

The Buffalo Chip

Resource Management Newsletter
Yellowstone National Park
2004: 2



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WHAT WE'RE FINDING: I&M IN THE GYE

by Cathie Jean

Background

In 1991, the NPS's Vail Agenda laid out a comprehensive strategy for serving America's noble trust into the 21st century. The Vail Agenda action plan called for park managers and superintendents to have solid natural resource information at their disposal. This meant knowing about the nature and condition of the major biotic and abiotic natural resources placed under their stewardship, and how resource conditions change over time. Reliable scientific information is necessary to enable park managers to take corrective actions before potential impacts severely degrade ecosystem integrity or become irreversible. The goal of the National Park Service's Natural Resource Inventory and Monitoring Program is to acquire the information and expertise needed by park managers in their efforts to maintain ecosystem integrity in the approximately 270 National Park System units that contain significant natural resources.

Resource inventories constitute a critical first step; they inform park managers about the nature of the resources held in trust. Subsequent monitoring programs allow park managers to more effectively detect changes and quantify trends in the condition of those resources, as well as understand the linkages between changes in resource condition and their cause. They also provide important feedback between natural resource condition and management objectives, which can serve both to trigger management actions and to evaluate managerial effectiveness.

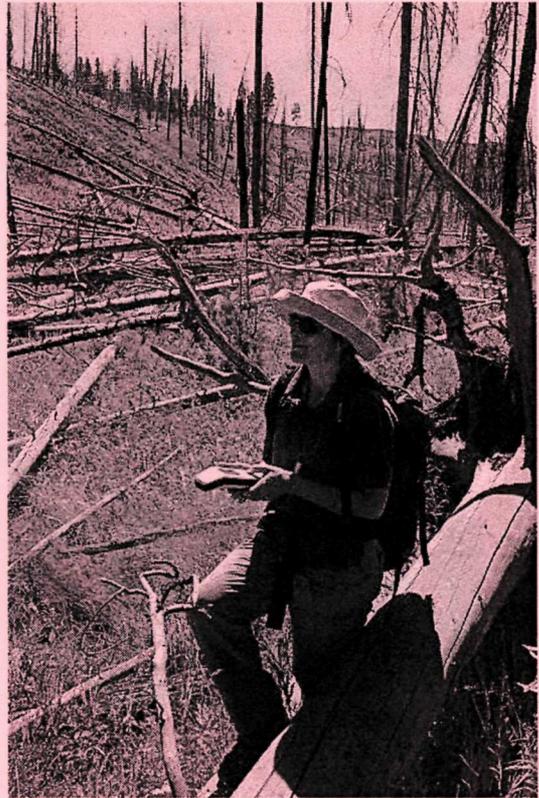
The Greater Yellowstone Inventory and Monitoring Network

The Greater Yellowstone Inventory and Monitoring Network (GRYN) consists of four park units located within and around the Greater Yellowstone Ecosystem, which includes parts of Idaho, Montana, and Wyoming. These units include Bighorn Canyon National Recreation Area (BICA), John D. Rockefeller,

Jr., Memorial Parkway (JODR), Grand Teton National Park (GRTE), and Yellowstone National Park (YELL). For purposes of this article, the John D. Rockefeller, Jr., Memorial Parkway is considered part of Grand Teton National Park.

Inventories

GRYN inventory activities over the last fiscal year (FY03) included a non-native vascular plant inventory in YELL and GRTE; amphibian inventory at YELL and GRTE; alpine vascular plant inventory at YELL; alpine lakes fish inventory, Snake River and Yellowstone cutthroat trout inventory and sage grouse survey at GRTE; bat inventories at all network parks; and a mammal inventory at BICA. Non-native vascular plant crews in GRTE identified new invasions of tamarisk and three species of ornamentals during the 2003 survey. All five weed management zones have been inventoried; the next step will be to collect inventories to fill data gaps and eradicate the tamarisk invasion along the Snake River riparian zone. The collected data is being used to create eradication and containment plans for exotic species discovered during the inventory. In addition, this was the third year of the exotic plant inventory project at YELL. Researchers at Montana State University are testing several survey methods in order to create the most reliable, efficient and consistent detection of low-occurrence populations. They have established a new method, the "targeted transect method," that has identified 26 of the 62 exotic species on the YELL priority list. They have also determined that rights-of-ways are a principal disturbance factor affecting exotic species distribution. The YELL alpine plant inventory, led by YELL botanist



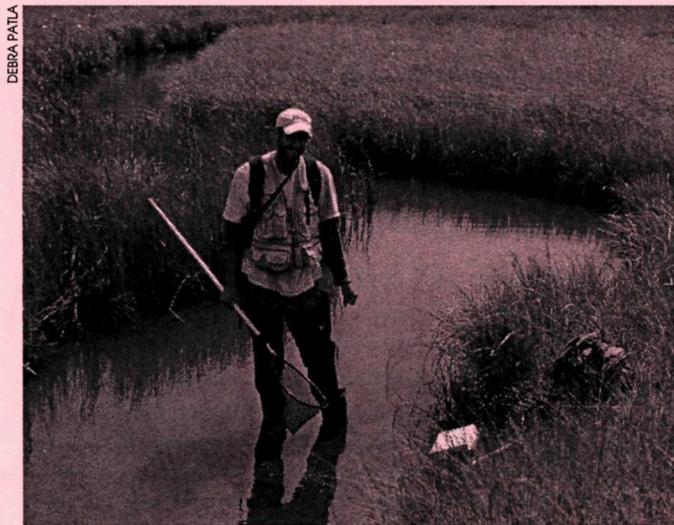
CHAD JACOBSON

Montana State University professor Lisa Rew takes a GPS point on a weed survey transect along Lava Creek in Yellowstone's northern range.

Jennifer Whipple, although weakened by the drought conditions (which caused low flowering and fruit set), successfully collected 241 species, including two species not previously reported and one species verified as occurring within park boundaries (according to preliminary examination).

Amphibian inventory personnel conducted surveys at 189 wetland sites in YELL and GRTE. Crews found boreal chorus frog, tiger salamander, Columbia spotted frog, and boreal toad breeding sites during the survey. Past recommendations to GRTE for protecting breeding site areas within the Snake River quarry area were successful in keeping breeding populations present at the sites despite extensive landscape alteration. Occupancy rates of chorus frogs and spotted frogs declined, while tiger salamander occupancy remained stable based

Idaho State University staffer Matthew Chatfield conducting amphibian survey on an unnamed creek north of Fishing Bridge.



DEBRA PATLA

on the Proportion of Area Occupied methodology developed by the U.S. Geological Survey (USGS). In addition, 11 alpine lakes were surveyed for fish species in GRTE in 2003. Yellowstone cutthroat trout were found at Grizzly Bear Lake, although no previous record exists of stocking at the lake. An inventory to systematically sample and document the geographic distribution of Snake River and Yellowstone cutthroat trout took place at GRTE and other federal lands in the Upper Snake River watershed.

GRTE personnel conducted a helicopter survey to identify existing and new sage grouse leks (sites where the birds engage in play and courtship activities). One new lek was observed, with six male grouse strutting at the site. A GPS location for the lek was recorded and mapped, and the lek was observed from the ground for the remainder of the season. The bat and small mammal inventories were highly successful, given preliminary data. Using mist-net (very fine net)

captures, staff of the Wyoming Natural Diversity Database documented most bat fauna predicted to occur within the region and two species previously undocumented in BICA. Bat inventory personnel also completed a GIS habitat model to facilitate the selection of suitable bat inventory sites and initiated the development of a bat call library to facilitate future acoustic monitoring efforts. Personnel also surveyed 12 locations for undocumented mammals and added the white-footed mouse (*Peromyscus leucopus*) to the formally documented list.

Monitoring

In addition to successful inventories throughout the network parks, the GRYN Vital Signs Monitoring Program has made much progress toward monitoring in the last year. The GRYN created a plan for designing conceptual ecological models that describe the interactions among key components of terrestrial, aquat-

ic and geothermal systems within the network. With the help of numerous experts who have knowledge of these systems, the conceptual models identified many potential vital signs. Simultaneously, the results from the third and final iteration of the internet-based Delphi survey (see *BC*, October/November 2001) were received, having been completed in conjunc-



DEBRA PALTA

A juvenile Columbia spotted frog, found in the Fawn Creek drainage.

tion with the University of Idaho's College of Natural Resources. Meanwhile, the GRYN held park-specific workshops in order to gain insight into the strengths and weaknesses of the potential vital signs, the conceptual modeling process, and the selection criteria. These workshops were created to gain park input into the vital signs selection process, as well as acquire peer review on the proposed set of selection criteria questions to be used to select vital signs.

The information obtained was essential to the success of the criteria during the Vital Signs Monitoring Workshop, held in Bozeman, Montana, in May 2003. At this workshop, almost 60 subject-area experts were invited to share their expertise by ranking all potential vital signs (from both the conceptual modeling and Delphi processes) using the selection criteria. By all accounts, the workshop was a success and allowed for input from experts from other government agencies, academia and the non-profit and private sectors.

Using this wealth of information, the GRYN hosted a Technical Committee meeting in which members used the ranked results of the expert workshop, added their management expertise, and created a proposed final list of vital signs, approved by the Board of Directors in August 2003.

The GRYN also hired a writer/editor to edit previous versions of chapters one and two of the Vital Signs Monitoring Plan and create chapter three—a synopsis of the vital signs selection process. The GRYN prepared a separate report for the water quality monitoring portion of the program, scheduled for completion early in FY04. During FY03, the core water quality group focused on several topics, including: 1) the development of and solicitation of requests for proposals for projects such as protocol development, synoptic studies, technical assistance requests for study plans, statistical frameworks/designs; 2) summarizing management issues and stressors related to water quality; 3) summarizing current water quality monitoring efforts; 4) a review of available field protocols for National Park Service-Water Resources

lows:

Biological Inventory Program

1. Create and maintain information-sharing strategies in an effort to integrate the I&M and Water Quality Programs into park activities and facilitate and manage the use of collected information.
2. Develop, implement and maintain an integrated plan for data management in the network (including inventory, monitoring and water quality components of the program).
3. Describe the distribution and relative abundance of vertebrate and vascular plant species, targeted species, taxonomic groups and/or species assemblages that are of special concern to GRYN parks.
4. Maintain an administrative and organizational framework for the GRYN Inventory, Vital Signs, and Water Quality Monitoring Programs.

Vital Signs Monitoring Program

5. Identify specific monitoring objectives associated with each vital sign, starting with those listed as high priorities.
6. Develop sampling designs for those monitoring objectives.
7. Develop protocols in accordance with the guidelines of the I&M Program.
8. Develop a strategy for leveraging funds from outside sources to enhance the monitoring capabilities of the network.

Water Quality Monitoring Program

9. Summarize and analyze existing information and concepts important for assessing current and future water quality monitoring efforts and needs in the network parks.
10. Implement and maintain an integrated GIS and data management program for water quality data.
11. Develop protocols for regulatory monitoring; have protocols peer reviewed; implement peer reviewed monitoring protocols. 🐾

HALEY COOPER



An adult blotched tiger salamander caught in the Boundary Creek drainage of the Bechler River.

Division (NPS-WRD) "core parameters;" and 5) the development of monitoring objectives for impaired waters within network parks.

Future goals

GRYN objectives for the coming year are as fol-

2003–2004 WOLF CAPTURE OPERATIONS

by Virginia Warner

Each winter, Yellowstone Wolf Project staff dart and collar wolves as part of the requirements associated with monitoring endangered species, and under conditions established in the EIS to reintroduce wolves to the GYA and central Idaho. The objective is to maintain radio collars on at least one animal in all YNP wolf packs; the collars transmit radio signals that allow researchers to locate and track specific wolves, with a handful of collars also recording GPS coordinates. Ideally, more than one wolf per pack is collared; relying on only one wolf per pack would be risky because wolves die, leave the park, and slip their collars.

On average, 26 wolves are collared per year; 42 were collared or re-collared this year—the highest success rate in the project's history. At least one wolf from every pack except the Bechler pack was collared, with GPS collars fitted on one wolf each from the Geode Creek, Slough Creek, and Cougar Creek packs. Currently, 44% of wolves in YNP are collared.

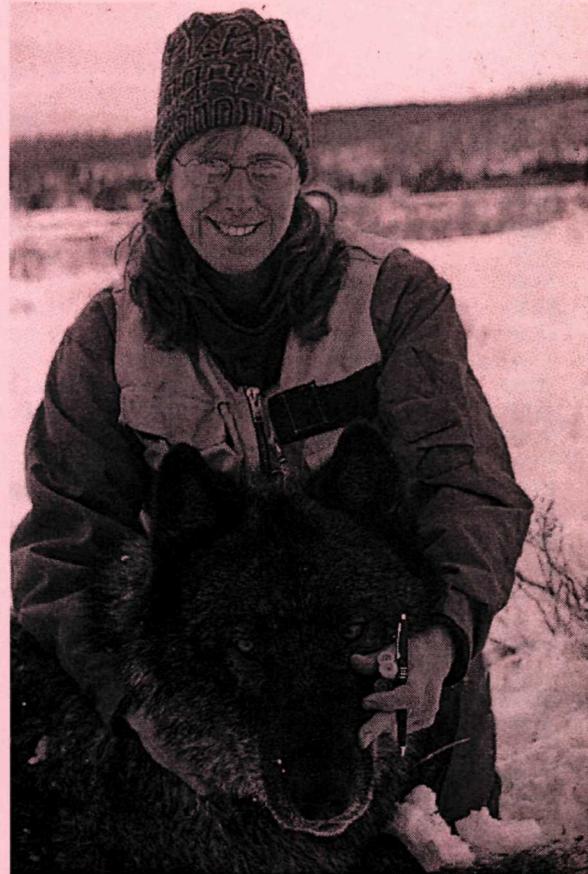
The wolves are darted from the air, making capture efforts dependent on weather conditions and pilot and helicopter availability. The wolf project team usually begins capture activities in January, when the snow is deep enough to slow the wolves. This year, in an effort to get as many collars out as possible, to target two packs that typically leave Yellowstone during December (Yellowstone Delta and Bechler packs), and because snow cover has been less than normal in recent years, the team decided to get an early start.

On November 13, eight wolves from three different packs were captured. Four were females, including two adults—usually the hardest to catch because they are generally lighter than males, and thus more agile in the snow. Wolf 48F, caught in Hayden Valley, is the alpha female of the Nez Perce pack. Her collar had stopped working, and this capture allowed personnel to replace it with a new one.

A large male was also re-collared. Wolf 194M (*right*) was born to the Rose Creek pack and had dispersed to Mollie's pack in 2000, when he was initially collared. He was captured in Pelican Valley and weighed an impressive 130 lbs.

Two wolves collared in this first round of captures later dispersed to Paradise Valley. Wolves 352M and 351M were both from the Geode Creek pack. Unfortunately, 351M got caught in a coyote trap and died. Another male, 356M, dispersed from the Swan Lake pack and was spotted walking on the road in Lamar

Valley. Rangers performed aversive conditioning that included hand clapping and yelling, and this wolf was subsequently spotted outside the park in Jardine. It is likely that these males traveled such great distances in search of available mates. In fact, in addition to the newly-captured and collared locals, one male adult, which was accidentally caught in a coyote trap in Paradise Valley and re-collared by Wolf Project staff, was identified as B-144, who dispersed all the way from Salmon, Idaho.



NS/DONUS SMITH

Wolf Project program assistant Deb Guernsey with Wolf 194M, of the Mollie's pack, November 2003.

Capture efforts resumed in mid-January after a short break over the holidays. Thirteen wolves from four different packs were captured and collared, including five females. On February 13 and 14, the crew captured six wolves from the Geode and Cougar Creek packs, including four females, and six in

the Delta pack that had not been collared since 2001. When those wolves were last captured, all of the collars were chewed off within six months. It is hoped that subsequent modifications will allow the collars to withstand more chewing.

With no injuries to humans or wolves, winter wolf

capture was definitely a success this year. All of the wolves recovered nicely post-capture. As the season winds down, so too do the wolves. By the end of February, mating season is drawing to a close. The wolves will begin to den in the coming weeks. 🐺

WOLVES CAPTURED AND COLLARED IN THE 2003-2004 CAPTURE OPERATIONS

WOLF #	SEX	AGE CLASS	SOCIAL STATUS	DATE OF CAPTURE	PACK
383M	Male	Pup	Subordinate	1/15/2004	Agate Creek
384F	Female	Pup	Subordinate	1/15/2004	Agate Creek
385M	Male	Pup	Subordinate	1/15/2004	Agate Creek
151F	Female	Old adult	Alpha	2/12/2004	Cougar Creek
388F	Female	Adult	Subordinate	2/12/2004	Cougar Creek
389M	Male	Yearling	Subordinate	2/12/2004	Cougar Creek
390F*	Female	Pup	Subordinate	2/12/2004	Cougar Creek
B-144	Male	Adult	Unknown	12/19/2003	Disperser from Salmon, ID
348M	Male	Pup	Subordinate	11/22/2003	Druid Peak
349M	Male	Pup	Subordinate	11/22/2003	Druid Peak
350M	Male	Pup	Subordinate	11/22/2003	Druid Peak
373M	Male	Pup	Subordinate	1/14/2004	Druid Peak
374M	Male	Pup	Subordinate	1/14/2004	Druid Peak
375F	Female	Pup	Subordinate	1/14/2004	Druid Peak
376F*	Female	Pup	Subordinate	1/14/2004	Druid Peak
351M	Male	Yearling/adult	Subordinate	11/23/2003	Geode Creek
352M	Male	Adult	Possible alpha	11/23/2003	Geode Creek
353F	Female	Adult	Possible beta	11/23/2003	Geode Creek
391F	Female	Adult	Subordinate	2/13/2004	Geode Creek
392M*	Male	Yearling	Subordinate	2/13/2004	Geode Creek
344F	Female	Yearling	Subordinate	11/13/2003	Leopold
345F	Female	Pup	Subordinate	11/13/2003	Leopold
381M	Male	Yearling	Subordinate	1/14/2004	Leopold
382F*	Female	Pup	Subordinate	1/14/2004	Leopold
194M	Male	Adult	Subordinate	11/13/2003	Mollie's
343M	Male	Pup	Subordinate	11/13/2003	Mollie's
048F	Female	Old adult	Alpha	11/13/2003	Nez Perce
340F	Female	Adult	Subordinate	11/13/2003	Nez Perce
341F	Female	Yearling	Subordinate	11/13/2003	Nez Perce
342F	Female	Pup	Subordinate	11/13/2003	Nez Perce
377M	Male	Adult	Unknown	1/14/2004	Slough Creek
378M	Male	Adult	Unknown	1/14/2004	Slough Creek
379M	Male	Adult	Unknown	1/14/2004	Slough Creek
380F*	Female	Pup	Subordinate	1/14/2004	Slough Creek
354M	Male	Adult	Unknown	11/23/2003	Swan Lake
355F	Female	Yearling	Subordinate	11/23/2003	Swan Lake
356M	Male	Yearling	Subordinate	11/23/2003	Swan Lake
395F	Female	Adult	Unknown	2/13/2004	Yellowstone Delta
396F	Female	Adult	Unknown	2/13/2004	Yellowstone Delta
397F	Female	Adult	Unknown	2/13/2004	Yellowstone Delta
398M	Male	Adult	Unknown	2/13/2004	Yellowstone Delta
399F	Female	Adult	Unknown	2/13/2004	Yellowstone Delta
400F	Female	Adult	Unknown	2/13/2004	Yellowstone Delta

* wolves fitted with GPS collars

GEYSERS IN WINTER

by Carolyn Loren and the Old Faithful Visitor Center Staff

Winter is always a challenging time for keeping track of geyser patterns. Yet with help from guides, local geyser gazers and recruited visitors, we've learned of some interesting winter activity.

Silex Spring, at Fountain Paint Pots, is at the top of the list: it has erupted a number of times this winter, which could be a first. Reported activity includes December 25–26, 2003 (eruption witnessed), January 2–3, 2004 (surging seen), January 16–17 (post-eruption signs seen), January 23 (eruption seen), and February 3–4 (surging seen). While Silex has had frequent eruption episodes in recent summers (2000 and 2001), the closest we've come to winter activity in the recent past is 20+ eruptions in November 2002. Its current eruption pattern may be different from those of past summers; eruption episodes seem shorter, and Silex's pool may be clearing sooner.

We have also had temporary eruptive activity at Scalloped Spring between Castle and Sawmill geysers. A bison calf fell into it during the evening of January 31–February 1. As you may recall, one fell into South Scalloped Spring a number of years ago; this time, while its hind end was partly covering it, Scalloped erupted up to eight feet every 3–15 minutes. We will likely never know how it happened, but wolves have been frequenting the Upper Geyser Basin lately. By February 3, all that was left to see of the bison was one rib stuck in the sinter. The water was in a constant rolling boil (as is typical), and it appeared soapy. The area still smelled like bison stew, but without good spices.

Other features have been less active than usual. As much as a week goes by without a daytime Beehive Geyser eruption, although we occasionally enjoy them

near the same time of day for several days. Plume Geyser's intervals have varied from 60–70 minutes to 1½–2 hours, and a new period of dormancy began January 24. That is not new; Plume was also dormant during the winters of 1992–93 and 1993–94.

Baby Daisy and Butterfly continue to be active; Fan and Mortar have erupted (and were even seen on January 24). Moved, ice-encased signs indicate Giant Geyser probably erupted January 16–17.

Over at West Thumb geyser basin, Hillside Geyser has been seen a number of times this winter. Little is known here about activity at Norris geyser basin; Steamboat's last eruption was October 23, 2003.

While we anticipated changes in geyser patterns from the 5.0 Jackson-area earthquake on January 22, preliminary analysis does not show the changes we saw last year after the large Alaska earthquake.



Silex Spring has erupted a number of times this winter.

Old Faithful is more faithful than ever. In 2003, only 5% of its eruptions were short mode, with a 65-minute interval until the next eruption. (In 1999, 45% of the eruptions were short mode.) Once again, a number of guides are counting on 92-minute intervals, and are adding 1½ hours to an early morning time, over and over, to plan their day with visitors. 🐾

BISON RETURN TO GARDINER

by Chris Geremia

As snow continues to pile up across the landscape, Yellowstone area bison face the inevitable challenge of foraging under harsh conditions. Across the park's northern range, snow depths vary from traces to at least two feet. In the interior, Pelican and Hayden valleys are blanketed with over three feet of snow.

Over the past month, Mammoth and Gardiner residents welcomed back their controversial seasonal neighbors. During the past two winters, approximately 10% of the central sub-population of bison (generally living in Hayden, Pelican, and Firehole valleys) has moved north to winter in the greater Mammoth and Gardiner areas, because suitable habitat for bison in Hayden and Pelican valleys shrinks dramatically as

foraging technique.

Population size can also be a factor in migration; the large size of the central sub-population likely creates social pressures that cause some bison to search for other foraging areas. The more bison spread out on the landscape, the higher the probability that some will move closer to the park boundaries. In 1998, the National Research Council (NRC) completed a technical report identifying bison population size as a significant factor correlated to movements out of Yellowstone. The NRC identified 3,000 animals as a threshold population size; when the population is higher than that, the probability of movement out of the park increases dramatically (see *BC*, midwinter 2003). Snow water equivalence (the amount of water contained in snow on the ground) is also strongly related to bison movement out of the park.

The current population size is unknown, but the late summer count, completed in August, estimated it to be around 4,250 animals. Fewer than 25 bison mortalities have been documented since that time. A winter population estimate flight will be conducted in mid-February. Regardless of snow conditions, the current estimate of population size alone strongly suggests that large numbers of bison will leave the park between now and mid-May. The ultimate fate of those bison will depend on where and when they cross the park's boundaries.

In a year such as this, with a large population, snow will significantly shape bison movement patterns. Bison Ecology and Management Office (BEMO) staff has been monitoring the winter snowpack conditions

since January. The pertinent management question is whether we can predict bison movement patterns near park boundaries based on an understanding of the structure of the snowpack. We are monitoring the snowpack in the Swan Lake Flat and Blacktail Plateau areas. Currently, the snowpack ranges from 12–36 inches. In some locations, an icy layer is developing approximately 4–8 inches above the ground that may hinder foraging. This layer has not been previously observed this winter. However, the snowpack is a mosaic. The presence of bison feeding craters (where the animals have used their heads to “plow” snow down

NPS PHOTO



Bison forage the lawns in front of park housing on the triangle at Gardiner, January 2003.

snow accumulates. In the park, winter habitat generally consists of windswept hilltops and geothermally-influenced areas such as the confluence of Raven, Astringent and Pelican creeks, Violet and Highland hot springs, the Mud Volcano, and the upper Alum Creek hot springs basin. Because they are at lower elevations and receive less snowfall, greater Mammoth and Gardiner, and the northern range provide animals with greater probability of finding suitable forage in winter. Regardless of where bison spend the winter, they tend to move to new locations when the snowpack becomes impenetrable to their snowplow-like

The current population size is unknown, but the late summer count, completed in August, estimated it to be around 4,250 animals.

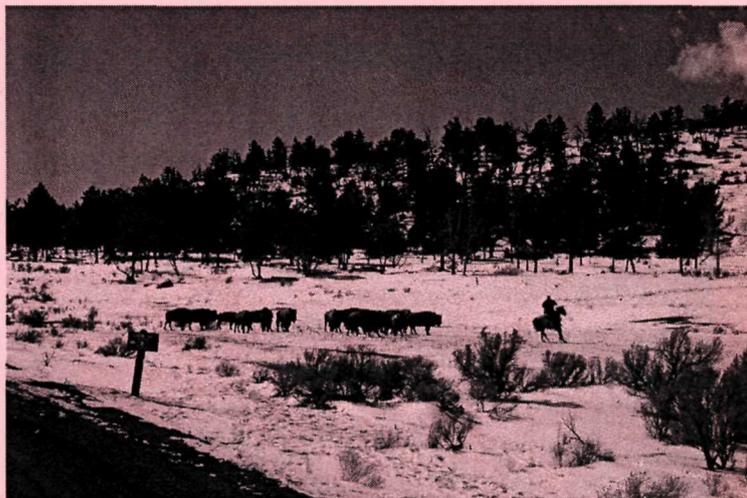
to the ground forage) adjacent to survey areas show that bison are finding microhabitats where the snow-pack contains few or no ice layers existing as potential foraging barriers.

Although we are beginning to understand how and why bison move to the park's boundaries, a more difficult question is why they choose the routes they do. To better understand bison travel corridors, BEMO staff has begun a long-term spatial ecology study in which we will fit central herd animals with VHF/GPS collars that record their movements. We suspect that central herd animals summering in Hayden Valley travel west across the Mary Mountain pass, into the Nez Perce drainage, and spread out in the Fountain Flats area. Some animals also utilize the road corridor to move north through the Madison and Norris areas. Animals may then gather at Swan Lake Flat before moving to Blacktail Plateau and onto the lower northern range. During September, observations by maintenance staff at Canyon (special thanks to Tom Kirchner), noted that small groups of bison were traveling to Swan Lake via the Solfatara Plateau and the road corridor from Canyon to Norris. Bison monitoring efforts on January 28 counted 75 bison in the Eagle Creek/Bear Creek area north of the park. Twenty-nine bison were located just south of the Gardiner school, and approximately 150 were scattered in five groups throughout Blacktail Plateau.

What is the fate of bison in Gardiner? Yellowstone's Organic Act requires that we conserve Yellowstone's wildlife, including bison. Concurrently, the 2000 Record of Decision for the Interagency Bison Management Plan dictates that we cannot have any free-ranging bison north of the park boundary at Reese Creek, or outside the Eagle Creek/Bear Creek tolerance zone at this time. If animals move into unsanctioned areas outside the park, then they will be hazed by the National Park Service. While

it may be distressing to some to witness hazing operations, it is important to remember that the alternative to hazing is capture.

Hazing operations on small groups of bison have been occurring at the North Entrance area since the middle of January. At this time, the bison appear "hazeable," and have thus far moved with minimal pressure, posing minimal resistance and showing no signs of aggression. If bison become "unhazeable," decisionmakers will be forced to move to a capture operation at Stephens Creek. Should capture operations be necessary this winter, Yellowstone National Park is moving forward with plans to test all animals at the Stephens Creek capture facility, hold animals that test seronegative for exposure to brucellosis, and vaccinate calves and yearlings with a safe brucellosis vaccine.



NPS PHOTO

Rangers conduct a hazing operation near the Mammoth Campground, March 2002.

These vaccinated animals will then be held in a fenced pasture at Stephens Creek until spring, when they will be released back into the park. This represents another giant step forward towards having free-ranging, untested bison in the greater Yellowstone area. 🐃

DRIVERS, SYNCHRONIZE YOUR WATCHES!

by Jim Caslick

Yellowstone's new regulations for snowmobile use are a snap to decipher, when compared to the first regulations for automobile use. The Washington office of the U.S. Department of the Interior published the auto regulations in July 1915, to take effect just three weeks later (no EIS or public comment period in those days!).

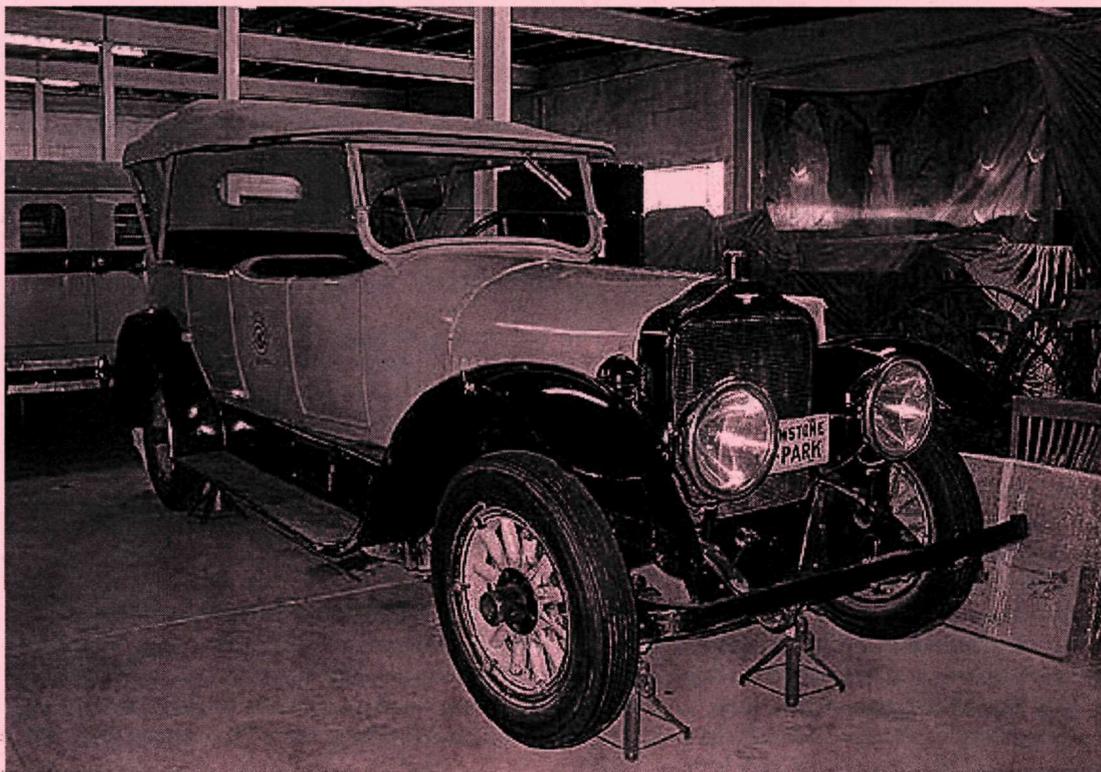
Only autos operated for personal pleasure were allowed—cars carrying paying passengers could not enter, nor could motorcycles. The entry fees for so-called "tickets of passage" were \$5.00 for runabouts (single-passenger cars), \$7.50 for five-passenger cars, and \$10.00 for seven-passenger cars, for each trip through the park.

Before cars were allowed to enter, they had to satisfy the park guard as to general condition, with brakes and tires in first-class working order. Upon entering the park, all drivers were required to block and skid their car's rear wheels with either the hand brake or foot brake, to the entrance guard's satisfaction. Also,

they had to show that they had enough gas to reach the first gas supply station, and that two extra tires were being carried.

These automobile operation regulations further required that:

- Muffler cutouts must be closed while approaching or passing riding horses, horse-drawn vehicles, hotels, camps, or soldier stations;
- Speed limits were 12 miles per hour ascending and 10 miles per hour descending steep grades, and 8 miles per hour when approaching sharp curves. On good roads with straight stretches, and when no team of horses was nearer than 200 yards, speed could be increased to 20 miles per hour. The speed limit when passing horses on the road was 8 miles per hour. Horns were to be sounded at all curves where the road could not be seen for at least 200 yards ahead, when approaching teams or riding animals, and also upon meeting other machines. Autos in motion



NPS PHOTO

1917 White Motor Company touring car, part of the park's historic vehicle collection.

were to remain at least 100 yards apart. No auto was to pass another auto traveling in the same direction; and

- Autos were to take the outer edge of the roadway, regardless of which way teams, saddle horses, or pack trains were approached, leaving the roadway for horses and horse-drawn vehicles. Teams of horses had the right of way, and autos were to be backed or otherwise handled as necessary to allow teams to pass safely. Autos were not allowed to pass any horse-drawn passenger vehicles running upon regular schedules, or to approach them closer than 150 yards.

Even with all the above (and more) regulations firmly in mind, the responsibilities of auto tourists had only begun! Upon entering the park, auto drivers were to synchronize their watches with clocks at the entrance stations and had to follow one of two published travel schedules that showed mileage between points and specific times for leaving and arriving at those points.

For example, the schedule showed that if you entered the park at the east gate, your first stop was to be Lake Hotel, and you had a choice of leaving the gate between either 7:30–8:00 A.M., or between 3:15–3:45 P.M. You were then to arrive at Lake Hotel between 10:00–11:00 A. M., or between 5:45–6:15 P.M. Earlier arrival spelled trouble, as it indicated speeding. Fines were imposed for arrival at any point before the approved lapse of time, as follows:

- 50 cents per minute for each of the first 15 minutes;
- \$1 per minute for each of the next 20 minutes;

and

- \$25 fine or ejection from the park, or both, for being more than 25 minutes early.

Autos stopping over at points other than the listed hotels or permanent camps could resume travel only at such time as coincided with a subsequent regular auto schedule past that point. In the meantime, these stopover vehicles were to park out of sight or at least 100 yards from the main road.

Penalties for violation of any of these rules could include revocation of the ticket of passage, fines, damages, immediate ejection from the park, and refusal of re-entry without sanction in writing from the secretary of the interior.

Owing to the scarcity of travel on the road between West Entrance and (then) Northwest or Gallatin Station Entrance, and on South Entrance and Northeast Entrance roads, autos were allowed to travel without schedule, but upon meeting the main roads at West Entrance, Thumb or Tower Falls, respectively, they had to conform to the regular schedules.

Can you imagine being a park entrance guard in 1915 when handed these four pages of new regulations with a handwritten note at the top of the front page (as the archived copy shows), simply saying "Please follow instructions?"

So it might be worth considering the new rules for use of snowmobiles in Yellowstone from within the context of the very long history of vehicle use regulations aimed at protecting both the park's visitors and its natural resources. It's a balance that requires not only rules and their enforcement, but also ongoing changes in these regulations as new modes of transport and new forms of recreation are developed. 🐾

2003–2004 WINTER ELK COUNT

by P.J. White, Tom Lemke, Dan Tyers, and Peter Gogan

The Northern Yellowstone Cooperative Wildlife Working Group conducted its annual winter survey of the northern Yellowstone elk population on December 18, 2003. A total of 8,335 elk were counted during relatively good survey conditions. Approximately 75% of the observed elk were located within Yellowstone National Park, while 25% were located north of the park boundary. Biologists used four fixed-wing aircraft to count elk through the entire northern range during the one-day survey. The

northern Yellowstone elk herd winters between the northeast entrance of Yellowstone National Park and Dome Mountain/Dailey Lake in Paradise Valley.

This year's count of 8,335 elk was fewer than the 9,215 elk counted during December 2002. The long-term trend in counts of northern Yellowstone elk suggests that their abundance has decreased at an average rate of approximately 6% per year since 1994. Predation by wolves and other large carnivores, and human harvests during the Gardiner area late season

hunt, have been the primary factors contributing to the decreasing abundance of northern Yellowstone elk since the mid 1990s. Other factors contributing to decreased elk abundance include a substantial winter-kill owing to severe snow pack during 1997 and, possibly, drought-related effects on pregnancy and calf survival.

The Gardiner late season elk hunt was designed to reduce elk abundance outside Yellowstone National Park so that elk numbers do not cause long-term changes in plant communities or decrease the quality of the winter range. As total elk numbers and elk migrations outside the park have declined in recent years, the Montana Department of Fish, Wildlife, and Parks has incrementally reduced the number of antlerless elk permits for the late hunt from 2,880 in 1997 to 1,400 in 2004. Elk harvest during the late hunt has decreased from 2,365 elk in 1997 to 718 in 2003. Montana Fish, Wildlife, and Parks will continue to use an adaptive harvest management approach to set biologically-based permit levels. Based

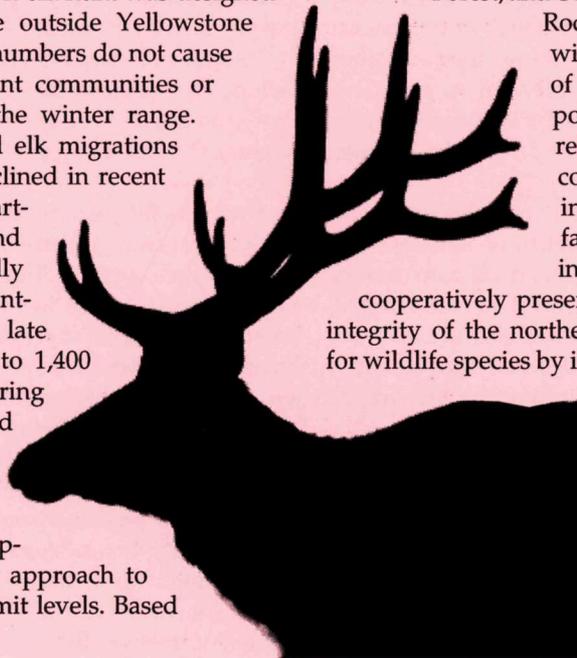
on current trends in the size of the elk population and low elk recruitment rates, elk permit numbers and the late season harvests will likely remain at conservative levels for the next several years.

The Working Group, comprised of resource managers and biologists from the Montana Fish, Wildlife, & Parks, Yellowstone National Park, Gallatin National Forest, and U.S. Geological Survey–Northern

Rocky Mountain Science Center, will continue to monitor trends of the northern Yellowstone elk population and evaluate the relative contribution of various components of mortality, including predation, environmental factors, and hunting. The Working Group was formed in 1983 to

cooperatively preserve and protect the long-term integrity of the northern Yellowstone winter range for wildlife species by increasing our scientific knowl-

edge of the species and their habitats, promoting prudent land management activities, and encouraging an interagency approach to answering questions and solving problems. 🐾



RESOURCE ROUNDUP

WEST ENTRANCE

This mountain lion kitten was seen near Seven Mile Bridge on the West Entrance Road on Monday, February 16. The kitten, whose mother was not observed, spent about an hour on the bank of the Madison River and on a downed tree in the river. It vocalized for a little while and was seen by NPS employees, skiers, and passengers of a Xanterra snowcoach.

After everyone but the park's photographer had left, the kitten left the river bank and walked back to the road, traveling west for about 60 yards. It then started to follow a packed game trail south of the road. —Jim Peaco



OLD FAITHFUL

On February 18, visitors reported seeing a dead coyote on the trail to Lone Star Geyser. The coyote was 20 feet west of the trail just

NPS/JIM PEACO

NPS/JIM PEACO

south of the bridge, but well north of the junction with Spring Creek trail. There is thermal activity further west of the trail in that area. It was reported that blood and wolf tracks (unconfirmed) were near the body, and that it was fresh (only that day's snow had yet fallen on the coyote, and no birds were in the area yet). —Beth Taylor

MAMMOTH HOT SPRINGS

Multiple reports of several wolf kills have been reported in the Mammoth area since the week of February 8. The Swan Lake pack was observed in the Lower Mammoth area, and three elk were killed on its outskirts. Visitors and NPS employees also observed a wolf killing an elk in the vicinity of the Mammoth Hotel. Such sightings are notable but not unusual; the presence of elk in the Mammoth area attracts wolves in search of a kill. It should be noted that wolves are in the Mammoth area to hunt elk—not because they have become “tame” or habituated. —Yellowstone Wolf Project staff 🐾

...NEWS BRIEFS...

LYNX TRACKS OBSERVED

On January 13, 2004, Yellowstone Lynx Project staff observed a set of individual lynx tracks within their study site along the east side of the park. A total of four bedding areas were documented, and numerous hair and scat samples collected for DNA analysis. This finding, along with two lynx detections from the past couple of years, will help answer the question of whether or not there are resident lynx in the park. If there are, the lynx crew also hopes to determine age and sex composition, as well as food habits. Anyone who observes suspected lynx tracks is encouraged to call Peter Lundberg at 307-344-2506.

GRAND LOOP ROAD LISTED ON NATIONAL REGISTER

On December 23, 2003, the Grand Loop Road Historic District was listed on the National Register of Historic Places. National Register nominations are currently being prepared for the park's Corkscrew Bridge and West Entrance Road Historic District, as well as two Precontact archeological sites. Yellowstone's currently-listed sites can be seen in Table 1.

WOLF 42F FOUND DEAD

On Monday, February 2, the weekly monitoring flight discovered the alpha female of the Druid Peak pack, 42F, dead on top of Specimen Ridge. Yellowstone Wolf Project ground crews noticed her missing from the pack on Sunday—a rare situation, especially as it is breeding season and the pack's alpha male, 21M, was never away from her side. Wolf Project staff skied to the site on February 3, and

performed a field necropsy confirming intraspecific killing as the cause of the death. Although heavy scavenging had already occurred, there was track evidence of a chase and several areas of trampled snow with pooled blood, blood stains along some drag marks, and hair in the snow.

The best evidence from ground and air monitoring implicates the Mollie's pack as the wolves responsible for 42F's death. Usu-

PROPERTIES	DATE LISTED
National Historic Landmarks	
Old Faithful Inn	7-23-1971
Madison Junction Trailside Museum	7-9-1982
Norris Geyser Basin Trailside Museum	7-21-1983
Obsidian Cliff	6-9-1996
Fishing Bridge Trailside Museum	5-28-1987
Northeast Entrance Station	5-28-1987
National Historic Districts	
Old Faithful Historic District	12-7-1982
Roosevelt Lodge Historic District	4-4-1983
Lake Fish Hatchery Historic District	6-25-1985
Mammoth Hot Springs Historic District	3-20-2002
North Entrance Road Historic District	5-22-2002
Grand Loop Road Historic District	12-23-2003
National Historic Sites	
Obsidian Cliff (Nature Shrine) kiosk	7-9-1982
Lamar Buffalo Ranch	12-7-1982
U.S. Post Office—Mammoth Hot Springs	5-19-1987
Lake Hotel	5-16-1991
Queen's Laundry Bath House	7-25-2001

Table 1. Yellowstone's National Historic Register listings.

ally in the Pelican Valley area, they were on the northern range in the Specimen Ridge/Little America area in the days surrounding the event. The Agate pack has also been in the area, so their involvement cannot be discounted. 42F's skull was collected because of her historical significance to the Yellowstone ecosystem. It will also be used as part of an ongoing wolf skull morphometrics database. Her remains were left on the site.

42F would have been nine years old in April, and was the last Canadian wolf remaining in the park. She was arguably one of Yellowstone's most famous wolves, documented in two *National Geographic* films, a scientific publication, and by thousands of wolf watchers as being a crucial part of the Druid Peak pack's legacy. She was in very good condition, and large for a female, with a massive head. Her teeth were in excellent condition for an old wolf.

42F was seen breeding with the alpha male, 21M, the day before the event. However, pups may still be born to the Druid pack this spring, as other adult females have been involved with breeding/courtship activities with unrelated male wolves from outside the pack. It is unknown if 21M will breed any of the females in the pack, most of

which are his offspring.

COURT SENTENCES ELFORD IN LONE STAR GEYSER INCIDENT

On Tuesday, February 3, 2004, Adam Ray Elford, 22 years old, of Vancouver, Washington, appeared before U.S. Magistrate Judge Stephen E. Cole at Mammoth Hot Springs for sentencing on charges stemming from an incident at Lone Star Geyser. On October 10, 2003, Elford drove his Toyota Tacoma around a locked barricade at the Lone Star Geyser parking area and proceeded down a 2.5 mile trail leading to the geyser. At the end of the asphalt, he and a companion, Austin B. Olsen, moved a log barrier and drove completely around the cone of the geyser and surrounding meadows until the vehicle became stuck in the soft soil.

An investigation indicates the two men caused considerable resource damage to Lone Star Geyser and the surrounding area. Already, park staff and the Montana Conservation Corps have spent more than 80 hours mitigating resource damage that resulted. A reassessment of the damaged areas will be completed this spring, with revegetation and restoration efforts to continue as necessary.

Elford, charged with operating

a vehicle off road; injuring mineral resources; possession of a loaded firearm in a motor vehicle; improper food storage; and operating a motor vehicle with a suspended driver's license, was found guilty on all five charges and was sentenced to 90 days in jail, with 70 days suspended. He was placed on three years' probation and banned from entering Yellowstone National Park for five years; he must pay a tow bill of \$386.69; and fined \$1,550. Elford will also be required to pay full restitution for all restoration costs on behalf of the National Park Service and reimburse the U.S. District Court for the cost of his court-appointed defense attorney.

The case against Austin Olsen is still being adjudicated and will be heard at a later date.

CONCESSIONS HISTORY AVAILABLE

"For the Benefit and Enjoyment of the People:" A History of Concession Development in Yellowstone National Park, 1872-1966, by Mary Shivers Culpin, is now available from the Yellowstone Center for Resources. Contact Virginia Warner at 307-344-2230 or virginia_warner@nps.gov to obtain a copy. 🐾

The Buffalo Chip is the resource management newsletter of Yellowstone National Park. It is published periodically by the Yellowstone Center for Resources. We welcome submissions of articles or drawings relating to natural and cultural resource management and research in the park. They can be sent to:

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