout the region. In May 2002, George left his home range and traveled across the Wind River Range, the Teton Wilderness area, and Yellowstone National Park. He continued his northwesterly journey as far as the Henry's Lake Mountains on the Montana/Idaho border before returning in early autumn to his home range near Big Piney, Wyoming. His return route followed the same general route he had taken in early summer. George's summer-long trip was over 728 km in length!

Although George was only a single individual, his broad-scale movement demonstrated that lynx could traverse the entire GYA. The role that long-distance movements play in maintaining lynx in the GYA is unknown, but they may play an important role in maintaining a lynx population that is disjunct from the Canadian border.

Lack of basic ecological information is a major impediment to lynx conservation and recovery. Lynx differ from many other threatened or endangered species that have clear, well-defined management needs. For example, organo-chlorine pesticides caused eggshell thinning in peregrine falcons; banning the use of these chemicals was a clear management need. However, we know very little about the life history of lynx, including how human-caused actions may contribute to their rarity. We also know little regarding their broad-scale movements, habitat preferences, mortality factors, and population trends. Ongoing research projects in Montana, Minnesota, Maine, and Colorado are beginning to address some of these key information gaps. Carnivore surveys, such as the recent effort led by Dr. Kerry Murphy in Yellowstone National Park, are also vitally important to further delineate the species' distribution. However, much additional work is needed before lynx can be conserved based on solid, empirical data. Thus, researchers and managers, working together, play key roles in providing the necessary research and management to ensure that lynx will continue to stalk the forests of Yellowstone National Park.

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simultaneously, we stratified transects by watershed and subsampled the grid at different times each summer. Logistical constraints or closures due to wildfires precluded access to some transects during summers 2001 and 2003.

To sample PHs outside this grid, we deployed transects in seven other areas of the park. Transect and station sites were chosen subjectively based on vegetation, topography, and logistical constraints. In this effort, we used 1–10 transects with 2–11 stations per transect, with the same lures. Informal surveys also often occurred over only two weeks and only during a single summer.

We annually deployed and revisited 21–35 hair snare transects (105–175 stations) on the east side of Yellowstone Lake following the NLDP, collecting 336 total samples, analyzing 197 using DNA-based techniques, and identifying 108 to species. We also deployed from 1 to 10 transects at six "subjective" survey sites in 2002, and four in 2003, collecting 174 total samples, analyzing 166, and identifying 77 to species.

Detections of Lynx

We confirmed three lynx detections with DNA evidence, all on the east side of Yellowstone Lake (Figure 6): a female in summer 2001 (NLDP, female DNA); a female accompanied by a male kitten in winter 2003 (skis; DNA of a male lynx that was a kitten, based on the size of its tracks, alongside a set of far larger lynx tracks); and an adult male in winter 2004 (skis; male DNA). Four probable detections were made, including a female accompanied by one kitten on the east side of Yellowstone Lake (a separate finding from the pair cited above). Four possible tracks, including two observed from a helicopter, were also found. Three lynx scats we collected contained remains of snowshoe hares (hair, bones, and claws) or snowshoe hare stomachs (e.g., lichens). Lynx DNA was present in each scat. We detected nearly all other small, medium, and large carnivores known to occur in the park. We found wolverines in three park sectors, but no fisher (*Martes pennanti*).

Lynx have persisted across the 133-year history of the park, apparently without any significant period of extinction.

Status and Distribution of Lynx in the Park

Based on our survey, it appears that lynx have persisted across the 133-year history of the park, apparently without any significant period of extinction. However, the species is limited in distribution, occurring in the best habitats only. Our cumulative detections from 2001 to 2004 likely represented at least four individuals, including two kittens born in two different years. The presence of offspring indicates that resident, breeding individuals were present—an important finding, because lynx reproduction has not been previously documented in the park, and rarely in the GYE. As in most carnivores, reproducing lynx females are typically resident (i.e., have well-established home ranges), as opposed to being nomadic.

The distribution of lynx was largely restricted to the East

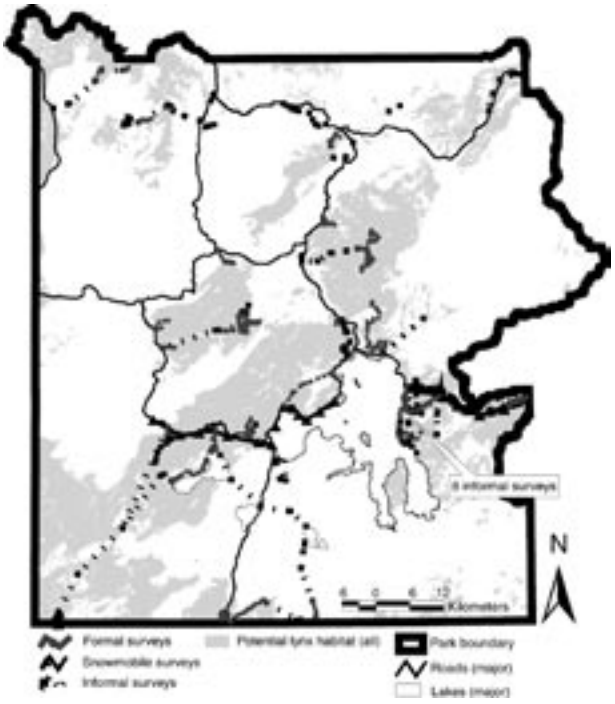

Figure 4. Snow tracking surveys, Yellowstone National Park, 2002.

Figure 5. Hair snare locations in Yellowstone National Park, 2001–2003.

and possibly the Central sectors of the park. We did not detect this cat in other parts of the park, but lynx could have occurred, with low probability, in the marginal habitats (e.g., new burns, grasslands) that we did not survey. Also, our detection techniques did not detect individuals with certainty, regardless of location, so some could have occurred outside the East and Central sectors as well.

The distribution of our lynx detections was generally consistent with our snow-tracking data that suggested the highest densities of snowshoe hares also occurred in the East sector. This portion of the park is dominated by andesitic soils that exceed other park soils in moisture-holding capacity and nutrients. Andesitic soils better support the subalpine and Engelmann spruce forests and thick understory vegetation that provide the horizontal and vertical cover needed by snowshoe hares. Also, growing conditions for boreal forest habitats within 100 m of Yellowstone Lake may be enhanced by fine soil materials (clay-sized particles) deposited in terraces that were formed in response to historic fluctuations in the lake level. Frequent storms create conifer windfalls along the lakeshore, breaking up the forest canopy and encouraging a denser understory that attracts snowshoe hares.

The explanation for our few observations of lynx in Yellowstone likely stems from poor habitat conditions for its primary prey, the snowshoe hare. Although the extensive, cold, boreal forests that characterize snowshoe hare habitat in the Canadian Rockies and Alaska extend southerly into the U.S. Rocky Mountains, forests here are fragmented when considered at a broad spatial scale, and limited to sites with optimal (high) elevation, adequate soil moisture and nutrients, and shady aspects. In particular, the central and western portions of Yellowstone are dominated by well-drained, nutrient-poor

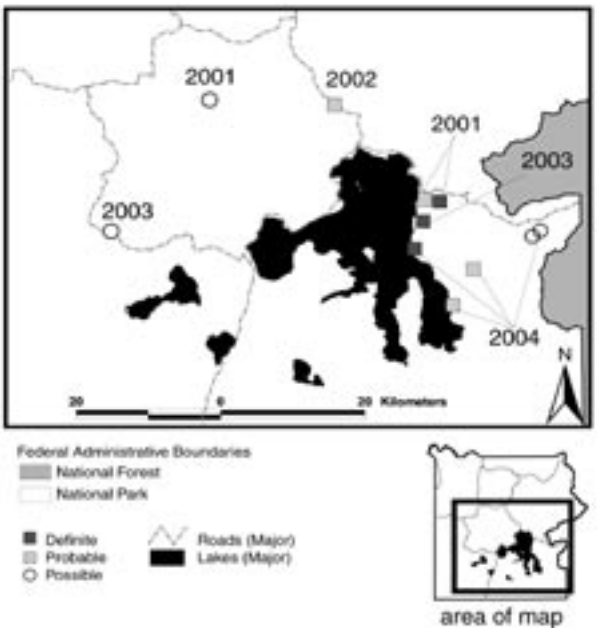

Figure 6. Lynx detections in Yellowstone National Park, 2001–2004.

NPS PHOTOS/TIFFANY POTTER

Hair snares are nailed to a tree 46 cm above the ground, in hopes of snagging hairs from cheek-rubbing lynx.

A hair snare that has been chewed, likely by a bear. It is made of carpet with inset nails to snag and hold animal hair, and contains a scent lure and catnip.

Aluminum pie plates are used as visual lures at hair snare sites. This plate was also chewed.

rhyolitic soils of recent volcanic origin that primarily support lodgepole pine. In mature forests, these soils provide for poor growth of understory cover, and open, park-like conditions prevail—to the detriment of cover-seeking snowshoe hares. Our companion prey studies (see article by Hodges and Mills in this issue of *Yellowstone Science*) indicate that the mature montane and boreal forests of the park typically support few, if any, snowshoe hares. Sparse conifer regeneration and woody debris often provide the only understory cover available. Consequently, we expect low numbers of lynx in the park. Although lynx food habits typically include other common prey (e.g., red squirrels, *Tamiasciurus hudsonicus*; voles, *Microtus sp*.), lynx do not appear to thrive where their winter diets consist primarily of these alternatives.

Lynx trapping and shooting in the park during the late 1800s and early 1900s may also help explain our few observations of lynx from 2001 to 2004. Human-caused deaths in the park, GYE, and northern Rockies likely reduced lynx populations, leaving few individuals to reproduce and repopulate vacant habitat. Park records of early gray wolf and cougar kills by trappers and control agents during the early years of management as a national park suggest that those losses profoundly affected the abundance of these large carnivores. Although the historical abundance and number of lynx removed from the park is unclear, it is possible that lynx numbers were considerably higher than present, and that removals were an important factor in the present-day levels we see.

Lynx Numbers in the GYE

Our scant lynx detections in the park were consistent with the few DNA-based detections by local U.S. Forest Service personnel and conservation organizations that have used similar methods in attempts to locate lynx (Figure 7). Of approximately 14 widely-distributed hair snare grids deployed in the GYE from 1998 to the present, lynx were detected in only six grids, in three portions of the ecosystem. In addition, although snow-tracking surveys have been completed in most units, DNA-based detections were made in only three. Lynx clearly occur in the GYE, but as in the park, they appear to be limited in distribution.

How Might Lynx Persist in the GYE?

How lynx manage to persist despite a spotty presence in the GYE is an important, unanswered question for managers. Because of our limited information on the lynx, we can only speculate on how it survives. Hodges and Mills have recently begun documenting relationships between forest succession, forest structure, and snowshoe hares in the park. Their data show that although a majority of forest stands in Yellowstone, regardless of age, support no hares, some widely-dispersed patches retain sufficient cover to support an abundance of hares (albeit in low numbers relative to those of northern latitudes). Through high mobility, lynx may be able to exploit these patches sufficiently well to establish home ranges, and even reproduce successfully to a limited extent. The two cases of lynx reproduction we documented may serve as cases in point. We know from the scientific literature that lynx are capable of long-distance movements, motivated by an apparent desire for exploration, emigration from home ranges due to declines in prey, and dispersal among newly-independent offspring. Perhaps this high capacity for long-distance travel also extends to efficient exploitation of widely dispersed patches of snowshoe hares. Reliance on alternate prey during winter may also help explain lynx persistence in the ecosystem. Indeed, the scientific literature indicates that during periods of hare population lows at northern latitudes, and during the summer and fall seasons, lynx increase their use of alternate prey.

Finally, linkages with other populations may explain lynx persistence in the GYE. Distant populations, perhaps even those as far north as northwestern Montana, Alberta, or British Columbia, may provide, through dispersal, new recruits that augment numbers here. Lynx numbers appear to increase, sometimes rapidly, in the contiguous United States after their populations reach high levels north of the U.S.–Canadian border, and then begin to decline. Scientists hypothesize that lynx

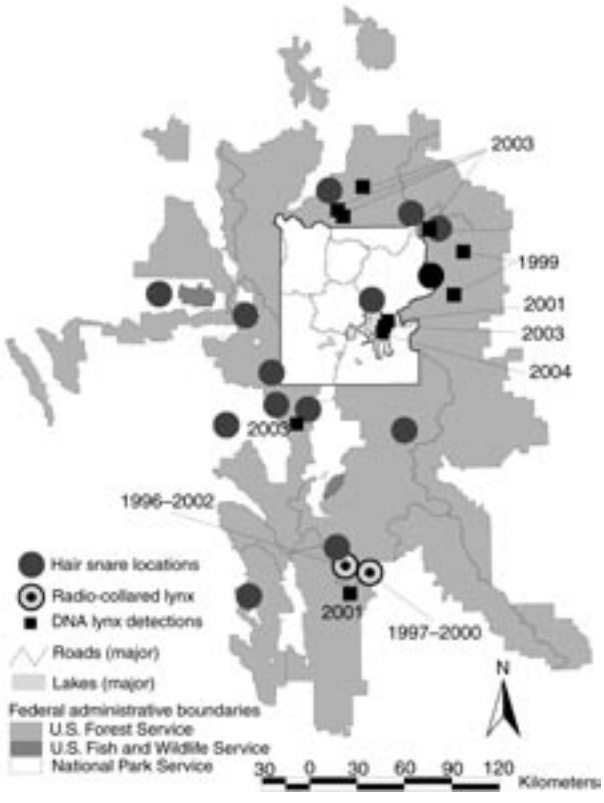

Figure 7. DNA-based detections of lynx using hair snares, snow tracking, or captures for research in the Greater Yellowstone Ecosystem, 2000–2004. Data from Squires et al. (2003) and courtesy of the Gallatin, Caribou-Targhee, and Shoshone National Forests.

NPS

The lynx crew after shovelling out Harebell Cabin, YNP, 2003. Left to right: Nate Berg, Justin Hadwen, Andy Weidman, Margo Higgins, and Tiffany Potter.

may exist in metapopulations—groups of semi-isolated, individual populations that collectively persist through exchange of individuals. Some populations supported by a high quantity and quality of habitat would contribute more dispersers than they would recruit (population sources); others would mostly absorb recruits and rarely produce excesses themselves (population sinks). In this scenario, the smaller the lynx population, and the less ingress it received from distant populations, the more likely it would be to go extinct in the area where it occurred. The strong evidence from radio telemetry data that some lynx are highly mobile, and the lack of regional genetic differentiation among their populations, supports the idea that lynx in the northern Rocky Mountains exhibit metapopulation structure.

The Future

What have we learned from our work that will help ensure the future of this unique carnivore in the park and the GYE? First, at the beginning of the twenty-first century, lynx still exist at detectable levels in the park, but occur in low numbers. Mature forests of the park that are considered productive habitat for lynx prey are limited in acreage, spatially fragmented, and appear to support lower prey densities than other areas at northern latitudes. Yet, lynx persist in the park despite the marginal habitat and population conditions. Movement and connectivity (i.e., population exchange) of lynx between and within ecosystems may be key to maintaining populations.

Although we know very little about lynx in the park, obtaining detailed information would require investment in a long-term project that would necessitate capturing, radio-marking, and monitoring many of the individuals that are present. Such a study would involve some disturbance of the few individuals present and would likely yield low sample sizes. Alternatively, repeat surveys of the sort we have done would enable us to see if lynx numbers and distribution change dramatically through time, but would leave key biological questions unanswered. We are continuing the snowshoe hare studies in cooperation with Hodges and Mills to better understand hare population dynamics, their relationship to forest structure, and the effects of disturbance agents such as fire on snowshoe hare and lynx habitat. In the absence of more detailed information on lynx, maintaining the pristine character and historic disturbance processes in park forests and habitat connectivity within the GYE and between the GYE and other forest ecosystems is probably the best long-range management strategy for sustaining this mysterious cat.

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Acknowledgements

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BOB WIESNER

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Yellowstone's First General Store

A Legacy of Jennie Henderson and Her Family

Robert V. Goss

NPS/VIRGINIA WARNER

Delaware North's Yellowstone General Store, 2005. Changes have been made, but it remains similar to the store of 1896 (see pg. 22).

A VISIT TO YELLOWSTONE NATIONAL PARK has been a memorable experience for millions of visitors since the park's creation in 1872. In those days, few visitors could come completely prepared for a visit lasting a week or more; the ability to purchase additional supplies or mementos of their visit after arriving at the park was both required and desired. Tourists were relatively infrequent during the park's first decade—government estimates of travel showed that only about 8,300 visitors made the arduous journey to Yellowstone from 1872 through 1882—but the acquisition of basic goods, food, camp gear, and other necessities was still a real problem in the park's infancy.[1]

This was especially true because of Yellowstone's remote location in the Rocky Mountains a good distance from any major population center. Virginia City, Montana, established in 1863 as a mining community, became a Yellowstone gateway with the construction of the Virginia City and National Park Free Wagon Road in 1873, but rail travel directly to Yellowstone did not begin until 1883, when the Northern Pacific Railroad extended its line from Livingston, Montana, south to the new town of Cinnabar, located about eight miles north of Mammoth Hot Springs.[2] The advent of direct train service to Yellowstone resulted in a five-fold increase in visitation over the average of about 1,000 visitors each year for the previous few years.[3] Although its construction was not completed for two more years, the National Hotel at Mammoth opened for business in August 1883.

By the mid-1880s, the park was served by the towns of Virginia City, Livingston, Cinnabar, and Gardiner, Montana. Unfortunately, when the inevitable and unpredictable need for a particular necessity arose, these towns were still many miles away—especially from the park's interior locations. Another aspect of tourists' "memorable experience" has been the desire to take home souvenirs of their visits. Before (and after) there were curio shops in the park, people collected pieces of Yellowstone itself, in the form of petrified wood, crystals, broken-off portions of geyser formations, pressed flowers, and other items they found interesting. Unfortunately and illegally, this type of curiosity collecting continued even after curio and general stores created an acceptable outlet for satisfying the demand for material goods and curiosities. The sale of curios, park views, guidebooks, tobacco products, and other items had begun at least by the early 1880s. In 1881, photographer H.B. Calfee set up a crude tent store in the Old Faithful area to sell his

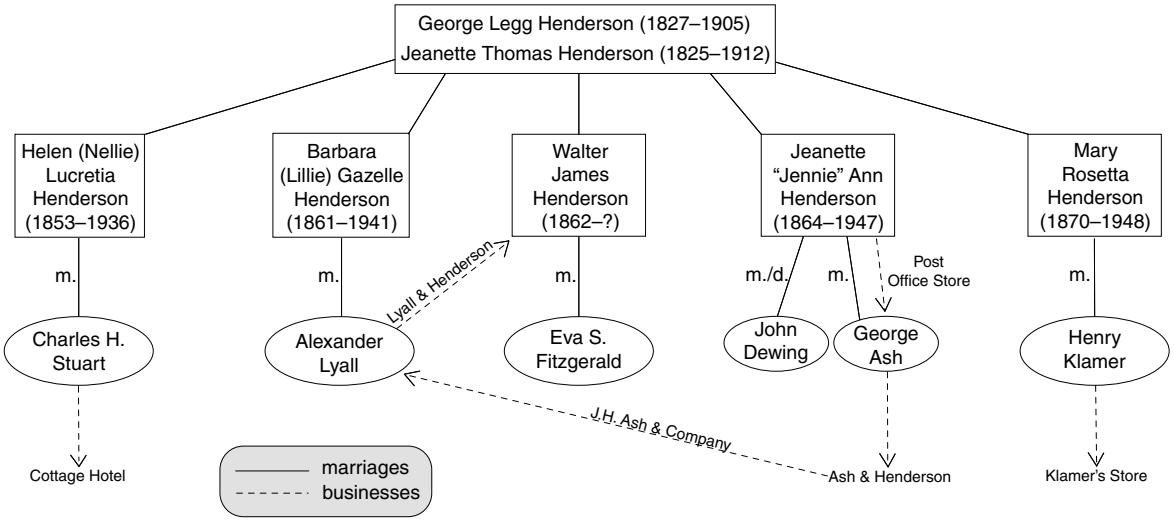
pictures of the park, and in 1883, Ole Anderson established a tent store to sell "coated specimens" at Mammoth Hot Springs.[4] To create coated specimens, Anderson took common items such as combs, bottles, horseshoes, crosses, pine cones, or other such items and soaked them under the mineral-laden, flowing waters of the Mammoth Terraces for a period of time. The items came out with an alabaster-type coating, and were popular with tourists.

At about this same time, what would be the first general store in the park gradually began to take shape, as Jennie Henderson and her family were establishing themselves at Mammoth Hot Springs. In the spring of 1882, Philetus Norris, who had served as park superintendent since 1877, was relieved of his position due to a variety of political intrigues involving Congress, the Northern Pacific Railroad, and the Yellowstone Park Association. His replacement was Patrick H. Conger, the brother of Senator Omar Conger of Michigan. Clarence Stephens, who served as assistant superintendent under Norris, did not care for this political turn of events, and asked to be replaced as soon as possible.[5] George Legg Henderson was chosen to be Conger's new assistant, perhaps due to the influence of George's brother David B. Henderson, an Iowa Congressman.[6]

George L. Henderson and his wife, Jeanette Thomas, whom he married in 1853, had originally settled in Iowa, and had 10 children together. Sadly, five succumbed to illness or accidents by 1875, and George and Jeanette divorced four years later, leaving George with the care of five children.[7] By 1882, Henderson was 54 years old. Apparently ready to leave his sorrows behind, he set out on a fresh adventure in life. He arrived at his new job in Yellowstone in May of that year, and settled into the Norris Blockhouse at Mammoth with his family, which included Helen "Nellie" Lucretia, age 29; Barbara "Lillie" Gazelle, 21; Walter James, 20; Jeanette "Jennie" Ann, 18; and Mary Rosetta, 11.[8] This must have been quite an undertaking for a single man, a bit past his prime of life, settling into a strange and still-wild country with a large family. Yet, as will be shown later, the family and their eventual spouses all pitched in to help make a living, and created or operated at least four separate businesses in the park by 1897.[9]

The beginning of the general store at Mammoth seems to have had twin origins. It primarily sprang from a post office business operated by the Henderson family beginning in 1882, and was reinforced a few years later with the establishment of the Cottage Hotel Museum at the Cottage Hotel. On July 5, 1882, shortly after the Henderson family's arrival, Barbara Henderson was appointed Postmaster, operating the post office out of the Blockhouse.[10] The Hendersons moved out of the Blockhouse the following summer, and into one of early hotelkeeper James McCartney's log cabins. The family fixed up the cabin and used it as both a residence and post office.[11] A T.W. Ingersoll photo in the Yellowstone archives, dating to the early 1880s, shows a series of four small log buildings in a row at the base of the hill close to where Ole Anderson later built his Specimen House. A sign reading "Post Office" hangs over the entrance to one of the buildings, and the cabin next to it appears as though it may have been used as the Henderson residence. Another building looks to have been utilized as a barn or stable.[12]

Apparently, Jennie assisted her sister Barbara in the operation of the post office early on, and there were indications that the ladies were attempting to make some money on the side by selling curiosities to the tourists. Being Postmaster in Yellowstone in those days was likely not a highly lucrative



Note: George Henderson was married twice more: to Hannah Burke Horton in 1889 (dissolved 1898), and to Elizabeth Ann Bryant in 1901 (marriage terminated same year).

The George L. and Jeanette Thomas Henderson family tree. George and their five children moved to Yellowstone in 1882. His children and their eventual spouses operated at least four separate businesses in the park.

position; even their father was only making $75 per month as assistant park superintendent. This certainly would not have been enough to comfortably support six people, and any schemes to make extra money would surely have been welcomed. David Dobson and William Ramsdell approached Jennie in July 1883 about the possibility of having her sell their coated specimens in the post office building on a commission basis.[13] The two men assured Jennie that they had received permission from Superintendent Conger to conduct this type of activity, and she displayed their wares for sale.[14]

YELLOWSTONE ARCHIVES, YELL 945

The Post Office Store, circa 1880. The second building from the left has a sign above the door reading "Post Office." The first building on the left may have been used as a residence.

Later that season, R.P. Miles and A.H. Wyatt, who had collected petrified wood, geodes, and various crystals in the Tom Miner Basin area north of the park, also approached Jennie about having her sell their merchandise at the post office. She agreed to this proposal and was now acquiring a nice stock of curios to offer tourists in what would soon become known as the Post Office Store. In the fall, there were suggestions of improprieties about the origin of these curios, instigated by Superintendent Conger, who had developed an intense dislike for George Henderson. Conger's negative feelings toward Henderson had begun that year, when rumors in Washington about administrative mismanagement in Yellowstone caused the Secretary of the Interior to send Special Agent W. Scott Smith to investigate conditions there. His report recommended the removal of Conger on grounds of incompetence. Conger wrongly blamed Henderson for having had a hand in the investigation, and began finding reasons to implicate Henderson in wrongdoing.[15] Conger also disliked former superintendent Norris, and displayed animosity toward the assistants who had worked for him. Although debate about the curios sold in the Post Office Store reached the halls of Congress, it was eventually shown that the display and sale of all the merchandise was quite proper and legal, leaving Conger to look for other ways to embarrass Henderson.[16]

The ladies continued to operate a store in conjunction with the post office in the following year. An article from a hometown Iowa newspaper in January mentioned the "Post Office Store," and noted that Barbara had gone down into the basement of the store one day and was overcome by noxious carbonic acid fumes that had built up. Luckily, she was soon missed and someone went down to look for her. After finding her lying unconscious on the floor, they carried her outside to fresh air and safety.[17]

On April 4, 1884, Jennie A. Henderson was appointed Postmaster, and the post office became officially known as Mammoth Hot Springs, National Park Reservations County.[18] Jennie and her family seem to have expanded the operation by taking in occasional visitors to spend the night. A letter from Herbert Rowe of England, dated June 27, 1884, noted that when he and his wife visited Yellowstone, they stayed at the Mammoth Hot Springs Post Office, which they described as the only hotel accommodations in the park.[19] The letter did not indicate the exact date of their visit, but it must have been May or early June.[20] The Henderson family continued their entrepreneurial expansion in the following year, as George devised plans for a new hotel at Mammoth that would be known as the Cottage Hotel. On March 1, 1885, Walter J. and Helen L. Henderson signed a 10-year lease for the establishment and operation of the hotel. The *Livingston Enterprise* newspaper referred to the hotel on June 13, reporting that "Henderson Town consisted of seven houses and soon will have an eighth."

The article continued that the "Misses Henderson expect to furnish cottages and board" to the public, and aimed to make "their cottages and Cottage Hotel home-like and attractive, both as to comfort and economy."[21] Construction on the 2½-story building began at least by June and continued into December, when it officially opened on Christmas Day.[22] The hotel was described as having 55 rooms, hot sulfur baths, trained guides, saddle horses, camping outfits, and elegant Quincy carriages for touring purposes. George Henderson managed the hotel and advertised the business as a summer and winter resort. An advertising card for the hotel claimed "Science and experience prove that the mountain air, mineral water, and sulfur baths are great remedial agents for all pulmonary, gastric, and kidney disorders."[23]

George also began a new career as guide and interpreter.

Several family members assisted him in the new touring business, conducted out of the hotel. Helen Henderson, also known as Nellie, became the first female guide and carriage driver in the park, while other guides included her husband Charles Stuart as well as Henry Klamer, who later married Mary Henderson.[24]

The year 1885 was a busy time for the Henderson family. Evidently weary of his battle with park authorities and ready for a life change, George retired from public service on June 2 of that year and put his time into the Cottage Hotel project and a small newspaper, the "Yellowstone Park Manual and Guide."[25] The paper not only extolled the virtues and beauty of countless park features, but also gave Henderson a medium through which to promote his family enterprises and "throw in a few licks" at his adversaries in the park hotel bailiwick. The paper sold for 25 cents, and advertised other businesses in Mammoth and Gardiner. Of particular interest is that the Hendersons were advertising for the Cottage Hotel six months prior to its actual opening. Walter and Helen were advertised as "Proprietors," with a rate of $2.50 per day, and a discount for extended stays.[26] They may have been using some of the seven Henderson houses for this purpose prior to the actual opening of the hotel.

Also advertised in the paper was the Cottage Hotel Museum, which apparently was also located in one of the various "Henderson Town" houses prior to the opening of the hotel. "J.A. [Jennie Ann] Henderson" was listed in the ad as proprietor, and a variety of items were mentioned for sale. These included guidebooks by G.L. Henderson, Henry Winser, Philetus Norris, and William Wylie, along with "Cigars, Tobacco, Tourists' Supplies, Haynes Park Views, [and] Anderson & Fossum's Famous Coated Goods." A separate ad lauded the various specimens in "Every Style, Plain and Lettered. Also Masonic and other Symbols, Crosses, Anchors, [and] Hearts." Visitors could leave orders for items at the beginning of their trip and pick them up upon their return.[27]

Another ad listed a different line of goods at the Museum, with a Henry Axtt as Salesman. It touted a "fine supply of Taxidermist work of superior quality…Buffalo Heads, Heads of Elk, Deer, and Mountain Sheep, And a full Ornithological Department."[28] This portion of the business may have served as a legitimate museum for the entertainment of the guests, in addition to being a sales outlet.

Meanwhile, problems were brewing that threatened the existence of Jennie Henderson's post office and store. When David Wear was appointed Park Superintendent in July 1885, he almost immediately began having confrontations with George Henderson. Henderson disagreed with many of Wear's official actions, and went so far as to complain to his brother in Congress. When difficulties arose concerning construction materials for the Cottage Hotel, Henderson again went over Wear's head and complained directly to the Secretary of Interior.[29]

Conditions between the two men continued to deteriorate, and Wear became so worried about the situation that in August 1886, he requested that all his mail be addressed to him in Gardiner. He believed that "all letters and official communications between the Department and myself are opened and read at the Post Office at this place [Mammoth] before being delivered, if delivered at all."[30] He filed a formal complaint with the Post Office Department in Washington, and an investigation was conducted. However, Wear had destroyed all of the suspect envelopes, leaving no evidence for the inspector to examine. The inspector interviewed Jennie Henderson, who "emphatically denied that the mail of [Superintendent] Wear or any other party had been tampered with in her office," and concluded that he believed Wear was sincere in his beliefs, but that he (the inspector) was "unable to procure any evidence that would substantiate [Wear's] belief."[31]

In October of that year, Marion Baronett, who married well-known park scout and explorer Jack Baronett in 1884, became Postmaster at Mammoth. The location of the post office was changed to the north side of Capitol Hill, in the vicinity of what later became the Haynes Photo Shop. Mrs. Baronett ran the post office for the next two years.[32] Whether this change of management was related to the letter-opening incident is unknown, but it seems possible.

During that same year, Jennie ran off and married John Dewing, a local frontiersman, much to the displeasure of her father. Dewing became an abusive husband and was later accused of participating in poaching activities in the park.[33] There was little mention of Jennie in the records for the next two years, and the extent of her participation in the family business during this time is not known. When the Henderson family formed the Cottage Hotel Association in January 1888, Jennie's name was conspicuous in its absence from the Articles of Agreement, which specified that "No additional members can be added without the consent of all members." Jennie was the only immediate family member not listed in the document.[34] Jennie may have desired not to participate in the Association, or the family may have excluded her. Perhaps her father was still angry at her for eloping with Dewing.

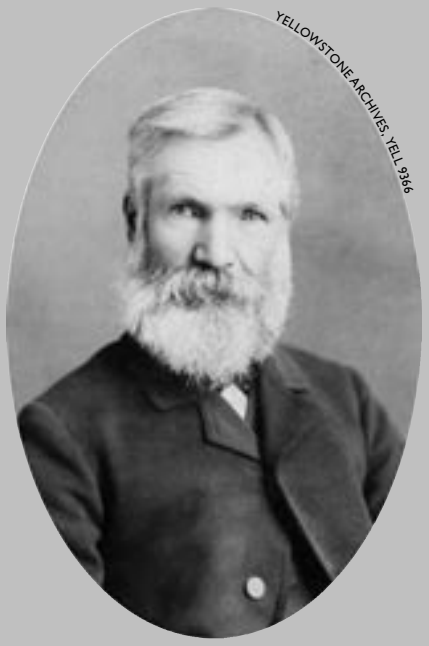
Whatever the reason, Jennie was back in business when she was re-appointed Postmaster on October 19, 1888, now using the name of Jennie H. Dewing.[35] Earlier in the year, Mrs. Baronett had received permission from the Department of the Interior (DOI) to sell a variety of tourist items at her post office. These goods included photographic views, stationery, and other unspecified items. The types of goods sold, and their pricing, had to be approved by the Assistant Superintendent, and the privilege was only valid through the conclusion of Baronett's tenure in office.[36] After Jennie took over the post office position, she applied to the DOI for a "continuation…of the privilege granted to her predecessor, Mrs. Baronett." Her request was granted on February 14, 1889.[37]

After the Army took over administration and protection of

(continued page 21)

G.L. Henderson: Interpreter and Innovator

by Lee Whittlesey, Yellowstone National Park Historian



Portrait of George L. Henderson, by F. Jay Haynes, circa 1895.

DURING HIS MORE THAN 20 YEARS of association with Yellowstone, George Legg Henderson became known as *the* recognized authority on the park, serving as assistant superintendent, park explorer, hotel owner, tour operator and conductor, interpreter, newspaper writer, place-name giver, parlor lecturer, congressional lobbyist, and finally, "park nestor"—a nineteenth-century term for wise counselor. He was also the first person to be formally referred to as "park interpreter." By 1884, he had written voluminously about his activities in local newspapers and in his own journals, and was becoming well known as Yellowstone's premier tour guide and writer. He had also given more than 100 place-names to the area. By most accounts, those whom Henderson guided found him well-informed as well as entertaining.

Henderson's contributions to interpretation in Yellowstone extended beyond his personal guide services. He had "finger boards" erected at Mammoth Hot Springs "to inform visitors where to find springs and other objects of interest," and decried the lack of signboards and bridle paths in the Norris and Lower geyser basins. He constructed and installed a ladder into Devil's Kitchen cave that was used by thousands of visitors to the Mammoth terraces until the cave's closure in 1939. By June 1885, Henderson had completed the *Yellowstone Park Manual and Guide.* The guide was a newspaper, with text on its front and back pages and beautiful woodcut drawings of park features on its two inside pages.

Henderson warned that vandalism to thermal features had to be carefully guarded against, and originated the idea of laying planks down in thermal areas for visitors to safely walk on—the forerunner of present-day boardwalks. By 1905, Frank Haynes's postcard of "Constant Geyser" at Norris Geyser Basin showed that Henderson's safety idea had been implemented, at least at Norris.

Henderson hired smart, conversant tour guides and drivers, and trained them to give interpretive tours using his own up-to-date scientific information. He pioneered the hiring of persons who spoke other languages with at least one guide who spoke French. And he used different routes for his guests so that they would see natural features and animals that clients of other guide services did not. Henderson's daughter Helen became Yellowstone's first female tour guide/interpreter as well as its first known female stagecoach driver.

The account of a tourist party Henderson guided in September 1884 reveals that Henderson was busily pressing his many original place-names into usage at Mammoth Hot Springs. Henderson's fondness for the classics is reflected in the names he used, such as "Evangeline," "Othello," and "Thanatopsis" springs. "Bethesda Plateau," "Three Graces Springs," and "Golgotha Geyser" were borrowed from the Bible; "Titian Basin," "Tyrian Spring," "Dome Raphael," and "Dome Angelo" all referred to famous artists; and "Marguerite Geyser," "Hiawatha Spring," "Faust Geyser," and "Barbara Frietchie's Well" all came from literature. Of the at least 213 place-names that Henderson originated, at least 40 are still used today.

The "park nestor," as he was often called, extolled the magic of Yellowstone in his lectures nearly to his dying day. Two of his last known lectures were apparently in Helena, Montana, in March and April of 1900. Henderson died on November 14, 1905, at the age of 78, at his winter home in Chula Vista, California.

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the park in 1886, conducting private enterprise there became a more formalized, bureaucratic experience. Gone were the days when a simple handshake and nod of approval from local authorities could govern business policies and procedures. Now, formal letters had to be written to the Secretary of the Interior before one could receive permission to conduct business, or receive approval for the classes of services to be provided, along with their pricing schedules. With this in mind, Jennie Dewing sent letters in February and May 1889 that enumerated the specific items she wished to sell, and their prices. The items included various types of tobacco products, stationery, writing utensils, toiletry items, colored glasses, gentlemen's ties, suspenders and hose, scarves, sewing items, gum, lemons, oranges, key rings, matches, park views, overalls, and coated specimens.[38] This wide selection of products indicated the true beginnings of the general store business in Yellowstone.

By May, Jennie had stationery printed featuring her new business letterhead, which proclaimed, "Yellowstone National Park Post Office, Dealers in Notions, Park Views, and Coated Specimens." M.R. [Mary Rosetta] Henderson, Jennie's sister, was listed as Assistant Postmaster.[39] This experience was to be very helpful to Mary after she married Henry Klamer and they opened a general store at Old Faithful. In the meantime, the two ladies continued to use the same log building that Mrs. Baronett had utilized north of Capitol Hill, both as a residence and business.[40]

At around the same time, the Henderson family was experiencing changes involving their Cottage Hotel. The Yellowstone Park Association (YPA), which controlled the National Hotel at Mammoth, and other, more primitive hotels at Old Faithful, Canyon, Lake, and Norris, held a tremendous amount of political power in the park and had considerable financial backing. Its goal was to achieve a monopoly of the park hotel business.[41] The pressures that the YPA exerted on the fledgling Cottage Hotel eventually became too great, and the Hendersons sold it to YPA in May 1889. One of the clauses in the sale contract stipulated that George Henderson be retained as a lobbyist for the company, and be allowed to continue his activities as park interpreter.[42] As a lobbyist, Henderson spent time in Washington, D.C., promoting the park and working for increased park appropriations. Walter and his wife Eva went to manage the Firehole Hotel for the summer, while Helen and her husband Charles Stuart managed the Cottage Hotel. YPA manager E.C. Waters promised to keep both Stuart and Henry Klamer busy working for the summer.[43]

There is little mention of the Post Office Store in park records for the next few years. In 1890, George Henderson noted that a tent-addition was added to the store.[44] By 1891, most of the Henderson family was wintering at homes in southern California, probably purchased with the proceeds of the Cottage Hotel sale. A clipping in the Ash Scrapbook revealed that three of the Henderson daughters were spending at least part of the year in National City, California, and numerous other articles from the *Livingston Enterprise* noted the family's seasonal travels to and from southern California from 1890 through the early 1900s.[45] George and Walter Henderson were also residing in southern California for part of the year; an 1896 newspaper clipping from their hometown newspaper in Iowa reported that Walter had "one of the fine houses in Chula Vista, with good thrifty lemon and orange groves, second to none," and George was mentioned as having a nice orchard home adjoining Walter's and son-in-law Charles Stuart's.[46] Because Jennie was required to keep the post office open on a year-round basis, it is likely that she spent some winters at Mammoth during this period, perhaps sharing the duties with other family members. Sometime in 1892, Jennie spoke to Acting Superintendent Captain George Anderson regarding her desire to construct a log addition onto the Post Office Store.[47] Although Anderson gave her verbal permission to do so, the records do not indicate whether the addition was actually built.

Changes came into Jennie's life the following year, when she divorced John Dewing and married George Ash, superintendent of the Wakefield Stagecoach Company.[48] Jennie may have been separated from Dewing for some period of time, as an 1892 newspaper article referred to Dewing as being from Gardiner.[49] She retained her maiden name, and after marriage became known as Jennie Henderson Ash. The couple was married June 25, 1893, at Mammoth Hot Springs, but because the license was obtained in Park County, Montana, the wedding party was required to "re-marry" in Montana. The group traveled to Gardiner, conducted the legal ceremony on a bluff overlooking the town, then returned to Mammoth for an elegant lunch at Jennie's home.[50]

Jennie's new husband was appointed Postmaster on October 3, 1893, and in the following year he filed an application to lease a small plot of land on which to build a new post office, store, and residence. Acting Superintendent George Anderson reported favorably on the idea in his annual report.[51] In late 1894, George Henderson wrote a letter to thank Captain Anderson for his favorable recommendation on George Ash's request, and to say he felt "assured that with your endorsement and my son-in-law's good record and my daughter's efficiency in the past we can secure a favorable issue in the matter."[52] Progress moved slowly on the issue, and in March 1895, Jennie wrote a letter to Captain Anderson inquiring about the status of the application; Jennie stated that she regretted bothering Anderson about the matter, realizing he was a busy man, but was anxious to find out about the application and whether she would be able to move forward with the plan.[53] Anderson was in Washington, D.C., at the time, and met with Congressman David Henderson concerning the lease. After the meeting, Congressman Henderson met directly with the Secretary of Interior to file the application for Jennie and, as had been the case in previous matters, performed a bit of diplomatic persuasion.

On August 7, 1895, the DOI awarded Jennie H. Ash a 10-year lease to operate a store, post office, and dwelling at Mammoth. The plot was irregularly shaped, and consisted of 24,000 square feet of land. A yearly rental fee of $30, due March 20 of each year, was stipulated. The Superintendent's Report for that year justified the decision by claiming that "a store such as Mrs. Ash proposes to keep is quite a necessity here, as without it there is no place nearer than Gardiner where notions and small articles so necessary to travelers can be procured, and even there the stock is meager and not wholly adapted to the needs of tourists."[54] On July 13, 1895, the *Livingston Enterprise* reported, "George Ash is arranging to erect a post office building and residence at Mammoth Hot Springs." That construction project was aided by Alexander Lyall, who later married Jennie's sister, Barbara.[55] The following year, the superintendent noted, "As soon as [the new store] was occupied I caused the old log buildings she had used as a post office to be torn down, and the locality to the north of the plain is now free of them."[56]

The new store, located between the Cottage Hotel and the National Hotel, opened in 1896, probably in the spring to be ready for the summer's onslaught of eager tourists. The enterprise was known as "Ash & Henderson," and their letterhead proclaimed sales of "Dry Goods, General Merchandise, Clothing, Boots & Shoes," and of course curios and photographic views; in other words, a variety of items that defined a "general store."[57] The building was a nice-looking, two-story frame structure with the residence on the left side, facing the main road. It measured 25' by 40', and that portion of the building (today's Yellowstone General Store) still looks much the same as it did in 1896. The store section of the building was 20' by 29', and faced the National Hotel.[58] Although George Ash originally made the application for the lease, officials issued it in Jennie's name, and most of the business correspondence in the files originated with her. Business letterhead from 1902 advertised her as Manager, and the business became known as J.H. Ash & Company by 1907.[59] George Ash may have assisted in the operation in the beginning, but he later seems to have remained behind the scenes.

YELLOWSTONE ARCHIVES, YELL 30313

The Ash & Henderson Store, shortly after construction, circa 1896.

In 1897, Jennie's brother-in-law Henry Klamer built the second general store in the park, at Old Faithful. Klamer's store was near what would later become the Old Faithful Inn. Today, it is known as the Lower Yellowstone General Store.

Private enterprise in the park in those days was competitive, but at the same time highly protected by contracts issued by the Department of the Interior. Contracts were specific about the types of activities and services that could be provided by an enterprise. For instance, when Ole Anderson expanded his business by building the Specimen House in 1895–96, park officials permitted him to sell other curios and tourist items, but not general wares and necessities. Sisters Anna Pryor and Elizabeth Trischman took over that business in 1908, and ran it successfully until 1952. Although they expanded the store to provide a bakery, soda fountain, ice cream parlor, and coffee shop, they, too, were never allowed to sell general wares and necessary articles.[60] Other early entrepreneurs who may have attempted to profit from the tourist trade prior to this time operated out of temporary tents, and probably from the backs of wagons, and were soon gone from the scene. Although contracts often prohibited businesses from expanding into new arenas, they also protected a business from incursions into its territory by others. DOI officials realized that only so many dollars could be generated during the park's short tourist season, and dividing those revenues too many ways could leave businesses with insufficient capital to properly maintain and expand their operations, leaving the tourist to suffer.

Even so, enterprises had to be vigilant about protecting their interests, and the Yellowstone archives are full of complaints about one business trying to capture another's commerce. In 1898, Ole Anderson requested permission to sell wares other than coated specimens and curiosities at his Specimen House, but was denied due to the fact that Ash & Henderson were already selling these items at Mammoth.[61] Two years later, Jennie wrote to her uncle, David Henderson, in Washington, D.C., complaining about sales practices at the Fort Yellowstone Canteen. It had been selling goods not only to post employees, but also to tourists and stagecoach drivers. While store prices were strictly regulated, prices at the Canteen were not, and they could undercut the store at will. Jennie requested that the Canteen restrict its sales to post employees and government drivers, as had been the previous practice. Congressman David Henderson intervened with Thomas Ryan, Acting Secretary of the Interior, who agreed with Jennie in February, thus resolving that issue.[62]

In another instance of protectionism that year, Jennie complained to the acting superintendent in May about the hotel association's practice of selling goods within the store's merchandising rights. The hotels were permitted to sell items such as tobacco products, playing cards, guidebooks, periodicals, and newspapers. However, the YPA had also begun selling curios and renting linen dusters and overcoats to their customers. Secretary Ryan again sided with Jennie, and advised the

hotel company to discontinue those practices. The issue was put to rest, but arose again in 1906, when Harry Child, head of the Yellowstone Park Association, requested that he be allowed to sell dusters, wraps, overcoats, hats, and caps to his guests. He complained that Ash & Henderson's hours of operation were inadequate to cope with the needs of his patrons. Ryan replied that these items were within the domain of the store, but that the hotel could sell any of them if the general store decided not to stock them. At the same time, Ryan demanded that Jennie keep her store open from 6AM to 11PM every day during the tourist season in order to properly serve the public.[63]

Physical expansion of the business came quickly when, in 1897, the couple let bids for new construction at the store. Alexander Lyall came up from Livingston to figure and submit a bid for "an addition to the store of Ash and Henderson."[64] Park records do not mention these plans, but financial records from 1910 indicate the presence of a storeroom, root house, icehouse, and house addition on the property, and it is possible that any or all of these may have been constructed at the time.

In the fall of 1899, Jennie expanded her retail operation by purchasing a stock of furs and game heads from a business in Colorado. Acting Superintendent Captain Oscar Brown approved the purchase in September, and a month later Jennie made a request to purchase a line of Indian and taxidermy goods from Mr. Wittich (first name unknown), a taxidermist in Livingston. Wittich had decided to drop those particular goods from his stock, and offered his entire inventory to Jennie. She was excited about the purchase and hoped that Brown would approve the deal, but park records do not indicate his response.[65]

Jennie was again appointed Postmaster in 1900, and took over the position from her husband on February 19. George Ash had been sick for some time with an undisclosed illness, and was perhaps unable to continue his duties. He passed away in early June in Salt Lake City. Jennie and her sister Barbara traveled by train to attend the funeral, returning to Mammoth around June 9.[66] Although now alone, Jennie at least had the support of her extended family and was able to continue on through this difficult time.

Two years later, officials changed the park's postal designation to Yellowstone Park, Yellowstone National Park County, Wyoming.[67] The name of the store had also been changed, this time to "Yellowstone Park Tourist Supplies." The store's letterhead noted that in addition to the original stock, the store was selling hay, grain, and novelties. The business seemed to be doing well, and in 1902, Jennie requested permission to build additions onto the store. One was to be 29' by 38' in size and located directly at the rear of the store portion. The other addition was 18' by 24', and located along the side of the addition opposite the National Hotel, facing the main road. The overall effect of the store addition was an upside-down, L-shaped structure, and the floor space of the store increased from just less than 600 square feet to over 2,100 square feet.[68] Alexander Lyall performed the construction of the addition, as he had on the original structure.[69] Construction on the addition began in March or early April, and by mid-May it was reported that the structure was nearly enclosed. In late April, Lyall fell from a ladder while working, dislocating his wrist and suffering numerous bruises and damage to his nose. This misfortune may have slowed his progress on the structure. When he was later seen in Livingston, the newspaper reported—tongue slightly in cheek—that he had both his arm and nose in slings.[70]

Jennie made another attempt to expand her business in that same year, this time into the park's interior. She requested permission to lease two acres of land at Norris Geyser Basin and erect buildings that would serve as a residence and a general store. YPA had opened a new hotel and lunch station nearby during the previous season, but there were no store facilities in the area as of yet. For reasons unknown, her request was either ignored or denied, and a note at the bottom of her letter was simply annotated, "No Action Taken."[71] Jennie and her father left the park that October to spend the winter in southern California.[72]

On August 7, 1905, Jennie's store lease was renewed for another 10 years, with the yearly rental fee now set at $100. The terms were essentially the same as those of the original contract.[73] Jennie decided not to continue as Postmaster. She submitted her resignation to the Post Office Department in a letter dated January 10, 1906, and recommended Alexander Lyall as her replacement. The department approved and appointed Lyall as Postmaster on February 6, and he began sharing in the operation of the general store.[74] By that time, the store was dealing in "Game Heads, Fur Rugs, Souvenirs, Agate Ware and Indian Curios, Indian Baskets and Navajo Blankets and Specialty, and Kodak Supplies," in addition to curios and general merchandise.[75]

That year, Jennie discovered that photographer Frank J. Haynes was selling souvenir spoons and leather curios in his photo shops—items that she felt were not within Haynes's merchandising rights. Together with Henry Klamer from the Old Faithful general store, she filed claims with the DOI protesting Haynes's actions. Haynes defended himself by asserting that he could indeed sell those types of items, as long as they were embellished with his park views. This time, the DOI sided with Haynes, and he was allowed to continue retailing those types of curios.[76]

During this period, Walter Henderson was spending at least part of the year in the park, while his wife Eva and their children were living in Seattle. By now, Jennie had lived and worked in Yellowstone for 25 years, and the winters were taking a toll on her. She spent at least part of the summer, and perhaps all of 1907, in San Diego with her family, as revealed in a letter Walter wrote to his mother from Mammoth in September. In closing the letter, Walter sent his love to Jennie, now

43 years old, and the kids.[77] Walter may have been running the store with Alexander Lyall, as Jennie's life in the park was rapidly coming to a close. In February 1908, Henry Klamer wrote to Acting Superintendent General S.B.M. Young from southern California, setting the stage for Jennie's departure from the park. Klamer disclosed that "Mrs. Ash's health has forced her to seek a better climate and feels that she can no longer conduct her business in the park," and implored Young to do all he could to assist Jennie in transferring the business to Walter Henderson and Alexander Lyall.[78] The Secretary of the Interior approved the transfer on February 27, and the two men took over the lease on April 20. The purchase price for the transaction is not known, but financial records for the business two years later showed a $3,000 payment to J.H. Ash, with notes due of $5,735.[79] The new business became known as Lyall & Henderson, and they were granted all the "rights, privileges and franchise now enjoyed by and accrued to [Jennie] by virtue of the terms of said lease."[80] After a quarter of a century as proprietor of Yellowstone's first general store, Jennie had passed the torch. The change of climate apparently aided in Jennie's recovery, as she lived until 1947, when she passed away at the age of 83.[81]

The business was now firmly in the hands of Lyall and Henderson. One of their first acts was to request permission to again increase the size of the store, with an addition measuring 31' wide by 60' long. In their letter to the Secretary of the Interior, the men bemoaned that "the original building has all the outward appearances of a residence," and that many tourists "did not know there was a store on the premises." They also complained that they had inadequate space to carry the necessary inventory for the increased numbers of visitors in the park and soldiers at the post.[82] Although correspondence among Lyall and Henderson, the DOI, and Acting Superintendent Major H.T. Allen continued for two years, no construction appears to have occurred. The primary obstacle was that YPA was contemplating the construction of a grandiose hotel at Mammoth that would have expanded onto the general store's plat of ground, requiring that the store be physically moved. YPA would have been obligated to bear the cost of moving the building, but the proposed new location would have been less advantageous to Lyall and Henderson, and would certainly have disrupted their operation for a time.[83] The staggering cost of such an immense structure may have eventually dissuaded the company from proceeding with construction, and the delays and uncertainties prevented expansion plans for the store. (In the end, YPA retained the original hotel, but between 1911 and 1913, its fourth floor was removed, the pitched roof replaced with a flat roof, and a four-story wing added on the north side containing 124 rooms.[84])

The men persisted despite the setback, and in 1909, were again faced with the problem of fighting YPA (now known as the Yellowstone Park Hotel Company) regarding the hotel's continued sales of dusters, hats, gloves, Kodak supplies, and other dry goods. In February, they made a formal complaint to Acting Superintendent Major Harry Benson, protesting the actions. They ultimately won their case, but it was not until July 1910 that Benson officially demanded that the hotel company discontinue the sale of such items.[85] In a similar vein, the Wylie Permanent Camping Company was permitted, in 1909, to maintain newsstands at its camps and lunch stations, and allowed to market newspapers, magazines, stamps, postcards, cigars, tobacco, candies, emergency medicines, and Kodak films. However, the DOI amended Wylie's lease to require that those Wylie stations in the vicinity of the Henderson & Lyall and Klamer stores not be permitted to establish newsstands.[86] Without the protective covenants issued by the DOI, the small general stores could easily have been pushed to ruin by competitive actions of companies such as YPA and Wylie that enjoyed superior investment resources.

In 1910, the DOI instituted a new policy that would affect all lease holders in the park. A "franchise or use tax" was assessed to all concessioners and was based on their gross receipts and profits. The monies were to go into the general maintenance

(continued page 26)

YELLOWSTONE ARCHIVES. YELL 9388

Lyall & Henderson's store, circa 1908.

Back of postcard with a photo of Walter Lyall Henderson (shown right), son of Walter J. Henderson, sent on November 11, 1903, from Lell Lyall to Helen Henderson.

The Henderson Family Today

by Lee Whittlesey, Yellowstone National Park Historian

THE HENDERSON FAMILY'S association with Yellowstone didn't end when they got out of the park concessions business. The descendants of George Henderson have an active interest in the park and their own history with it. On July 9–11, 2002, three direct descendants and one relative-by-marriage of G.L. Henderson visited Yellowstone. These visitors were (James) Dean Henderson and his son Jim Henderson of Whidbey Island, Washington; Kathy Lynn Henderson of Fullerton, California; and Dean's wife Muriel. Kathy Lynn is the great-great-granddaughter, and Dean the great-grandson of George Henderson.

The four Henderson descendants spent a full day in the park library, examining materials about their family. They looked at the park's original Cottage Hotel ledger, which the Henderson daughters used for penmanship exercises in the 1880s, and examined copies of G.L. Henderson's 1885 newspaper, the *Yellowstone Park Manual and Guide*. I also took them on a walking tour of the numerous sites at Mammoth Hot Springs that G.L. Henderson knew and loved, many of which were named by him. Standing in a place where she knew her ancestors had been, and seeing things they had seen, was Kathy Henderson's favorite part of the entire trip.

COURTESY KATHY LYNN HENDERSON

Walter J., son of G.L. Henderson, and his wife, Eva Henderson.

COURTESY KATHY LYNN HENDERSON

Postcard of Walter L. Henderson at Beehive Geyser.

These descendants provided the park with a great deal of new genealogical information on G.L. Henderson and his family for the park library's biography file. In particular, they were able to provide information on G.L.'s first wife, Jeanette Ann Thomas, about whom little was formerly known. They also provided the park with a portrait photo of Walter J. Henderson (son of G.L.) and a group portrait of G.L.'s daughters.

In the summer of 2004, Kathy Henderson's father and stepmother, Mel and Tina Henderson of Sharbot Lake, Ontario, Canada, came to Mammoth Hot Springs for a short visit. They also toured the Mammoth area with me. Mel is the great-grandson of G.L. Henderson, and he and Tina were fascinated to see and learn about places like Orange Spring Mound, Bath Lake, and Rath Terrace that his great-grandfather gave names to and discussed with so many park visitors from 1882 until 1902.

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YELLOWSTONE ARCHIVES, YELL 23430

The Yellowstone Park Store, circa 1915. New owner George Whittaker added the glassed-in front section to the left.

funds for the park.[87] Lyall & Henderson was assessed $900 for 1910, which increased to $1,600 for the 1911 season. The men protested the amount of the tax and objected that their financial reports had not included much of the labor performed by family members. The Secretary of the Interior responded that the men should have included those figures in their sworn statement for the year. The secretary also berated them for subtracting the $3,000 payment to J.H. Ash from their profit margin, apparently feeling that the payment should have been accounted for in a different manner.[88] The secretary did agree to lower the 1910 tax to $800, but refused to budge in 1911, and that rate remained for the next two years.

The year 1910 was the first in which financial reports for the store are available. Figures revealed that cash sales totaled $35,026, with profits of $7,527 and salaries of $2,173. However, profits for the 1911–12 seasons averaged only about $4,400. The 1912 report also listed seven employees, including a manager, cook, and five clerks.[89] In addition to the stock previously advertised by the business, letterhead from the period proclaimed "Boots and Shoes, Ladies' and Gent's Furnishings, and Precious Stones."

Lyall and Henderson were now both in their early fifties, and they maintained residences in southern California, spent a great deal of time separated from their families, and were ready to relieve themselves of the responsibilities of a business in Yellowstone. Records do not indicate how long the men were interested in selling the business, but on January 6, 1913, George Whittaker wrote a letter to the DOI requesting permission to have the Lyall & Henderson lease transferred into his name. Whittaker may have been negotiating with the men for a while, and already worked out arrangements for the purchase of the business. Whittaker had a long history in the park, having been stationed as a soldier with the army at Fort Yellowstone in 1891, and later employed as a civilian scout from 1897 to 1909. He had worked summers since 1903 as an agent for the Yellowstone Park Transportation Company at Yellowstone's Canyon location, and spent the past several winters as a special agent in the Customs Service in New York City.[90] Whittaker was probably well known to Lyall and Henderson, and his credible reputation and years of experience in the park would have made them think that he was an excellent candidate to take over the business.

Walter J. Henderson and Alexander Lyall signed an assignment of lease on February 8, 1913, that "set over to George Whittaker…all our interest in the lease for certain premises situate[d] in the Yellowstone National Park... [including] all the rights, privileges and franchises now enjoyed and accruing to us." This was basically the same language used in the transfer of 1908 from Jennie Ash. The men requested that the Secretary of the Interior ratify and confirm the transfer. Whittaker also petitioned to have a new lease issued for a period of 10 years, rather than taking over the existing lease that expired in 1915.[91] Lewis C. Laylin of the DOI approved the transfer on February 25, and Whittaker signed a 10-year lease on March 13, 1913. The exact sale price for the business was not stated, but Whittaker's financial report for the year ending 1913 showed a note payable for $45,098. There may also have been a down payment made at the time of sale.[92] Thirty-one years of living and conducting business at Mammoth had now ended for the Henderson family. Alexander Lyall departed for his residence in San Diego, while Walter returned to Chula Vista to tend his citrus groves and enjoy the "wonderland" of southern California. When brother-in-law Henry Klamer died in August 1914, Walter returned to Yellowstone to help his sister Mary manage the Old Faithful general store. Walter and Mary returned to California after Charles Hamilton purchased the store in June of the following year.[93] Dean Henderson, grandson of Walter J. Henderson, does not remember his grandfather working again after his return to Chula Vista, aside from managing his citrus groves. He recalls that Walter spent his time investing in stocks and bonds, claiming he "could make more money in a morning doing that than most men could make in a month working."[94]

George Whittaker went on to run the store at Mammoth for 20 years, adding a gas station to the operation in 1915, with the advent of the "horseless carriage" in Yellowstone. He also established a general store at Canyon in 1917, and a gas station there a few years later. Anna Pryor and Elizabeth Trischman, the sisters who operated the Park Curio Shop at Mammoth, bought Whittaker out in 1932, and managed those enterprises at Mammoth and Canyon for another 20 years.

Charles Hamilton, who started his business in 1915, when he purchased the Klamer Store at Old Faithful, expanded his general store and filling station operations to Lake, Bridge Bay, and West Thumb. When he acquired the Pryor Stores in January 1953, he gained a monopoly on the general store business in the park. Hamilton Stores successfully operated Yellowstone's first general store and the other park stores for another 50 years. In 2002, Delaware North Companies, Inc., through the DOI's competitive bidding process, won the right to operate the general stores and photo shops in Yellowstone. They assumed control on January 1, 2003, under the name "Yellowstone General Stores," ending 87 years of business for the Hamilton family.

Some years ago, the Yellowstone Park Company, then concessioner for the park hotels, used a promotional slogan in Yellowstone claiming, "You'll love the way it hasn't changed!" That may be a nice sentimental thought, but the reality is that the park is ever-changing, both in nature and in the park's business world. In the park's early days, storekeepers had to plan far ahead in order to make sure they were stocked up for the short summer season. Supplies were slow-coming, arriving by train in either Gardiner or West Yellowstone and then hauled by freight wagon over the park's bumpy, rutted roads. Those early entrepreneurs would be amazed at the speedy, just-in-time freight service now available to park vendors. Though today's visitors may experience many of the same sights and features seen by visitors 100 years ago, the manner in which they are served by the park businesses has completely changed. Many of the comforts, services, and products available in Yellowstone today are much the same as those enjoyed by folks in big cities, and pioneers such as Jennie Ash and Henry Klamer paved the way. Only time will tell what other changes will occur in Yellowstone's future.

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COURTESY OF AUTHOR

Robert Goss is an amateur historian who has lived and worked in the Yellowstone area for over 30 years. He began work with the Yellowstone Park Co., and is currently employed by Xanterra Parks and Resorts at Mammoth Hot Springs. This is his fifth article on the subject of the early storekeepers in Yellowstone. He has self-published several books on the history of the concessions operations in the park.

Endnotes

[1] Aubrey L. Haines, *The Yellowstone Story Vol. II* (Yellowstone National Park, Wyo.: Yellowstone Library and Museum Association in Cooperation with the Colorado Associated University Press, 1977), 478.

[2] Aubrey L. Haines, *Yellowstone Place Names: Mirrors of History* (Niwot, Colo.: University Press of Colorado, 1996), 257.

[3] Captain George Anderson to John W. Noble, W.W. Wylie, and O. Anderson, file "Anderson Lease, 1896," Box C-17, Yellowstone National Park Archives (YNPA).

[4] *Ibid.*

[5] Aubrey L. Haines, *The Yellowstone Story Vol. I* (Niwot, Colo.: University Press of Colorado, 1996), 260–62.

[6] Lee H. Whittlesey, "The First National Park Interpreter: G.L. Henderson in Yellowstone, 1882–1902," *Montana the Magazine of Western History*, Spring 1996, 26–41.

[7] James Dean Henderson, Jr., Family Records, Robert Goss Collection, Gardiner, Mont.; Great-grandson of George L. Henderson, Grandson of Walter J. Henderson.

[8] Whittlesey, "The First National Park Interpreter;" Henderson Family Records.

[9] These businesses included the general stores at Mammoth and Old Faithful, the Firehole Hotel (Henry Klamer was part owner and later married Mary Henderson) and the Cottage Hotel, which included a guiding/tour business and the Cottage Hotel Museum. Alexander Lyall, who married Barbara Henderson, did contract construction business in the park, while Walter Henderson guided hunting parties for a time (*Livingston Enterprise*, July 18, 1885).

[10] Aubrey L. Haines, "Postal Service in Yellowstone National Park," 1966, Vertical Files, "History," Yellowstone National Park Library (YNPL). Haines notes that the first post office in the park was established on March 2, 1880, at Mammoth, with Clarence Stephens as Postmaster. Stephens had his office in the Blockhouse, and it has been assumed that the post office was also operated out of the same building. The post office was officially known as Mammoth Hot Springs, National Park County. At that time, mail was coming up by stage from Bozeman, Montana, probably on a somewhat irregular basis. In October of that year, the mail contract was awarded to the stagecoach firm of Gilmer & Salisbury, who began bringing the mail into the park from Virginia City through the park's West Entrance. Post offices were established for a short time at the Marshall Hotel on the Firehole River, and at Norris and Riverside. In the fall of 1882, the Northern Pacific Railroad line reached Livingston, Montana, and by December, mail service was again re-routed from Bozeman to Mammoth Hot Springs.

[11] Jewell F. Joyner, "History of Improvements in Yellowstone National Park, 1929," Vertical Files, "Structures," YNPL.

[12] Photo YELL 945, YNPA.

[13] Haines, *The Yellowstone Story Vol. I*, 297–98.

[14] Haines, *The Yellowstone Story Vol. I,* 297.

[15] Haines, *The Yellowstone Story Vol. I,* 262, 291, 297.

[16] Haines, *The Yellowstone Story Vol. I,* 297–99.

[17] Clipping dated January 30, 1884, West Union Iowa, Ash Scrapbook, George Ash Collection, YNPA, 4.

[18] Haines, "Postal Service in Yellowstone Park," 5.

[19] Herbert W. Rowe to Secretary of the Interior, June 27, 1884, in G.L. Henderson's "Yellowstone Park Manual and Guide," July 1, 1885, YNPL.

[20] Haines, *The Yellowstone Story Vol. I,* 310.

[21] *Livingston Enterprise*, "Local Layout," June 13, 1885.

[22] Robert V. Goss, "Yellowstone: The Chronology of Wonderland" (self-published, 2002), 96.

[23] Cottage Hotel Advertising Cards, George Ash Collection, YNPA.

[24] Whittlesey, "The First National Park Interpreter," 35–36. Klamer married Mary in 1892, while Helen married Stuart in November 1887 (Robert V. Goss, "Serving the Faithful in Yellowstone: Henry Klamer and the General Store in the Upper Geyser Basin," 18–19; *Livingston Enterprise*, November 19, 1887, "Henderson-Stuart Marriage").

[25] Although Henderson preferred to note that he "retired," Whittlesey states that Henderson was "dismissed" by Interior Secretary L.Q.C. Lamar for unknown reasons (Whittlesey, "The First National Park Interpreter," 34).

[26] Cottage Hotel Advertising Cards, George Ash Collection, Manuscript File, YNPL.

[27] G.L. Henderson, *Yellowstone Park Manual and Guide, 1885,* Map Drawers, YNPL.

[28] G.L. Henderson, *Yellowstone Park Manual and Guide, 1885*.

[29] Cottage Hotel Advertising Cards, George Ash Collection, Manuscript File, YNPL.
[30] David Wear to First Assistant Secretary of the Interior, August 12, 1886, in file "Mary Culpin, 1886–87," Vertical Files, History, YNPL.
[31] Report of Post Office Inspector to the Post Office Department, August 31, 1886; *ibid.*
[32] Haines, "Postal Service in Yellowstone," 5–6.
[33] Author's conversation with Lee Whittlesey, Yellowstone National Park Historian, June 12, 2002.
[34] Henderson journal 6290, George Ash Collection, Rare Separates File, YNPL, 141.
[35] Haines, "Postal Service in Yellowstone," 6.
[36] Secretary of the Interior to Captain Moses Harris, March 14, 1889, Document 173, YNPA.
[37] Captain Moses Harris to Jennie Dewing, February 14, 1889, Document 284, YNPA.
[38] Jennie Dewing to Captain Moses Harris, May 20 and February 27, 1889, Documents 811 and 812, YNPA.
[39] Dewing to Harris, May 20 and February 27, 1889.
[40] Superintendent's Report, 1895, section on "Leases," YNPL.
[41] G.L. Henderson, *National Park Manual: Short Letters from Tourists,* 1888, George Ash Collection, YNPA.
[42] Whittlesey, "The First National Park Interpreter," 37.
[43] E.C. Waters to G.L. Henderson, May 21, 1889, George Ash Collection, Manuscript File, YNPL. Walter married Eva Fitzgerald, daughter of former Asst. Superintendent S.M. Fitzgerald, on January 3, 1889 (*Livingston Enterprise,* November 3, 1888).
[44] G.L. Henderson to Captain Boutelle, June 20, 1890, George Ash Collection, Manuscript File, YNPL.
[45] George Ash Collection, Manuscript File, YNPL; *Livingston Enterprise*, "Local Layout," December 6, 1890; May 24, 1890; March 28, 1891; April 13, 1895.
[46] G.L. Henderson, *Postville Review,* Postville, Allamakee Co., Iowa, January 25, 1896, Goss Collection.
[47] Mrs. Dewing to Captain Anderson, February 4, 1893, Document 808, YNPA.
[48] The company was formed in 1883 by George Wakefield and Charles Hoffman, who operated the transportation system in the park until 1891. After that, they continued their service from Livingston to Cinnabar, Montana, and began travel from Monida, Idaho, through the park's West Entrance. The company was known as Wakefield & Ennis by 1894 [Robert V. Goss, "Making Concessions in Yellowstone," 4th Edition (self-published, 2004), 101]. Ash was noted as Superintendent of the company by at least 1889, and continued in that position through most of 1893 (*Livingston Enterprise*, "Local Layout," March 29, 1890; November 7, 1891; May 14, 1892; July 9, 1892; January 7, 1893).
[49] *Livingston Enterprise*, "Local Layout," October 22, 1892.
[50] *Livingston Enterprise,* "Local Layout," June 24 and July 1, 1893. This process of dual marriage ceremonies is still required today for marriages conducted at Mammoth (in Wyoming) with Montana marriage licenses.
[51] Superintendent's Report, 1894, section on "Leases," YNPL.
[52] George Henderson to Captain Anderson, November 18, 1894, Document 1004, YNPA.
[53] Jennie Ash to Captain Anderson, March 25, 1895, Document 2071, YNPA.
[54] Superintendent's Report, 1895, YNPL, 5.
[55] Structure Inventory Report, Mammoth General Store, July 2, 1976, Vertical Files, History Files—Historic Buildings, Mammoth Concessions, YNPL.
[56] Superintendent's Report, 1896, YNPL, 5.
[57] Jennie H. Ash to Captain Anderson, August 5, 1896, Document 2066, YNPA.
[58] Jennie H. Ash to Major John Pitcher, March 28, 1902, Item 60, Box 29, "Leases and Contracts for Use of Public Lands (Expired)," Lyall & Henderson file, YNPA.
[59] Walter Henderson to Mrs. Jeanette Henderson, September 3, 1907, Henderson Family Records, Goss Collection.
[60] Goss, "Yellowstone: The Chronology of Wonderland," 129. George and Anna Pryor (nee Trischman) took over the store in 1908, but George assigned his interest to Elizabeth in 1912. They eventually acquired the general store privilege in 1932 when they purchased Whittaker's Yellowstone Park Stores (Goss, "Making Concessions in Yellowstone," 4th Ed., 85–86).
[61] Acting Superintendent to Secretary of the Interior, July 9, 1898, Document 3471, YNPA.
[62] Acting Secretary of the Interior to Acting Superintendent, February 17, 1900, Document 3955, YNPA; Jennie H. Ash to D.B. Henderson, February 7, 1900, Document 3956, YNPA.
[63] Acting Secretary of the Interior to Acting Superintendent, May 10, 1900, Document 3956b, YNPA.
[64] *Livingston Enterprise,* "Local Layout," May 1, 1897.
[65] Jennie H. Ash to Captain Brown, September 1 and October 23, 1899, Documents 2054 and 2052, YNPA.
[66] *Livingston Enterprise,* "Local Layout," June 9, 1900.
[67] Haines, "Postal Service History of Yellowstone," 6.
[68] Jennie H. Ash to Major John Pitcher, March 28, 1902.
[69] "Contracts to Bid," file "A. Lyall," Box C-17, YNPA. This file also shows that Lyall, living in Livingston, was in the contractor business and had received government bids to erect Teamster's quarters, workshops, and an addition to the commissary storehouse for the Army in 1900. In the following few years, he received at least two other bids to construct various buildings for the government.
[70] *Livingston Enterprise*, "Local Layout," April 26, 1902; May 17, 1902.
[71] J.H. Ash to Secretary of the Interior, August 7, 1902, Document 3537, YNPA.
[72] *Livingston Enterprise*, "Local Layout," October 4, 1902.
[73] Ash Contract of 1905, Item 60, Box 29, "Leases and Contracts for Use of Public Lands (Expired)," Lyall & Henderson file, YNPA.
[74] Haines, "Postal Service History of Yellowstone," 6.
[75] Alexander Lyall to Joel W. Thorne, August 7, 1906, Document 6282, YNPA.
[76] Thomas Ryan to Acting Superintendent, July 14, 1906, Document 6923, YNPA.
[77] Walter Henderson to his mother, September 3, 1907, Henderson Family Records, Goss Collection. By this time Jennie had two children, George L. and Jessie M. Ash.
[78] Henry Klamer to S.B.M. Young, February 1, 1908, Document 9109, YNPA.
[79] Lyall & Henderson, "Financial Reports to 1916," Item 52, Letter Box 25, YNPA.
[80] 1913 Lease Agreement, file "J.H. Ash and G. Whittaker," Box C-17, YNPA; Letter of Assignment, April 20, 1908, Item 60, Box 29, "Leases and Contracts for Use of Public Lands (Expired)," Lyall & Henderson file, YNPA.
[81] Author's conversation with Lee Whittlesey, June 12, 2002, and his personal notes concerning the Henderson family.
[82] W.J. Henderson and A. Lyall to Secretary of the Interior, June 22, 1908, Document 8154, YNPA.
[83] Documents 8144, 8149, and 8154, YNPA; various letters in file 190, "Expired Leases & Contracts, Lyall & Henderson," Item 60, Box 29, "Leases and Contracts for Use of Public Lands (Expired)," Lyall & Henderson file, YNPA. An architectural rendering of this imposing hotel was created by Robert Reamer in 1906 and is on display near the map room of the current Mammoth Hot Springs Hotel.
[84] Goss, "Yellowstone: The Chronology of Wonderland," 97. The north wing is the only existing remnant of the 1913 hotel, aside from some foundation work.
[85] Alexander Lyall and Walter Henderson to Major Harry Benson, February 22, 1909, Item 60, Box 29, "Leases and Contracts for Use of Public Lands (Expired)," Lyall & Henderson file, YNPA; Major Harry Benson to Yellowstone Park Hotel Company, July 15, 1910, Item 72, File 380, Letter Box 34, "Store Privileges 1909–13," YNPA.
[86] Secretary of the Interior to Major Benson, April 10, 1909, Item 72, Letter Box 34, "Store Privileges 1909–13," YNPA.
[87] Superintendent to H.E. Klamer, April 4, 1910, Item 68, Letter Box 32, "Rentals & Taxes," Klamer file, YNPA.
[88] Lyall & Henderson to Secretary of the Interior, April 26, 1911; Secretary of the Interior to Major L.M. Brett, May 3, 1911, Item 68, Letter Box 32, "Rental & Taxes," Lyall & Henderson file, YNPA.
[89] Lyall & Henderson, "Financial Reports to 1916."
[90] Robert V. Goss, "Yellowstone's George Whittaker: Soldier, Scout and Businessman — A Journey from Bedrolls and Saddlebags to Ledger Books and Grocery Bags," (self-published, 2002).
[91] Assignment of Lease, February 8, 1913, Item 60, Letter Box 29, "Leases and Contracts for Use of Public Lands (Expired)," George Whittaker file, YNPA.
[92] Whittaker Financial Reports, 1913, Item 52, Letter Box *25,* YNPA.
[93] Robert V. Goss, "Serving the Faithful in Yellowstone: Henry Klamer and the General Store in the Upper Geyser Basin," (self-published, 2003).
[94] Author's conversation with James Dean Henderson and his son on July 8, 2002, at the YNPL.

FROM THE ARCHIVES

YELLOWSTONE ARCHIVES, YELL 5143

This circa 1900 photo shows a lynx, possibly in a trap. It was found in the Yellowstone archives by Jon Dahlheim in a Yellowstone photo album that belonged to Judge Meldrum, the first magistrate of Yellowstone National Park. It is not certain that the photo was taken in the park.

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In this issue

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A Youth Conservation Corps volunteer assists the lynx crew by checking a hair snare pad for snagged hairs.

Coming this summer, *Yellowstone Science* features *Drawn to Yellowstone* and the Grand Canyon Hotel.

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