

Elk and Other Ungulates

Yellowstone National Park's high plateaus provide summer grazing for about 35,000 elk and much smaller numbers of deer, bison, pronghorn antelope, bighorn sheep, and moose. The largest of the seven primary elk herds, Yellowstone's northern herd, has generally numbered 15,000 to 22,000 over the past decade. One-third or more of its winter range is on public and private lands north of the park, and up to half of these elk and many of the other grazing animals migrate to lower areas in or outside the park during the winter, depending on the depth of snow and winter severity.

For decades many people have believed that the park had more elk than the range could reasonably sustain. Elk, along with bison and pronghorn, were blamed for overgrazing the grasses and shrublands as well as for increased erosion and declines in willows, aspen, and beaver. As a result, thousands of Yellowstone's ungulates were shipped to other ranges or simply shot. Despite prevailing scientific opinion at the time that mass-reduction of elk was "necessary," public outcry resulted in these efforts being halted in 1967. Since the 1960s, wildlife managers in largely intact parks such as Yellowstone's have sought to accommodate, insofar as practical, each species' propensity to "naturally" regulate its population size. When natural regulation is permitted to take place, wildlife populations fluctuate over time as birth and death rates are affected by a combination of factors, including winter severity, the quantity and quality of available forage, emigration, hunting, and predation by other animals. Except for bison, wild ungulates may be hunted during state-regulated seasons when they leave the park.

But natural regulation has remained controversial. In 1986, continuing concern over the condition of the northern range in both the scientific community and the general public prompted Congress to mandate more studies. This research initiative, one of the largest in the history of the NPS, encompassed more than 40 projects by NPS biologists, university researchers, and scientists from other federal and state agencies. The key findings from these research projects have been published in two books: the peer-reviewed technical report, *Effects of Grazing by Wild Ungulates in Yellowstone National Park* (1996); and *Yellowstone's Northern Range: Complexity and Change in a Wildland Ecosystem* (1997). Traditional interpretations of the range as overgrazed were based on commercial rangeland standards that are not appropriate for the park. Although experts will continue to disagree on some points, overall the studies demonstrate that the northern range has continued to provide a robust source of nutrition for large, healthy ungulate herds year after year. Despite certain localized effects, elk do not appear to have had any significant adverse effect on the overall diversity of native animals and plants.

While there is much more to be learned about how the ecosystem functions, the continuing controversy over the park's natural regulation policy is steeped in different human value systems. Some people, uncomfortable with the inherent variability of natural systems, prefer to manage for consistency. Others regard a largely uninhabited

natural system as a rich opportunity for us to learn from and enjoy. In 1997, the General Accounting Office, which had completed a detailed review of northern range research and management, acknowledged that there was indeed scientific debate underway, but did not fault park managers for adhering to a natural regulation policy. In 1998, Congress called for the National Academy of Sciences to review management of the northern range, and the two-year study began in January of 1999.

Interagency cooperation. Yellowstone cooperates with the Gallatin National Forest and the Montana Department of Fish, Wildlife and Parks in a Northern Yellowstone Wildlife Working Group. This group discusses wildlife management and research related to the northern range and shares the cost of annual monitoring flights to count ungulate herds and classify them by sex and age—information used to plan hunting seasons outside the park and to assess the relationship between grazing animals, their habitat, and predator populations. The agencies have also worked in partnership with groups such as the Rocky Mountain Elk Foundation to secure additional winter range for these herds outside the park. Cooperation has also made possible periodic surveys of the Gallatin and Jackson Hole elk herds that winter west and south of the park.

The park staff includes three biologists who work full-time on monitoring and management of ungulates, although bison currently take up most of their time. (See “Bison”, page 3–16.)

AN ELK BY ANY OTHER NAME

Shawnee Indians call the animal “wapiti”, which means white-rumped deer. Although the North American elk is the same species as the red deer of Europe, the first European settlers called them “elk,” the word used for moose in Europe. Of the six sub-species that existed in North America when the Europeans arrived, only four remain today—the Manitoban, the Roosevelt, the Tule, and the Rocky Mountain elk—the last of which is found in Yellowstone. Today, greater Yellowstone is home to about 120,000 elk.

While grass is their favored food at any time of year, elk can survive on a wider range of plant types in the Yellowstone ecosystem than can other wild ungulates (hooved animals) and consequently are much more numerous. Although their strength, stamina, and speed help protect elk from predators, they are an important food source for wolves, grizzly bears, mountain lions, and coyotes, as well as scavengers such as foxes, eagles, and carcass beetles. But the severity of winter weather is the major controlling influence on elk populations.



HOW GRAZING AFFECTS WILDLANDS

Scientific appraisals of range conditions measure criteria such as plant productivity. One research technique used on Yellowstone's northern range is to compare grazed grasslands to areas inside plots called exclosures, which are fenced to prevent grazing. Although plants on ungrazed plots are taller, grazing does not reduce the seasonal protein content or total volume of grass, or the seedling establishment or annual growth of big sagebrush on the northern range, except in drought years. This is because elk move across the landscape as foraging conditions change, seldom grazing forbs and grasses during their most vulnerable period, and moving to higher elevations before the plants flower and seed. Furthermore, the fenced areas provide an extreme comparison, since the absence of all grazing is an artificial and undesirable condition when the goal is to preserve natural processes.

Wild ungulates enhance the cycling of nutrients by tilling the soil with their hooves and speeding up the decomposition process, converting plant matter to feces and urine that are cycled back into the system along with the animals' carcasses. Nutrient cycling has been found to occur at a higher rate on heavily grazed sites, stimulating production of the elk's preferred food plants. Many scientists value Yellowstone as a comparison to other more controlled landscapes around the world.



Elk numbers. Yellowstone's experience, since elk culling came to an end in 1968, has shown that natural regulation combined with regulated hunting in the surrounding national forests appears to be limiting the size of the elk population. Researchers have found that as the northern Yellowstone elk population increases, the cows carry less fat and produce fewer calves, and the calves weigh less at birth and are therefore less likely to survive. Elk numbers have increased during years with mild winters and wet summers and declined after the drought, fires, and severe winter of 1988. Since 1990, population estimates of the northern herd have ranged between 11,000 and 19,000. The park's other resident herd, which lives year-round in the Madison, Firehole, and Gibbon river valleys, numbers 600 to 800 animals.

Elk and their environment. Most studies suggest that elk in Yellowstone have not been detrimental to their associated grassland habitats. But the riparian zones and sparsely seen willows and aspens of northern Yellowstone show visible effects of heavy grazing pressure. Historic photos and tree-ring studies indicate that some northern range locations were once able to produce larger stands and greater numbers of willows and aspen than is now the case. However, it is possible that the aspen and willows of the late nineteenth century were able to grow to tree height because of some combination of climate, fire, commercial beaver trapping, and possibly elk reduction through hunting. Pollen studies

going back many thousands of years tend to support the view that the conditions necessary for aspen to grow to tree-size rarely occur in Yellowstone. No significant decline in northern range willows has occurred since 1959, despite a quadrupling of elk numbers there. Aspen, willows, beaver, and moose are also more abundant in the riparian zones of the southern and northwestern parts of the park, offering the opportunity for comparative studies with the northern range.

Another long-standing concern has been that ungulate grazing causes increased erosion. A team of researchers from government agencies and Trout Unlimited mapped erosion in the upper Yellowstone River drainage and found that most of the sediment transported in park rivers comes from four steep and geologically unstable areas. Sediments in rivers throughout the park are within the normal range observed in other western streams, and the Lamar Valley remains a blue-ribbon trout fishery, comparing favorably with that of other sport fisheries that have no wildlife herds grazing nearby.



Bighorn sheep. Early accounts that reported large numbers of bighorn sheep in the Yellowstone area have led to the speculation that they were more numerous before the park was established. Possible reasons for the decline include over-hunting, the introduction of domestic livestock diseases, and the difficulty that bighorn sheep have in recolonizing ranges from which they have been extirpated. The northern range population has not completely recovered from a *Chlamydia* epidemic that broke out in the winter of 1981-1982, which is believed to have resulted in the loss of about 60 percent of a herd estimated to number 500. Concerns about the herd have prompted visitor use restrictions in the Gardner Canyon between Mammoth Hot Springs and the park's north entrance, where bighorns are observed throughout the year. With funding provided by the Federal Lands Highway Program, researchers from Montana State University initiated a study on bighorn sheep habitat use in the park and how it is affected by human activity along the Gardiner to Mammoth and Dunraven Pass road corridors.

The Northern Yellowstone Wildlife Working Group conducts an annual ground count on the northern range and in recent years began funding an aerial bighorn count in the spring. In the past five years, counts of bighorn sheep on the northern range have varied from about 150 to 225 animals. Other bands of sheep summer in the high country of the Absaroka Range, along the park's north and east boundaries, and in the Red Mountains in southern Yellowstone.

White-tailed deer. Although occasionally seen in various parts of the park, white-tailed deer favor lower elevations and their numbers have never been high.



Moose. As solitary animals that spend much of their time in forested areas, Yellowstone's moose are very difficult to count, but the northern range population appears to have decreased since the 1960s, and especially since the fires of 1988 burned their winter spruce-fir habitats. Although the possibility of competitive exclusion by elk has not been ruled out, the loss of old growth forests and mortality from hunting outside the park may also be factors. Moose are often seen in riparian areas around Yellowstone Lake and along the Madison, Gallatin, Snake, upper Yellowstone, and Bechler rivers, but no regular surveys have been made in these areas; the only studies of moose have been in northeastern Yellowstone and the forests to the north.

Mule deer. While a few of Yellowstone's mule deer winter in the park's thermal basins, most migrate outside the park to lower elevations in winter. New research indicates that deer summer throughout greater Yellowstone, returning to a small area around Mammoth Hot Springs and Gardiner, Montana, during the severe snow season. Aerial surveys conducted on the northern range herd since 1985 indicate that this mule deer herd numbers between about 1,600 and 2,500 animals, despite a regular fall hunting season and significant numbers of road-killed deer outside the park.



Pronghorn antelope. Once abundant in the major river valleys that radiate from the park, pronghorn were heavily reduced by settlement and hunting in the nineteenth century. They were also culled along with elk and bison because of overgrazing concerns. By 1967 fewer than 200 pronghorn were counted. The only surviving herd in the park summers mostly in the Lamar Valley, but moves to lower elevations inside and outside the park in winter. The herd grew to 594 in 1991 but has since declined to less than 250 animals; predation by coyotes and other carnivores, inbreeding depression, and loss of winter range have been suggested as possible reasons. Research was initiated in 1998 on this small population, which contains more genetic diversity than any other North American herd studied. Biologists believe that if the herd drops below 200 animals, it will be in jeopardy of extinction.



Mountain goats. Although absent from the park for millenia, mountain goats were deliberately introduced around the park in the 1940s and 1950s. Since then, they have colonized adjacent drainages in the park, and bands of up to several dozen goats have become established in the northeastern and northwestern corners of the park. In areas where they are not native, mountain goats may damage native plants found nowhere else on the continent. The possible impact of goat colonization on Yellowstone's flora is unknown, and there is concern over the potential competition between goats and native bighorn sheep. The park hopes to convene a panel of outside experts to recommend management alternatives for dealing with the goats.



Program Needs

- **SECURE ADDITIONAL WINTER RANGE.** Yellowstone must continue to support the efforts of states and private groups to secure additional winter habitat in the face of ongoing land development. Riverine bottomlands are especially valuable to both wildlife and people, who want them for agricultural, recreational, and residential use.

- **RESEARCH AND MONITORING.** Despite the long history of elk research and management in the park, there is no ongoing funding to support surveys of elk, mule deer, moose, pronghorn, and bighorn sheep and their associated habitats on and beyond the northern range. Additional research is needed to improve our knowledge of pronghorn, bighorn sheep, and moose populations, and to study the effects of mountain goats on native plant and animal populations and determine appropriate management actions. More research is needed on interactions between elk, moose, beaver, and woody vegetation—aspens, willows, cottonwoods, sagebrush, and junipers—on the northern range and in other areas of the park.





ELK AND OTHER UNGULATES

STEWARDSHIP GOALS



Yellowstone provides habitat for wild populations of native elk and other ungulates, allowing herds to fluctuate in response to natural ecological processes with minimal influence. Visitors have opportunities to observe and learn about ungulate ecology.



The park identifies, protects, and if necessary restores populations, especially those of rare or endangered wildlife. Professionally trained staff monitor the full spectrum of ungulates and related species and oversee needed research.



Staff work cooperatively with neighboring agencies and partners to manage non-native species' influence on native ungulates and their habitat, and to prevent ungulate conflicts with humans.

CURRENT STATE OF RESOURCES/PROGRAMS



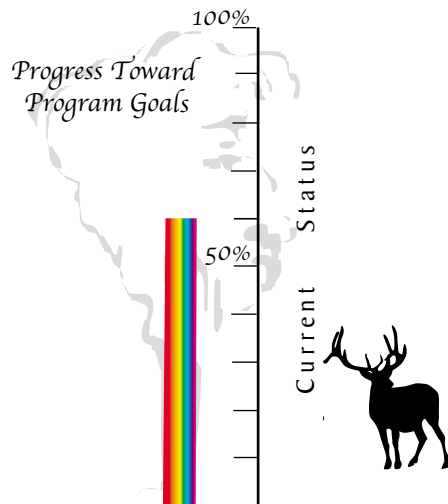
One of North America's largest elk herds and other ungulates provide outstanding viewing opportunities for visitors. Controversy over the elk's influence on range condition, riparian species, and biodiversity recurs among interested citizens and scientists and requires more research.



In addition to elk, staff wildlife biologists monitor moose, pronghorn, deer, and bighorn sheep, species which persist but receive relatively little research and management attention; long-term viability of pronghorn is a special concern.



Partnerships with the states, other federal agencies, and groups such as the Rocky Mountain Elk Foundation have led to improved databases and habitat outside the park. Non-native plant invaders and mountain goats pose an unknown level of threat to native species.



1998 FUNDING AND STAFF

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| Recurring Funds | |
| Yellowstone N.P. Base Budget | \$ 38,000 |
| Cost Recovery/Special Use Fees | |
| Non-Recurring Funds | |
| One-time Projects | |
| Staff | 0.5 FTE |

The human resources and funding necessary to professionally and effectively manage the park to stewardship levels will be identified in the park business plan.