Yellowstone's Northern Range

Where Nature Takes Its Course

United States Department of the Interior
NATIONAL PARK SERVICE

Dear Yellowstone Neighbors:

I urged Superintendent Mike Finley and his staff to prepare this newsletter because the conservation of park resources is too important an issue to be addressed with anything less than the full attention of citizens like yourself. Yellowstone's Northern Range has been controversial for most of this century, whether the debate is over elk numbers, bison management, predator control, or grassland ecology. The public is watching, and has important questions that deserve careful answers.

This newsletter introduces a wealth of new research findings about the Northern Range that has been done by respected scientists from a dozen universities and many state and federal agencies. These research findings have been published in the nation's leading scientific journals, which require strict adherence to objective research and represent the highest scientific "court" in the land. Science has taught us that a wildland ecosystem cannot be judged by the standards of commercial rangelands, and that the verdict on the Northern Range is to be found in the abundance of plant and animal life that continue to thrive there year after year.

It's also important to recognize that for Yellowstone, as for any wildland, science cannot provide all the answers. We treasure Yellowstone precisely because its landscape has been determined largely by natural processes rather than by human decisions. Questions about its management inevitably touch upon deep-seated values that are based less upon facts than upon on how each of us believes we should relate to our natural environment.

Please give this newsletter some time. Although no amount of science can settle such debates, we in the National Park Service believe that only by understanding what we have learned through research can we move the discussion about the Northern Range forward.

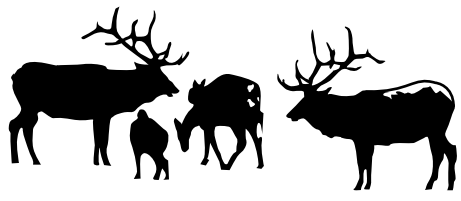
Sincerely,

Michael V. Finley
Superintendent
Yellowstone National Park

When the U.S. Congress set Yellowstone's boundaries in 1872, the primary goal was preservation of the area's geysers and other geothermal wonders; little thought was given to the migratory habits of its wildlife, about which little was then known. The park's higher elevations provide summer range for an estimated 38,000 grazing wildlife called ungulates — elk, bison, pronghorn, deer, bighorn sheep, and moose. But each year the accumulating snow spurs most of them to lower areas where the winter is warmer and drier, where there is more open range and fewer forests.

About half of the 30,000 elk that summer in the park spend the winter on an area known as the Northern Range, which covers 600 square miles along the Lamar and Yellowstone river basins, overlapping the boundary between Wyoming and Montana. A third of this range is on public and private lands north of the park, where wild ungulates often compete with livestock for grassland in winter.

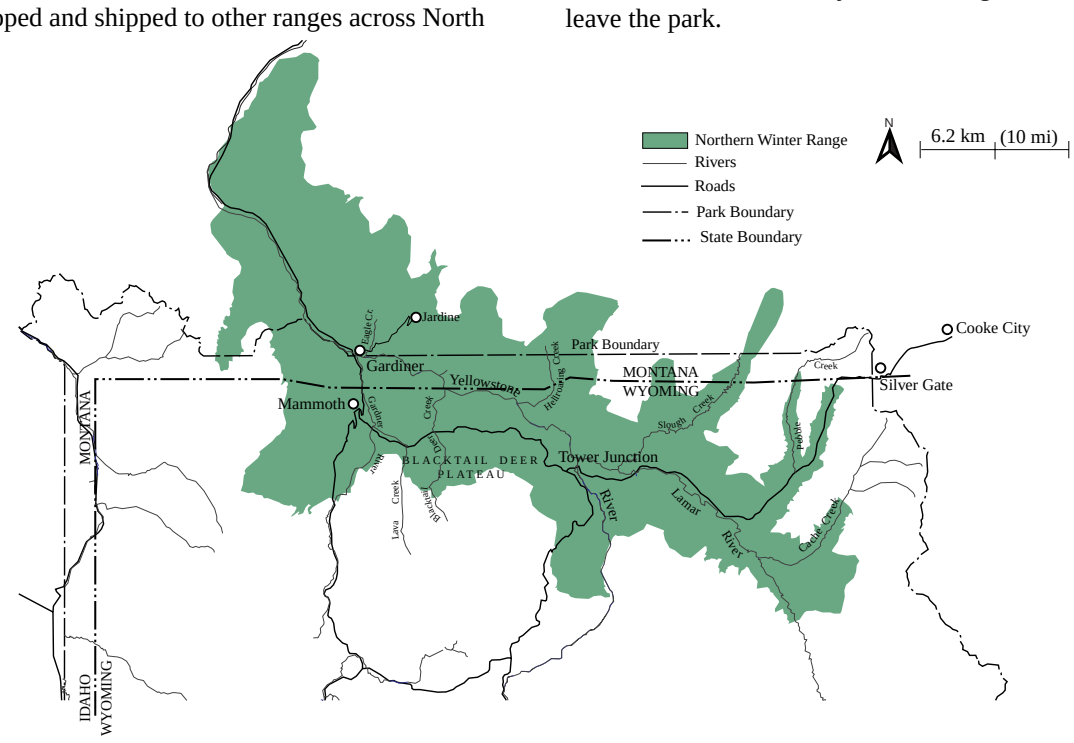
Sometimes referred to as "America's Serengeti" because of the large herds of wildlife that graze on its rolling expanse, the Northern Range has also been the stomping ground for generations of wildlife experts, politicians, and concerned citizens who have wrangled over how to best "manage" this natural treasure. Why the controversy?

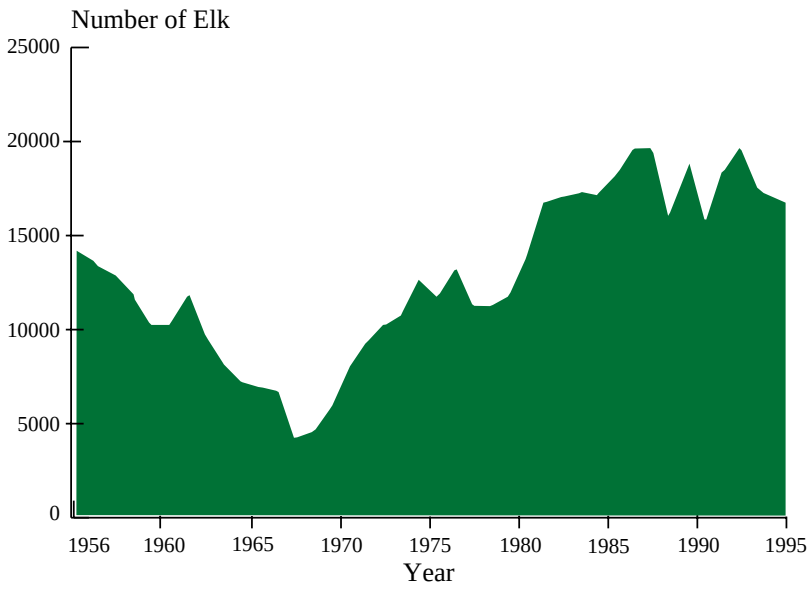


Too Many Elk at Home on the Range?

For decades it was commonly thought that the elk were "overgrazing" the Northern Range — that they were eating the vegetation more quickly than it could recover and damaging the plant communities, including willow and aspen. From this point of view, in order to maintain "the right balance" between elk and their habitat, the elk must be reduced periodically, although bison and pronghorn have also been blamed for overgrazing. As a result of this belief, Yellowstone's grazers were once trapped and shipped to other ranges across North America; some were simply shot. When control efforts resulted in the slaughter of thousands of elk in the 1960s, a public outcry led to hearings held by U.S. Senator McGee (Wyoming) and reductions came to an end in 1968. At that time, the number of elk wintering on the Northern Range was down to about 4,500.

Since then, wildlife managers at Yellowstone and throughout the United States have come to recognize each species' ability to "naturally" regulate its own number when we do not intervene unduly through our land use and other activities. When the process of natural regulation is permitted to take place, there's no "right" number of elk for the Northern Range. Instead, the elk population fluctuates over time as its birth and death rates are affected by a combination of factors, including winter severity, the quantity and quality of available forage, emigration, parasites, disease, and predation by other animals. Elk are also subject to hunting when they leave the park.





Although the elk population wintering on the Northern Range quadrupled after reductions stopped in 1968, the fluctuations have become smaller as they increasingly reflect natural population control rather than human interference. The current population levels, which are determined by aerial surveys, may approximate the number of elk present on the range before significant human intervention began in the 19th century.

The Effect of Natural Regulation on the Northern Range

In a world where progress is generally associated with our ability to control and shape our physical environment to some ideal vision of the way we think things should be, the idea of accepting natural regulation has been controversial. It's obviously not appropriate for all animals in all parks, or in any situation where it is necessary to protect human life or property. But three decades of experience have shown that, combined with regulated hunting in the surrounding national forests, natural regulation *has* controlled the size of the elk population. Although the number of elk wintering on the Northern Range has increased in response to the conversion of more than 10,000 acres north of the park from livestock to wildlife use and increased migration to that land, it has also responded to weather variations and other environmental factors. Elk increased during years with mild winters and wet summers, and declined after the drought and fires of 1988. Since 1990, annual fall population estimates have fluct-uated between 16,000 and 20,000.

Although the northern Yellowstone elk depend in part upon public and private lands north of the park, it appears that the cooperative effort that has developed over the years has sustained a large, thriving elk herd that is valued by Yellowstone visitors as well as by hunters and other wildlife supporters. According to the Montana Department of Fish, Wildlife and Parks, this elk herd has the highest economic value of any in the state.

But how has natural regulation of elk affected the range itself and the other animals who live there? In response to the continuing controversy over the condition of the range, in 1986 Congress mandated a study on the results of natural regulation. This research initiative, one of the largest in the history of the National Park Service (NPS), encompassing more than 40 projects by NPS biologists, university researchers, and scientists from other federal and state agencies, has made substantial progress in clarifying the complex ecology of the range. The research results demonstrate that the Northern Range has continued to provide a robust source of nutrition for large, healthy ungulate herds year after year, and despite certain localized impacts, elk do not appear to have had any significant long-term effects on the overall biodiversity of native animals and plants on the range. The changes in vegetation that have caused some observers to raise alarms are either not the result of elk "overpopulation" or are part of long-term ecological processes such as climate and predation that we are only beginning to understand.

Some of the key research findings, which have been summarized in the recently published book, *Yellowstone's Northern Range: Complexity and Change in a Wildland Ecosystem*, are reported in the articles that follow. Although there is still much that needs to be studied, and experts will continue to disagree on some points, this research has fundamentally altered the nature of the grazing debate in Yellowstone and may influence the management of wildland ranges throughout the world.

What is Wildlife For?

A Changing View

The shift toward natural regulation of wildlife to the extent feasible is part of a long evolution in the public's view of the purpose of a national park and the role of wildlife. When Yellowstone was established 125 years ago, the primary goal was to protect certain specific natural wonders and hunting was permitted. The park was not staffed or equipped during its early years to prevent the widespread slaughter of wildlife that swept the West in the 1870s and early 1880s, and many of Yellowstone's wildlife populations were nearly decimated. Recognizing that the park could serve as a reservoir to restock the surrounding area with game, sportsmen and other conservationists gave widespread support to the hunting ban that went into effect in 1883.

From then until the 1930s, wildlife management was largely a matter of protecting the "good" animals (elk, deer, and other game animals) and eliminating the "bad" ones (wolves, coyotes and other predators). But as the protected animals became less wary of people and easier to see, the park's wildlife became valued not only as a source of game for hunters outside the park but as an important visitor attraction in the park, and both predators and their prey came to be regarded as worthy of preservation.

We now recognize that plant and animal communities may change significantly from one year (and century) to the next in response to changing environmental conditions. But for a long time, biologists thought natural processes tended toward a stable state that could be predicted, with the goal of maintaining some ideal "balance of nature" between predators and prey, grazers and their forage. Consequently, management of Yellowstone's Northern Range was expected to keep animal numbers steady and minimize winter mortality, a goal that required deliberate reductions in the elk population.

By the 1960s, an increasing number of ecologists were challenging the belief that the Northern Range was overgrazed. They proposed to let the elk herds seek their own population level so that their numbers would be "naturally" regulated by their environment. This view, which has been borne out by actual experience on the Northern Range since elk reductions ended, has become part of the answer to the larger question, "What is wildlife for?" Instead of focusing solely on the protection of individual plant and animal species, the goal of wildlife management has become to preserve the whole set of complex natural processes that shape an ecosystem. Inherent in this approach is an acceptance of the fact that some years will bring heavy winter mortality for some animals, followed by periods of population growth.

Just as ranchers and farmers see yearly variations in growing conditions and the success of their crops, so must Yellowstone's wildlife respond to changes in its environment, which may include fire, floods, and drought. But where animal mortality on a ranch may be considered a "waste," among wild animals it is crucial to the survival of many other plant and animal species.

> "The natural resource policies of the National Park Service are aimed at providing the American people with the opportunity to enjoy and benefit from natural environments evolving through natural processes minimally influenced by human actions."
>
> — National Park Service Management Policies, 1988

What *is* Overgrazing?

When concern about overgrazing first surfaced in the 1920s, opinions on how the Northern Range "should" look were based on the only available criteria: that used to evaluate ranges grazed by domestic livestock. Scientists had no clear idea of how unmanipulated wildland grazing systems worked or what they typically looked like because by that time they were already gone in the United States, often replaced by domestic livestock operations which have entirely different goals and effects on the landscape. But wildlife are not livestock, which move primarily when and where humans move them. Wild ungulates have evolved with their range, which has adapted to survive their grazing.

Consequently, a wildland range *does* look different from a commercial range; its appearance depends entirely on environmental factors, instead of on close supervision by someone whose primary goal is to maintain the highest sustainable level of livestock production. What a wildland ecologist would consider normal grazing effects, a livestock manager might consider unacceptable. For example, ranchers view evidence of erosion with alarm because soil is an economic asset. But in a wildland area where natural processes are to function as much as possible without human interference or economic considerations, erosion is an inherent part of the landscape, whether caused by the movement of animals or long-term geological forces.

Instead of assessing a range based on its appearance, scientific appraisals of both commercial and wildland ranges depend on the measurement of criteria such as plant productivity. In Northern Range research, these evaluations have been done by comparing grazed areas to areas inside plots that have been fenced to prevent grazing.

Is the Grass Greener on the Other Side of the Fence?

Although plants on ungrazed plots are taller, research on the Northern Range has shown that, except in drought years, grazing does not reduce the seasonal protein content or volume of grass, or the seedling establishment or growth of big sagebrush.

How can this be? Elk move across the range as foraging conditions dictate, seldom grazing forbs and grasses during their most vulnerable period and generally moving to higher elevations before the plants flower and seed. In addition, the effect of processing plants through an ungulate's digestive tract is very different from plants being left to die as leaves and stems on the ground. Grazers enhance the cycling of nutrients by tilling the soil with their hooves and by speeding up the decomposition process, converting plant matter to feces and urine that are quickly cycled back into the system along with their own carcasses.

The appearance of the Northern Range is affected by grazing, but ungulates are only one of many contributing factors; the primary influence over the long term is climate.

> "To me, the point is the ecosystem. Is the system functioning, or are things breaking down? Are we getting an invasion of unpalatable plants, or breaking down soils so that their rate of nutrient recycling is going to pot? That's what I'm looking at. And I don't see that in Yellowstone. Therefore, as a grazing system, this is a healthy one."
> — 1995 interview with Sam McNaughton, botany professor at Syracuse University

What About Willows and Aspen?

Research has shown that about 83% of the elk's winter diet comes from grasses and forbs, the rest from woody vegetation. Although some observers have attributed a decline in willows and aspen on the Northern Range to overbrowsing by elk, other factors may be involved. Where willows grow in Yellowstone is almost entirely determined by altitude and precipitation: 99% of the park's willow communities are found in areas that are above 7,000 feet and/or receive more than 20 inches of annual precipitation, which excludes most of the Northern Range. Although old photos show that some Northern Range locations had much taller willows in the 1890s than they do now, most of the decline in the last century has been during droughts rather than periods of large elk populations. No significant decline in Northern Range willows has occurred since 1959 despite a quadrupling of elk numbers.

Like willows, aspen thrive in areas of the park where the climate is better suited to them, including ungulate summer ranges and other places that receive more than 25 inches of precipitation a year. A 1995 tree-ring study showed there's been only one period since the early 1800s when Northern Range aspen were able to escape browsing and reach tree height. Most of the aspen that are growing old on the Northern Range now were just getting started during the period from the 1870s to the 1890s.

While this evidence suggests that the sparseness of Northern Range's willows and aspens cannot be explained simply by the size of the elk population, its woody vegetation has been studied far less than its grasses and sagebrush. The park strongly supports the need for more research on the relationship of willows and aspen to other plants and animals on the range.

What Makes the Rivers Muddy?

An increase in elk numbers has also been blamed for erosion and heavy sedimentation in Northern Range rivers. To determine if there was any scientific basis for this, a team of researchers from government agencies and Trout Unlimited mapped erosive lands in the Yellowstone River drainage from the park to Livingston, Montana from 1985 to 1987. They found that most of the sediment that muddies park rivers comes from four steep and geologically unstable areas such as the Grand Canyon of the Yellowstone River and the higher elevations of the Lamar River watershed. In none of these places are ungulates significant soil movers.

Consequently, even if the Northern Range were rid of all ungulates, its rivers would still become muddy, especially during spring snowmelt and intense thunderstorms, and following fires when vegetation is reduced. These processes are part of the natural functioning of a wildland ecosystem.

Sediments in rivers throughout the park are within the normal range observed in other western streams, and the Lamar Valley is still considered a blue-ribbon trout fishery, comparing favorably with that of other sport fisheries that have no wildlife herds grazing nearby.

Other Wildlife on the Range

The quadrupling of the northern Yellowstone elk herd since reductions stopped in 1968 has led some to question whether the increase in elk has come at the expense of certain other animals. But competition is a fact of life and, on a "level" playing field where human intervention does not give one species an advantage over another, does not mean that something is wrong. The predominance of elk is largely a result of its ability to survive on a greater variety of forage than other wild ungulates. But changing environmental conditions dictate that all plant and animal populations will fluctuate over time and vary in different locations in the park. The range expansion and mild wet climate that contributed to the elk increase during most of the 1980s also favored most other ungulates on the Northern Range (and throughout the greater Yellowstone ecosystem), including bison, pronghorn, bighorn sheep, mule deer, and white-tailed deer. Only moose declined during that period.

Moose: Unlike elk, moose depend on woody riparian vegetation for most of their diet, and since they can survive in snow that is much deeper, they tend to winter at higher elevations than elk. Their solitary habits in forested areas make population estimates difficult, but there are thought to be several hundred moose on the Northern Range. The population does appear to have decreased since the 1960s and, although competitive exclusion by elk cannot be entirely ruled out as a factor, the fires of 1988 and hunting outside the park may have also played a role.

Pronghorn: Although once abundant in the grasslands of greater Yellowstone, pronghorn were heavily reduced by settlement and hunting in the 19th century, and because of overgrazing concerns in the 20th century. The only resident herd in the park is that on the Northern Range, where neither its rapid increase in the 1980s to almost 600 nor its more recent decline to 200 in 1996 appears related to the size of the elk population.

Beaver: Because the beaver's preferred foods, especially aspen, have been only marginally present in the area for thousands of years, most of Yellowstone is not good beaver habitat. Intensive beaver poaching in the late 19th century may have contributed to a temporary spread of aspen, which after wildlife protection improved, permitted a temporary beaver boom by the 1920s — at the same time the elk population was growing. But once the beaver had used up this food source and began going after the willows, the beaver population began to decline. Although there are few on the Northern Range, beaver colonies persist elsewhere in the park.

Predators: Elk provide crucial food for many predators and scavengers, including grizzlies, black bears, wolves, bald eagles, cougars, foxes, ravens and many small birds, mammals, and insects. Each grizzly bear within the calving range of the northern elk herd may kill an average of 15 elk calves a year. Elk bulls are especially susceptible to grizzly predation during the fall rut, and coyotes can take elk that are in poor condition or whose movements are hampered by snow. More research will be needed to determined the impact of the reintroduced wolf packs, which subsist primarily on elk.

Why the Buffalo Can't Roam

The park's bison population was reduced from about 1,500 to less than 400 animals in response to overgrazing concerns in the 1950s and 1960s, and then grew to more than 3,900 by the mid-1990s. As they have for centuries, Yellowstone bison survived the winter by migrating to geothermal areas and lower elevation ranges both in and outside the park. Although some people saw the number of bison outside the park in the late 1980s and early 1990s as evidence of food shortages caused by overgrazing, research has shown that the increased migration is largely a result of the bison taking advantage of trails now groomed for snowmobile use.

But because some carry brucellosis, a bacterial disease that also infects domestic livestock, for about 30 years bison entering Montana from the park have had to be shipped to slaughter or shot, even if on publicly-owned land such as national forests. Unfortunately, the unprecedented snow and ice of the winter of 1997 drove an unusually large number of bison to leave the park, and more than 1,000 were killed in Montana by state and federal officers.

At present, a public desire to have bison in the Yellowstone area, especially on public lands intended for wildlife conservation, is pitted against the hypothetical risk of bison infecting cattle with brucellosis. The NPS and other Department of the Interior agencies are committed to carrying out research that has been funded to increase our knowledge about the brucella organism in wildlife and its possible threat to livestock, but wild brucellosis cannot be eliminated unless an effective bison vaccine is developed.

How Does Natural Regulation Work?

The natural regulation of wildlife may involve both an animal's internal physiology and its external environment. To varying degrees, wildlife populations exhibit "self regulation," which means their growth tends to slow down as the population becomes more dense and to increase if their numbers decline — a biofeedback response. For example, as more elk inhabit the same range, the cows carry less fat and produce fewer calves, and the calves that are born weigh less and are therefore less likely to survive. As the northern Yellowstone elk population has grown, researchers have documented a decline in pregnancy rates and increases in the winter mortality of calves, yearlings, and older bulls.

Environmental factors such as climate and predation also play a large role in controlling an animal population. During a predation study done from 1987 to 1990, about one third of the elk born on the Northern Range were lost within one month to predation by grizzly bears, black bears, coyotes, and golden eagles, and an average of 20% of the population died each winter, mostly from undernutrition in the very young and very old.

But while a policy of natural regulation may work for elk on the Northern Range, it's not appropriate in all wildlife management situations. National Park Service policy and federal legislation will continue to require intervention in certain circumstances — for example, to restore wolves and native fish, to suppress exotic plants and animals, to fight fire in specified situations, and to cull bison. Hunting on public lands adjacent to the park can also be used to complement natural regulation. The challenge is to pay careful attention to the consequences of ecosystem processes while resisting the temptation to step in to "fix a problem" that may be more complex or of a different type than first appears.

If You'd Like to Comment or Obtain More Information

The changes that have taken place over the years in how Yellowstone manages its wildlands have reflected not only an increased understanding of the ecological processes involved, but also the ongoing public debate. National Park Service policy works best when it has the support of citizens who understand their stake in preserving these natural resources. If you would like to express your opinion on how the Northern Range should be managed, please send your comments to:

Northern Range Comments
Yellowstone Center for Resources
P.O. Box 168
Yellowstone National Park,
WY 82190

You can also write this address to request a summary of the research or a copy of the research report, *Yellowstone's Northern Range: Complexity and Change in a Wildland Ecosystem* (151 pages).

What Lies Ahead for the Northern Range?

Much has been learned in the last 30 years about natural regulation and about the limitations such a policy faces in an ecosystem that is subject not only to the same natural forces that have been in place since the glaciers retreated more than 12,000 years ago, but to the more recent jurisdiction by multiple government agencies and to increasingly intense use by private landowners. After decades of futile attempts to improve upon nature, the National Park Service believes that it's in Yellowstone's best interest to let the range's ecological processes determine the fate of its plant and animal communities, insofar as this is possible.

This is not a "hands off" approach. On the contrary, as one of the few such expanses remaining with all of its original component parts, Yellowstone's Northern Range provides one of the world's most challenging laboratories for studying the complexities of landscape ecology. Despite the tremendous progress that has been made in understanding how it functions as an ecosystem, the Northern Range has much more to teach us about the processes that shape wildlands and native grazing systems. The National Park Service's primary goal will therefore continue to be to preserve its components and prevent unnecessary interference with its natural processes.

Throughout this century, the U.S. Congress and the public have supported the addition of rangelands outside Yellowstone to improve the integrity of migrating elk and other wildlife. These acquired rangelands and conservation easements have helped restore migratory patterns and winter range for more than 5,000 elk north of the park. This has proven to be ecologically beneficial to elk and other wildlife, and provided numerous public benefits. As future decisions are made about the use of public land outside of the park and about opportunities to acquire more land, the public will need to consider what priority it wishes to give to wildlife habitat.

Ultimately, the question of whether natural regulation is right for the Northern Range is as much philosophical as scientific. In Yellowstone, as in many national parks, decisions must often be made with only a partial understanding of their possible effect on lands held in trust for future generations. Because careful scientists don't presume to have all the answers, the debate over whether and how to intervene on the Northern Range will continue to be fueled by political processes and public pressure. But it is the hope and intent of the National Park Service that any resulting decisions will be steered by the best available scientific information, and that this information will be shared with all those interested in participating in the discussion.

"The most important message from this study [which compares sites over time using photos dating back to the 1880s] is that the Yellowstone landscape is above all else magnificently dynamic - there is no "correct" or "pristine" fixed state to which the Park ecosystem should be held, even if this were possible... In this sense the past serves as only a limited guide to the future because the intensity and frequency of the processes driving ecosystem dynamics change."

- From *Yellowstone and the Biology of Time* (in press), by Mary Meagher and Douglas Houston