



United States Department of the Interior

NATIONAL PARK SERVICE

P.O. BOX 37127

WASHINGTON, D.C. 20013-7127



IN REPLY REFER TO:

MAR 15 1989

Memorandum

To: Directorate and Field Directorate
From: Director
Subject: Winter Effects on Yellowstone's Wildlife

There has been so much media coverage about Yellowstone National Park commencing with the fires and the killing of elk and bison migrating outside the park, especially the herds on the Northern Range (Lamar Valley/Gardiner), that I feel it is important that National Park Service employees be informed about these events. Therefore, I am providing you with the attached report concerning the winter's effect on the bison and elk in Yellowstone. Please read this material carefully. If you have any questions, I suggest you direct them to Superintendent Bob Barbee. He or his fine group of scientists will be able to answer your questions.

I am asking that the Regional Directors make this information available to your Superintendents.

Attachment

WINTER EFFECTS ON YELLOWSTONE'S WILDLIFE

Since the beginning of time, wildlife living in natural settings have had to endure winter. Yellowstone National Park is one of the major wildlife sanctuaries in the world. It is a place where animals are protected from hunting or other molestation. However, there is no sanctuary from winter. Yellowstone is situated along the high plateau of the Northern Rocky Mountains. Winters can be severe. From a wildlife viewpoint, winter in Yellowstone and other mountainous wildlife areas is characterized by cold, barrenness, and death. For eons, natural processes have maintained wildlife species, large and small. At some time or another, be it man or beast, death occurs. The old, diseased, and lame are especially susceptible to death during severe winters.

For wildlife, the winter of 1988/89 is severe in the Greater Yellowstone Area. The last several winters in Yellowstone have been very mild. Many animals that would have naturally died during normal or severe winters have survived, putting elk and bison populations at their upper equilibrium in relation to their habitat. Therefore, it was inevitable that the next normal or severe winter would cause higher than average mortality in wildlife. As anticipated, this winter is causing higher mortality in wildlife throughout the intermountain west.

Park management is very sensitive to the public's concern about animals dying in and around the park. The combined effects of severe drought, loss of some winter range to last summer's fires, and the return to normal harsh winters have added to the potential of a high winter mortality rate.

FEBRUARY 24, 1989

Natural winter mortality is a given among ungulate populations in Yellowstone National Park. It occurs to some extent every year regardless of climatic conditions, and typically affects the oldest and youngest members of a population more than prime breeding adults. This natural winter mortality is highly variable according to winter severity and current population size in relation to habitat. Population size may also be influenced by exceptionally productive summers. These patterns are apparent regardless of human influences such as hunting outside the park, or reductions (until the mid-1960s) inside the park, although such removals substitute for natural mortality to some extent.

On the northern winter range winters have been below average in severity for a decade, while summers have been exceptionally wet 1983-1987. Increases have been recorded in all ungulate populations, most notably elk and bison. In addition, many older individuals have survived longer than would be their natural lifespan in more usual circumstances. In the park's recorded history elk mortality on the northern winter range has been enough to attract public and/or administrative attention in the winters of 1880, 1892, 1897, 1899, 1910, 1917, 1920, 1927, 1939, 1943, 1962, 1975, 1976, and 1978. Because bison have a history of intensive and extensive human influence the same patterns have not prevailed. However, among the interior bison natural mortality occurred in 1956, 1962, 1965, 1971, and 1982. In many wildlife populations in North America a 10 percent annual mortality may be the minimum turnover.

Natural mortality is vital to the survival of a host of dependant nesteaters, from grizzly bears and coyotes to eagles and ravens. In a stormy spring the grubs and insects that hatch from winterkilled ungulate carcasses may mean survival to tanagers and bluebirds. By contrast, a mild winter is a very tough winter for the dependents; in such a year a large male bison carcass essentially disappears, except for major bones, in 24 hours.

Particularly on the northern range ungulate populations have been variously influenced by removals (reductions) by park rangers through 1968. These removals substituted for such natural winterkill, and had the effect of depriving dependent nesteaters of a large part of their food base, whether because there were few weak animals for predators such as cougars, or little carrion for grizzly bears. In addition the opportunity for visitors to watch undisturbed ungulates carrying on their daily lives was mostly disrupted because these animals became very wary. For years after cessation of reductions any elk seen in the open in daylight was running, flat out.

This year elk and bison numbers are high as a result of the recent mild winters and wet summers. Approximately 19,000 elk were counted on the northern winter range in January 1988; parkwide mid-winter bison numbers were approximately 2,700 with at least 700 on the northern range. The winter of 1989 was preceded by extreme drought during the summer of 1988. Comparative vegetation measurements suggest that summer forage was reduced by 60-80

percent. Available measurements also suggest that winter range forage was only 22 percent lower because of above average April and May 1988 precipitation.

However, this assessment is a minimum and probably underestimates winter range drought effects by a considerable amount. Measurements were essentially unavailable for later season grasses such as timothy and for the wet sedge wales and bottoms which are of particular importance to bison. The absence of later precipitation apparently had major effects which could only be assessed visually in the context of longterm experience.

Thus, the stage was set for ungulate population changes and some level of winterkill this year: high population numbers as a result of recent exceptionally favorable habitat conditions, followed by a drought summer, extensive fire, and an average winter. In these circumstances an average winter will produce population effects that would require a severe winter in other circumstances. We cannot yet assess the total amount of winterkill. However, intensive surveys have located about 300 elk carcasses on the northern range from January 1 to February 24. This is 1 1/2 percent of the January 1988 population count. Known bison winterkill is 1/2 of 1 percent on the northern range.

In recent winters northern range bison have made large movements across the boundary near Gardiner, Montana. Major influences appeared to be use of the plowed road for travel, gregariousness of bison, and acquired knowledge of new areas. Population increases with mild winters and wet summers have intensified boundary problems. This year, with drought and fire, major movements were predicted in September. Even an average winter such as this adds additional impetus.

This winter State of Montana permit hunters have removed more than half of the estimated 900 early winter northern range bison north of the park boundary. There is no question this will impact this sub-population, but it will not exterminate the bison. There are two other sub-populations totaling at least 1,800 bison on the mid-winter count. Few of these cross park boundaries. Most importantly, the bison have a demonstrated history of biological ability to recover from low numbers. The native bison were reduced to a known 22 animals by illegal killing at the turn of the century; with adequate protection they increased steadily. Furthermore, during the last of the park's population reductions of the 1960s less than 100 bison were left on the northern range because of cooperation with a brucellosis control program. The population at the end of the 1960s was essentially a bull population with only a handful of adult cows. On their own, this populations recovered nicely. An air survey on February 24 showed a minimum of 285 bison on the northern range. Some proportion of these will probably be shot by permit hunters before spring.

The park is still testing the extent to which natural regulation will operate in these ungulate populations. The ongoing long-term research studies by service and independent researchers are crucial to our understanding. We certainly don't have all the answers, but to date, in the context of the park's objectives as a natural area, we do not see a population problem. To interfere in the natural processes within the park would seriously compromise research efforts. More importantly, past experience demonstrates that the welfare of dependent nesteaters, and the long-term enjoyment of park visitors, would also be compromised.

BRUCELLOSIS AND THE YELLOWSTONE BISON

Brucellosis (undulant fever, Bang's disease) is a contagious disease caused by the Brucella bacterium. In cattle the causative organism is abortus; this is also the causative organism in bison and elk in this area. Although many people believe the disease was first introduced by cattle, data is presently lacking. In the Yellowstone bison it is endemic, that is it is present, it may have some individual physiological effects, but it does not appear to prevent population increases. Population increases respond to natural environmental fluctuation in forage availability and winter severity.

While brucellosis is not of concern within the park in the present perspective, park management realizes that the organism poses some public health and livestock economic concerns outside the park. Accordingly, a boundary control program was designed in the late 1960s to prevent contact between cattle and those few bison which wandered outside the park. This worked well until the exceptionally severe winter of 1975-76 when more than 80 northern range bison moved down the natural travel route of the Yellowstone River to the boundary area in the vicinity of Gardiner, Montana. Because of learned knowledge, the naturally gregarious nature of bison, and the use of the plowed road as an energy efficient travel route, bison movements intensified in spite of very mild winters. Numbers increased for the same reason. It appeared that the bison would recolonize areas outside the park, from which they vanished a century ago, if they were allowed to do so. Park management tested various means to impede this bison movement for a decade, proving that bison can be herded where they want to go. At present the State of Montana permit hunt, open year round, is used to remove all bison that move into the state.

It does not seem that the potential for brucellosis transmission is high. No cases have ever been traced to the park, and cattle ranchers vaccinate their cattle. The incidence in northern range bison consistently tests somewhat more than 50 percent; 1 1/2 percent in elk. Elk concentrated on feedgrounds south of the park may show a test incidence of more than 50 percent at times. There is documented research in test situations to show that transmission among elk, elk-cattle, and bison-cattle, are all biologically possible. While the likelihood is small in free-ranging wildlife, there is, at least, some potential. That potential would increase with bison calving where cattle are pastured. The usual transmission mode is through ingestion of contaminated feed.

At present, there is such concern about the brucellosis issue because Montana has brucellosis-free status, which is important to livestock industry economics. Standard brucellosis eradication measures have been recommended to the Park Service; these consist of testing all animals, removing reactors, and vaccinating calves. These methods work well and are appropriate for livestock; they would have disastrous effects on the Yellowstone bison. Aside from the wilderness character of the park, which dictates no expansion

of roads and installation of handling facilities, the level of removal necessary would have major ecological effects parkwide. A major food base for dependent meat eaters, including species such as the grizzly bear, would disappear for some decades. The boundary control program was originally designed to attempt to meet both objectives; protection of the bison but also livestock protection. In any case, with the incidence present in elk, and occasionally other hosts, it seems likely that the organism could not be eradicated from this area.

A technical working committee was recently established because of the difficulties of this particular issue. The group is composed of technical representatives from the National Park Service, the several states' veterinarians, brucellosis researchers, and a wildlife research veterinarian. This group will further identify research needs, pull together existing data from the several professions, and seek practical ways the problem might be addressed while continuing to recognize both wildlife and livestock values.