PEOPLE

and the

GALLATIN ELK HERD

ALLAN L. LOVAAS

Montana
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by
ALLAN L. LOVAAS

Prepared under the auspices of the Cooperative Upper Gallatin Elk Herd Management Plan.

Montana Fish and Game Department

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"Those who cannot remember the past are condemned to repeat it."

George Santayana

"If you can't stand the heat, stay out of the kitchen."

Harry S. Truman

"It is not the critic who counts; not the man
who points out how the strong man stumbled
or where the doer of deeds could have done them better.
The credit belongs to the man who is actually in the arena,
whose face is marred by dust and sweat and blood;
who strives valiantly; who errs and comes short again and again;
because there is no effort without error and shortcoming;
but who does actually strive to do the deed;
who knows the great enthusiasm, the great devotion;
who spends himself in a worthy cause;
who, at the best, knows in the end the triumph of high achievement,
and who at the worst, if he fails, at least fails while daring greatly,
so that his place shall never be with those cold and timid souls
who know neither victory nor defeat."

Theodore Roosevelt

FOREWORD

Those responsible for managing wildlife must be concerned with more than the ecology, environmental requirements, and protection and harvest of animals, birds and fish. Wildlife managers, in our complex and dynamic society, must realistically appraise and cope with demands and restrictions imposed by sociological, political, and economic influences. While the scientific bases of wildlife management have constantly expanded through the years, the ability of the profession to deal with problems evolving from its relationships to society has often lagged behind, despite the best efforts of information and education programs.

Many writers have discussed the interactions of wildlife management and the community in general terms, but few studies have delved deeply into specific examples. Paul Tillett's *Doe Day* (1963, Rutgers University Press), an account of public reaction to deer management in New Jersey, and Richard A. Cooley's *Politics and Conservation: The Decline of the Alaska Salmon* (1963, Harper and Row, Inc., New York), about the management, or mismanagement, of the Alaska salmon fishery as influenced primarily by economic interests, are two exceptions.

The completely documented case history of the Gallatin elk herd is unique in that it is a study in depth of a single, very controversial, wildlife management situation. Readers, whether professional conservationists, sportsmen, or interested citizens, can gain insight into some of the rewards, difficulties and frustrations involved in this exceedingly important and interesting "people aspect" of wildlife management.

Frank H. Dunkle
Director, Montana
Fish and Game Department

INTRODUCTION

The Gallatin elk herd has been greatly influenced by people. Some influences have been direct, including hunting, trapping, and feeding; others have been indirect, including eliminating predators, removing Indians, grazing of livestock, controlling wildfires, creating game preserves and, mostly, through permitting the herd to burgeon out of control on its depleted range. Many people consistently failed to recognize through the years that what they may have wanted in regard to the elk was not nearly so important as what was possible. Bacon said, "We cannot command nature except by obeying her" (155), and since elk are products of their environment, the only way to maintain healthy elk herds is to maintain healthy elk environments. Peoples' desires, demands, hopes, fears, avarice, and misunderstandings led the Gallatin elk herd and its habitat through very difficult times and severely buffeted the fledgling field of wildlife management in the process.

Wildlife management can proceed only so far as people allow it to. Progressive wildlife management agencies pursue their programs up to the limit of public support but if they exceed this limit, backlashing public opposition will not only halt the programs, but will also threaten gains consolidated previously. Wildlife management is, therefore, an art as well as a science. The history of the management of the Gallatin elk herd amply demonstrates the need for both.

People provide the reasons, the incentives, the finances, and the political bases for wildlife management. To gain understanding and support, forward-looking wildlife management agencies constantly inform people about the complexities of wildlife ecology and the ramifications of management programs. Constructive criticism can be very valuable to a wildlife management agency, providing it with a vital spark, forcing it to stay alert and progressive, and preventing careless mistakes. Unfortunately, much of the criticism is not at all constructive. Wildlife management attracts attention of self-styled experts, special interest groups, people who are basically just against any change in the status quo, and many who mean well but are poorly informed or misinformed. Wildlife management programs pushed to the limits of public support consistently outrage these critics, but the price of tranquility is frequently inertia, or worse. Criticism, both constructive and detrimental, was continual throughout the history of the Gallatin elk herd.

Adequate and necessary harvesting of big game herds creates perhaps more controversy than any other part of wildlife management. Most people support and sympathize with protection of wildlife, but often

This big bull shows the effects of malnutrition. Big game herds must be balanced with available winter range.

they do not fully comprehend that hunted big game herds must be balanced with available range or habitat. During modern times with restricted hunting, little predation, and diminishing habitat, big game animals can readily overpopulate and severely damage their ranges. These herds must be managed, not just protected, to remain viable, healthy, and capable of producing harvestable surpluses. Attempts to obtain adequate harvests of the Gallatin elk herd usually generated virulent criticism.

Wildlife management agencies must determine which criticism originates from non-constructive or special interest factions and which represents the true will of the people. This is often difficult and a hard-pressed agency may underestimate the extent of its support in the face of heavy, clamorous opposition. It is easy, and tempting, for a wildlife management agency to cease struggling quite so hard to effect essential programs and to promote instead a sense of well being, even though this is accomplished at the expense of the resources the agency is responsible for. Although frequently faltering, those responsible for management of the Gallatin elk herd kept struggling, at times in the face of intense opposition.

Aldo Leopold (114) described the usual sequence followed in development of game management: 1. restriction of hunting; 2. predator control; 3. reservation of game lands (parks, refuges, forests, etc.); 4. artificial replenishment (restocking, game farming, etc.); and 5. environmental controls (control of food, cover, etc.). Management of the Gallatin elk herd followed this sequence almost exactly. Hunting restric-

tions, predator control, establishment of a National Forest and a game preserve, artificial replenishment in the form of hay feeding, and finally attempts to rehabilitate the environment by reducing grazing pressures from the elk all had their place for better or worse in the history of wildlife management in the Gallatin Canyon.

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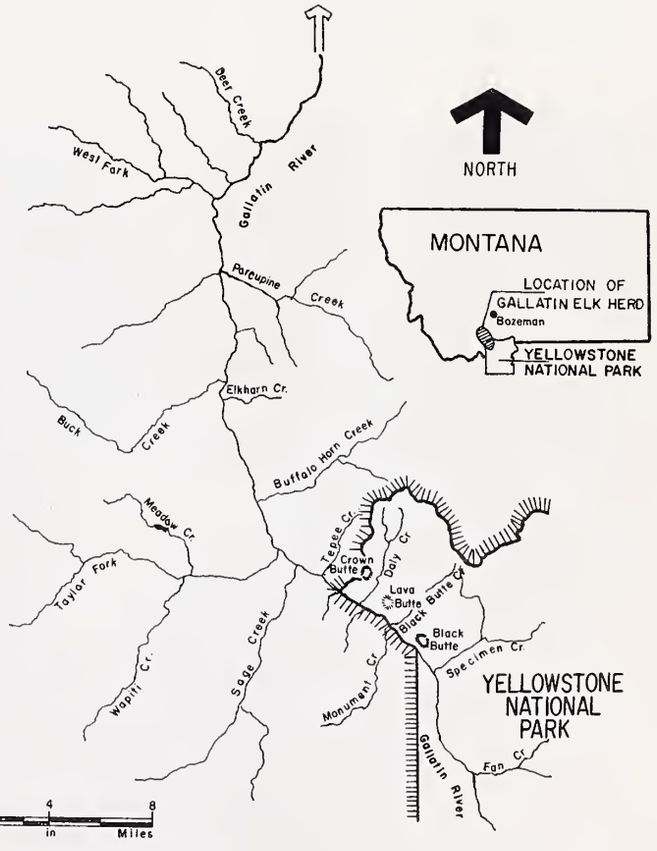
DESCRIPTION OF THE AREA

The Gallatin River rises high in northwestern Yellowstone National Park and bends north into Montana through the Gallatin Canyon, where it is pinched between the mighty Gallatin and Madison Mountain Ranges. It bursts from the mountains into the broad Gallatin Valley and eventually swings westerly to meet its principal tributary the East Gallatin. The Madison and Jefferson Rivers are joined at the Three Forks to form the Missouri. Over half the river's 120 mile length flows through the mountains (79). Lying in some of the most rugged, most beautiful and coldest terrain in the United States, the Gallatin Canyon widens slightly in its midsection allowing room for an elk winter range. Deep snows in the fall and winter force elk from the high mountain meadows within Yellowstone into this Gallatin Basin, or Upper Gallatin Valley. The elk winter along the river and its tributaries from about Specimen Creek to Taylor Fork and Porcupine Creek. At times they winter lower during severe winters to West Fork and portions of Deer Creek (68, 135). The elk are discouraged from moving completely out of the mountains and into the lower valley by the precipitous and rugged lower portion of the canyon, which is bounded on the west by the great mass of the Spanish Peaks and on the east by the deeply cut and heavily timbered drainages of Levenski, Portal, Moose, Swan, and Squaw Creeks.

The Gallatin Canyon in the main winter range area and also many of the side drainages have fairly broad bottoms and rolling foothills with open grassy parks and sagebrush slopes interspersed with timber that becomes more dense above the canyon floor (101). The major elk calving area—Fan Creek to and including Taylor Fork, is characterized by broad, open slopes



GALLATIN ELK WINTER RANGE

with open timber stands. Big sage is the dominant plant, lodgepole pine is the dominant tree, and the timber, consisting of Douglas fir, aspen, Englemann spruce and lodgepole pine (108), is often dense on north slopes. Sagebrush-grassland areas are characterized by various sagebrushes, rabbitbrushes, Idaho fescue grass, wheatgrasses and bluegrasses (136). Patten (131) studied intensively the area lying generally between Taylor Fork and Monument Creek and identified nine vegetational types or communities: rockslides or scree slopes, grassland, sagebrush, lodgepole pine, lodgepole-spruce-fir, spruce-fir, Douglas fir, limber or whitebark pine, and aspen, with willow thickets along the major streams.

Geologically the Gallatin Basin is a slightly depressed tract of sedimentary rocks within the Madison-Gallatin uplift (98). Elevations range between 6,200 and 7,500 feet (136). There were four stages of Pleistocene glaciation in the region and the present topography is a result of Pleistocene erosion by streams and glaciers modified by extensive mass gravity movements (98). Minor land slumps are common at present. Soils on south facing slopes and ridgetops are generally clayey with various amounts of rock particles. Erodability varies depending upon the amount of rock present (136). Patten (131) described the soils in his study area as greatly variable in texture, structure, profile and depth. He identified three soil associations: a northern coniferous forest soil and two lithosols (fresh and slightly weathered rocks and rock fragments).

Summer temperatures in the basin seldom exeeed 80 degrees and winter temperatures are often below zero and usually below freezing. Chinook winds during the winter sometimes raise the temperature by as much as 40 degrees within 24 hours (131). The annual precipitation seldom exceeds 25 inches and may range below 15 inches. Precipitation is rather evenly distributed throughout the year with slightly more occurring during the winter as snow. Summer droughts are not common but July and August may have little or no precipitation (131). The climate is very similar to that at West Yellowstone, Montana, where the lowest temperature recorded is minus 66 degrees and the average number of days without killing frost is 40 to 60 (98).

Dr. F. V. Hayden (99), the famous explorer and geologist, traveled up the Gallatin Canyon in 1872. Finding old traces of many Indian camps in the basin, he wrote that it had been a great resort for Indians:

> *The high walls that hem it in on either side furnished a protection, not only from their enemies, but from high winds and severe cold. A tribe could remain here an entire season well protected, while the young men could go out on either side among the mountains in search of game. . . . The well-known Bannock trail passes by this valley.*

Deep snows of fall and winter funnel elk from the large summer range of Yellowstone National Park into the much smaller winter range of the upper Gallatin canyon. Photo by Bob Cooney.

EXPLORATION, AND EARLY ELK DISTRIBUTION

The main Gallatin herd has probably always dwelled year-long within the mountains. Fish and Game Department Photo.

The Gallatin Canyon was by-passed by nearly all the early explorers. The Yellowstone and Madison Valleys provided routes for north-south travel in the region. East-west travel was by way of the Gallatin Valley or further south above the canyon where the Bannock Indian trail skirted the head of the Gallatin on its way from the Madison Valley to the Yellowstone country (139). The lower canyon, "a deep gorge through Precambrian rock for 20 miles" (98), was nearly impenetrable in its primitive state, at least during some seasons. This slowed the advance of the hunters, grazers, woodchoppers and settlers until years after the Gallatin Valley was settled. The first permanent settlements in the valley were made in 1863 (102), but when Hayden (99) traveled up the canyon in 1872 he stated, "In no part of the West have we found a more difficult trail, and this may account for the fact that so few persons have ascended the stream." He remarked, "even the settlers in the open valley below knew nothing about it [the canyon]."

Robert Vaughn (171) traveled through the headwaters of the Jefferson, Madison, and Gallatin Rivers to the Yellowstone in September 1864 and was enamored of the area. He was enthusiastic about the scenery, forests, natural parks with deer and elk, clear brooks with speckled trout, beautiful springs, majestic peaks and exhilarating mountain air.

Walter de Lacy (76) traveled down the canyon with a group of prospectors in September 1863. Their passage through the lower canyon was very difficult. They climbed over points of rock and forded the river repeatedly. They saw many elk in the basin, which were "not accustomed to the sight of men, and would stand within thirty yards of us without fear." They noted abundant signs of Indians there also.

T. B. Gray (66) traveled up the canyon in September 1870, believing he was the first to do so. He wrote, "We forded the river several times, and once were compelled to climb the cliffs several hundred feet." In 1881, however, "a very fair mountain trail, and perfectly safe" extended through the canyon (37), although two years later this trail was described as "A dizzy bridle path . . . along the side of the mountain. On one hand the range rises abruptly some fifteen hundred feet, and an equal distance below is [sic] to be seen the waters, boiling, seething—madly rushing on their course to the Gulf" (23a).

Significantly, the early trips through the canyon, which required many fordings of the river, were made in the fall during low water. Osborne Russell (95), a trapper who maintained a remarkable diary of his wanderings through the Rockies, went through the Gallatin Valley from the east in May 1838 and when his party crossed the Gallatin River the swift current washed the horses downstream and the riders were forced to swim for shore, losing three rifles. They then moved a short way up into the canyon and followed a creek (apparently Spanish Creek) west toward the Madison. Difficult to travel at any time, during high water the lower canyon may have been nearly impassable to either man

or beast. Russell wandered through the upper Gallatin also, traveling from the Yellowstone to the Madison in August 1835 (95). His party killed an enormous bull elk in the Gallatin, the animal was described as having 14 points on one antler, 12 on the other, and "the fat on his rump measured seven inches thick."

Some of the early naturalists advanced the theory that elk were plains animals which inhabited the mountains in numbers only after being driven there to escape the white man's hunting on the plains (90, 149). It is patent that this was in error. Elk were abundant on the plains, many explorers saw them there, but they were also abundant in the mountains at the same time and many explorers saw them there. Elk were easier to see on the plains than in the mountains and elk sightings were not always reported by explorers. However, enough sightings were reported to establish that mountains provided suitable elk range. An abundance of elk, or signs of elk, were seen in what is now Yellowstone National Park by Russell (95) in the 1830's, Henderson (100) in the 1860's, Cook, Folsom and Peterson (97) in 1869, Langford (113) in 1870, Hayden (99) in 1872, Jones (109) in 1873, and Ludlow (118) in 1875. Captain Bonneville (107) saw many elk in the mountains south and west of the Yellowstone region during his travels of 1832-35. Koch (112), Adolph Murie (128) and Olaus Murie (129) effectively refuted the theory that elk were not originally at home in the mountains.

The elk herds on the plains were wiped out by hide hunters and settlers, but some of the mountain herds survived because of isolation and cover, although often greatly reduced in size. The Yellowstone herds were effectively protected from hunting within the park by 1886 (71).

There are theories that elk in what is now Yellowstone National Park originally migrated from the mountains to winter far out on the plains each year (1, 124a, 129, 151), but many elk wintered within the mountains, in foothill areas, as they do today (128, 129). Hunters made big kills from the Northern Yellowstone herd within the park in the 1870's, and Soda Butte Creek, well within the mountains, was a favorite wintering area in 1880 (128). Russell (95) and Bonneville (107) repeatedly commented about observing elk and bighorn sheep wintering together on the mountain slopes. Russell went into the mountains on at least two occasions in wintertime to hunt elk, and Bonneville spent a winter in a mountain valley on a fork of the Salmon River where elk and bighorn sheep were abundant, while bison occupied the area below a "deep gorge" that formed the mouth of the valley.

While elk herds in the mountains have specific and well defined home ranges and migration routes (68, 129, 135, 151), these routes apparently developed from necessity, and the extent and timing of migrations depended upon snow conditions. Riney (147) observed that deer transplanted into New Zealand from temperate climates migrated according to need, not according to heredity. If they found all the yearly requirements for existence within a small area, they remained within that area all year, sometimes despite heavy hunting pressure. They established migrations in areas where migrations were necessary for survival.

The main Gallatin elk herd has probably always dwelled year-long within the mountains. Considerable winter range is available above the nearly impassable lower canyon. While data are limited, winter weather is commonly more severe in the lower canyon than in the basin. Yearly precipitation at Squaw Creek, near the mouth of the canyon, averaged 19.7 inches from 1950 to 1955, compared to an average of only 9 inches (incomplete records) at Porcupine Creek (101). Precipitation at Squaw Creek in 1962 was 24.4 inches, at Porcupine Creek 15.6 inches; while during the winter period of November 1962 - April 1963, there were 11.5 inches at Squaw Creek and only 6.3 inches at Porcupine Creek (156). An event in 1888 illustrated this difference in snow conditions. A prospector spent the winter at Porcupine Creek but expected to come to Bozeman by March 1. When he did not show up, a friend twice attempted to reach him but had to turn back because of deep snow in the lower canyon (27a). The friend finally got through to the prospector by the end of April and found him "safe and sound. His horse and two mules wintered well in the basin with three feet of snow on the ground" (27b). No doubt some hillsides were blown and melted free of snow. The prospector built a cabin and spent the next winter at Porcupine Creek too, the feed was good and his mules were "rolling fat" (10a).

Many hunters made the difficult and dangerous journey to the basin to hunt elk in the early days, but no accounts have been found of hunters waiting for a migration of elk at the mouth of the canyon or at the foot of the mountains. Only three elk from over 1,000 tagged as calves in the basin from 1938 to 1963 were killed below the basin (126). The elk apparently have no inclination to leave the open, grassy areas of the winter range to push north, often against deepening snow, into the rough, timbered country below, and it is doubtful they ever did so. Some migration up Taylor Fork and into the Madison River drainage occurs during at least some years. Twelve percent of the elk tag recoveries were from there (137), but the main herd remains in the upper Gallatin.

As Olaus Murie (129) wrote, "elk have always been at home in the mountains as well as on the plains." The elk in the relatively inaccessible Gallatin Canyon, along with the other natural resources of this beautiful area, were left undisturbed for some time after other parts of the region were explored and settled.

Horses and sleighs, or wagons, were once the means of travel tc many Montana elk hunting grounds. U. S. Forest Service Photo.

EARLY ELK HUNTING

A heavy tide of gold seekers swept through the Gallatin Valley in 1864, settled Bozeman, and followed with Salesville (Gallatin Gateway) the next year (6). Wildlife was always important in this area. Venison made up a significant part of the early settlers' food supply (77) and Bozeman became something of a fur center during the 1870's (78). Elk meat in 1873 was preferred to beef and, at seven cents a pound, was cheaper (34). The elk herds close to settlements bore the brunt of early hunting (77), and the scarcity of elk around Bozeman was lamented by 1886 (26).

By 1883 hunters were traveling up the "dizzy bridle path" through the lower canyon to the basin where game was "abundant" and hunting was good (23b). Two hunters killed 18 elk there one December afternoon in 1885, and bagged several bighorn sheep and deer the next day, but they lost a pack horse while bringing in the meat when the animal slipped off the trail (25).

State game laws were enacted as early as 1873 (36b), but most people were unaware of these laws or simply ignored them (36a) although the Gallatin County Sporting Club was organized in 1878 to protect wildlife by "ferreting out violations of the game and fish laws, and having the wrong doers brought before the courts" (35). The population of Bozeman was 900 in 1879 (6). Elk meat was sold in the streets of Bozeman in 1886 (26), although by then selling game meat was illegal (24). Trout were sold on the city's streets in 1892, and "no one seemed to care so long as they could get a mess by paying twenty cents a pound for them" (12d). The early game laws were a jumble and not even the newspapers could agree whether or not elk hunting was legal in 1891. Some were of the opinion that the season was open, others that it was closed, and one declared the season was closed until 1895. A Bozeman newspaper advised hunters not to kill elk until "the matter is more definitely settled" (11c).

Sport hunting for elk in the Gallatin Canyon has always been the boom or bust type because of the migratory habits of the elk and sanctuary afforded by Yellowstone National Park. Most elk spend the summer in high mountain meadows of Yellowstone and are vulnerable to hunting only when they migrate below the park (Black Butte formed the original northwestern corner of the park. The boundary lines extended straight east and straight south from the Butte).

Snow is the chief causative factor in elk migrations, and snow conditions in the Gallatin Canyon vary greatly between years. Elk move to lower elevations during the winter to find new feeding grounds (129). They stay within the park as long as they can each fall until forced out by accumulating snow or, if possible, until

The wolf, an efficient hunter, was once an important part of the Gallatin ecology. Fish and Game Department Photo.

the hunting season is over. Early-day hunters, like today's, often thought a scarcity of elk during a mild fall was due to reduction of the herd rather than to the actual cause which was nearly always delayed migration.

The sporadic hunting success in the Gallatin Canyon is easily identified in contemporary accounts from Bozeman newspapers. In January, 1891, game was "quite abundant" in the basin (11a) and elk, deer and bighorn sheep were killed there the following fall (11d, 11e).

"Quite a large number" of elk were seen in the basin the next January (12a), but hunters in the fall reported game as "very wild and much scarcer than in former years" (12c).

Game was "abundant" in the basin during the winter of 1895 (13a). Gallatin County's first game warden was assigned to duty that year, although his effectiveness was hampered because he had "his head full of conflicting game laws" (13b). Elk were "very plentiful" the next spring and the new warden, along with the protective laws, was given credit for the "large increase" (14b).

Hunting success was poor in 1897, "There are said to be more hunters than there are games up the Gallatin river this winter. So the hunters have to play poker —or lie—to get any satisfaction whatever" (15b). "The Gallatin Basin is said to be so full of hunters that guns are discarded entirely, and only axes and such weapons that will not kill a man at more than fifty yards are used" (15c). One party of three hunted steadily for 24 days without getting a shot (15c). A man was fined $50 for selling elk meat in Bozeman that year (15a).

A new wagon road to Taylor Fork increased the hunting pressure in 1898, but by mid-November game was "either extremely shy or very scarce, or both, this season" (16a). There was "very little snow so far on the mountain slopes" on November 19, and game was still "very scarce" (16b).

A branch of the "League of American Sportsman [sic]" was organized in Bozeman in 1899 under the sponsorship of the game warden to help prevent "the ever-lasting destruction of wild game by unscrupulous persons, who want only to slaughter wild animals both in and out of season" (17). There was an apparent need for such a group because when the game warden was suspended for a time after January 1, 1900, "there seemed to be a continual stream of hunters going in and out of the basin, and meat was hauled out by the sleigh load" (18a).

The hunters in September 1900 were "preparing for a hunt after big game as soon as good heavy snow shall fall in the mountains" (18c). But a man reported from Taylor Fork in October, "he has not seen an elk this fall and game is very scarce" (18d). Hunters trooped to the basin (18e) but the weather did not cooperate, in early December the lack of snow and mild weather "gives one the impression that summer is close at hand" (18f). The poor hunting season caused one hunter to lament (18f):

> *In the mountains along the West Gallatin, where only a few years ago thousands of deer and elk could be seen almost any time, there is scarcely a sign of game now, and nearly every party which has returned from a hunting trip to that once "sportsman's Paradise" has the same story to tell, "we got no game."*

A visitor to Bozeman from Taylor Fork in the spring reported, however, "There are quite a number of elk in the upper country and they doubtless wintered well" (19a).

A scarcity of snow and poor hunting were reported in 1901 (19c). Hunting licenses were required for nonresidents that year (19b).

A second game warden was appointed to the county in 1902 (20a), although an editorial in the *Montana Stockman and Farmer* (reprinted in a Bozeman newspaper) called game laws "a fraud upon the people" and "An Imposition on the Taxpayers," and described the game wardens as "a corps of expensive . . . incompetent officials" (20b). The editorial contended that enforcement of game laws depended wholly upon local sentiment. It advocated enforcement by county sheriffs instead of game wardens, claiming this would reduce costs by two-thirds. Mild weather and poor hunting prevailed early that winter (20c), but later snows brought out some hunters (20d), and "more elk . . . wintered in the basin than for several years past" (21a).

An editorial in the *Marysville Mountaineer* in 1903, entitled "The Game Law Humbug" (reprinted in a Boze-

man newspaper), complained that game laws discriminated against the poor man who could no longer shoot game or catch fish all year long "for the use of his table or the support of his family," and aided the "dudes in the cities" who went out for a "bit of shooting, in imitation of their English cousins" (21h). Several hunting parties killed elk in the basin that fall (21e, 21f, 21g).

Storms and below zero weather occurred in mid-October 1905 and the wintery weather continued into November (140b). Hunting was good, a party of five hunters bagged their limit of elk and reported they could have shot twice that many since "elk are quite numerous in the vicinity of the basin" (140a).

A license was required of all hunters and guides in 1907 (141).

Elk hunting was poor early in the 1909 season (143a, 143b), but inclement weather occurred in late November (143b, 143c). Hundreds of hunters then flocked to the park boundary and "everyone of them seems to be getting something," and the wagons bringing the elk carcasses to Bozeman were "loaded to the axles" (143c).

"The early snows in the park drove the elk out" in 1910, "and few were the hunters who did not get their share. Venison has been a common meat in Bozeman this fall" (144a). The hunting season was a "record breaker," the "most successful season in the amount of big game killed in many years" (144b).

Hunting was poor in 1911 (145d). The weather was mild and the winter remained open, and large numbers of elk were seen wintering in the Daly and Tepee drainages in mid-January (146b). Hunting was also poor in 1912 (146f).

Although newspapers only incidentally reported upon hunting, these accounts clearly illustrate that boom or bust sport hunting prevailed even during the early years in the Gallatin Canyon. Exceptionally good hunting or exceptionally poor hunting and the prowess of popular local nimrods made interesting copy. Good hunting was reported in 1883, 1885, 1891, 1903, 1905, 1909, and 1910. Poor hunting was mentioned in 1892, 1897, 1898, 1900, 1901, 1902, 1911, and 1912. Probably most of the intervening years were also years of poor or indifferent hunting success and were not newsworthy. The parallels between weather conditions and hunting success were also clear in the articles, as a 1911 news item about hunting in the Gallatin Canyon summed up (145b):

> *Experienced hunters say there are only two good times to go hunting—one is just when the season opens, the other is after the first snow. While many are taking advantage of the opening time, there are many more who are waiting until later, when the snow drives the great herds of elk, deer and sheep out of the park and into reach of the hunting enthusiast.*

Because of the limited access to the Gallatin Canyon, hunter check stations have long provided effective methods of checking game harvest there. Fish and Game Department Photo.

Records from hunter checking stations maintained by the U. S. Forest Service and the Montana Fish and Game Department from 1919 to the present (81, 137) illustrate that erratic hunting success continued in the Gallatin Canyon. The lowest number of elk checked in one year during the period 1919-1963 was 20 in 1921, the highest was 1,177 in 1942. Less than 100 elk were checked during 10 years, between 100 and 400 during 17 years, between 400 and 800 in 12 years, and over 800 in 6 years.

Sportsmen, in 1909, petitioned the Forest Service to create a game preserve adjoining the park to be bounded by the Gallatin River and Tepee Creek (143d). According to supporters of the petition, large numbers of hunters patrolled the park boundary each fall causing "thousands" of elk to stay back in the park in a small area "without enough feed to winter a large sized jack rabbit." Also, unsportsmanlike, "pot hunting" was a common occurrence in the open pass on the park boundary behind Black Butte when hunters surprised groups of elk which milled in confusion when the shooting started, creating easy targets. Proponents of the preserve thought if elk could go through the pass and out of the park unmolested they would scatter and go "into the winter range with full bellies," permitting sporty hunting rather than "pot hunting."

Chief Forester Pinchot consented to the suggestion for a preserve, but he stated that the State Legislature or Congress would have to establish it (143e).

The preserve was established by the Legislature prior to the 1911 hunting season, but the weather was mild that fall and hunting was poor (145c, 145d). The poor hunting, despite the new preserve, caused some hunters to grumble (146a). Proponents of the preserve acknowledged that, "Some complain that the elk will not come out of the Preserve and there is [sic] good

grounds for the complaint, but is it because of a stubborn desire to thwart the efforts of the hunter or is it because of the persistent and consistent efforts of the hunters to patrol carefully the lines of the Preserve?" They derided the "coffee coolers" who sat around big fires in big camps "and scared the game back into the lines." They believed the preserve had made more forage available to the elk, which provided better meat for the hunters, and stopped the "Black Butte slaughter" so, while there were still some places where "pot hunting" could occur, "there is a vast improvement over the old days."

The 1912 hunting season saw "the return of scores of empty-handed and disappointed hunters" (146f). Excellent conditions for the elk continued into February with practically no snow on grazing areas and herds were seen scattered from Porcupine Creek to the park boundary (38).

Establishment of the preserve demonstrated again the dominating role of snow conditions in the elk hunting of the Gallatin Canyon. Elk readily moved into the preserve, but when snow conditions permitted them to stay, there they stayed until the hunting season was over. It also demonstrated that hunters would congregate on the boundary line no matter where it was drawn.

The variable hunting success in the Gallatin Canyon, dependent upon elk migrations from Yellowstone National Park as affected by snow conditions, prevailed even during the first years of sport hunting. The attempt to improve migrations by creation of a game preserve had very limited success. Enactment and enforcement of hunting regulations and restrictions were slow to gain public acceptance and support, but were grudgingly accepted as an inevitable price of civilization by 1917 (67a):

> *There remains now but a dim memory of the time when a man might arm himself as he saw fit and go forth at any time of the year and kill what wild game he liked. Each session of the legislature draws the protection about the scattered remnants of wild life that roam the hills of Montana, a little more closely.*

EARLY GRAZING

The year when domestic livestock first grazed winter range of the Gallatin elk herd is not clear. The presence of a trail through the lower canyon was mentioned in 1881 (37). Around Salesville (Gallatin Gateway) in 1889 "the range is reported poor . . . and the stock too numerous for the amount of grass" (10b). The basin was definitely grazed in 1891. Stockmen opened the trail in mid-April so cattle could "obtain the advantages of the excellent grass in that region" (11b), and "horses wintered well on the hills adjacent to the basin" in 1892 (12b). Very heavy grazing was reported in 1896. At least 1,800 cattle were in the basin by May 9, and more were on the way, with an estimate that 5,000 head would graze there that season (14a). Cattle from two ranches were started for the basin in early May, but then were detoured up Spanish Creek toward the Madison because their owners thought the Gallatin would be overstocked that year (14a). The unfenced range attracted stockmen in 1900 (18b):

> *Gallatin basin is about the only stock range now left unfenced in the county, and nearly every one owning stock seems to be pushing them there this spring, and several bands large and small have passed nearly every day this week.*

Cattle were wintered in the basin by 1903, although fed hay for five months (21b).

The unrestricted, heavy concentrations of livestock in the basin grazing from April long before the snow was gone and continuing in some cases until the winter snows drove them out (175), must have consumed nearly all available forage before the elk, migrating with the snows, came down to this, their ancestral winter range. The implications were predictable. Elk were reportedly "starving to death" in the park boundary area during March of the severe winter of 1903. Eight carcasses were found and park officials and soldiers fed hay to some elk in the park (21c). A rancher reported in May, however, "he saw no dead elk but saw many that were very much alive and looking well" (21d). Large numbers of cattle and horses were driven to the basin by May 8, "although the spring as well as the grass is more backward than for several years past" (21d).

The stir caused by the deaths of a few elk from apparent malnutrition indicates that these losses were probably quite unusual. By 1903 people had been traveling to the basin for over 20 years and spending the winter there for at least five years, but no previous mention of winter losses of elk has been found.

Domestic goats were brought into the basin in 1904, but up to 80 percent of the herd of 1,000 did not survive the winter (22). Elk broke into haystacks along the West Fork that winter, but members of the Gallatin herd were not blamed, rather, "Uncle Sam's elk from the Park. . . . Some of them wintered no doubt previously down in the Jackson Hole Country . . ." (22).

The Gallatin Forest Reserve was created in 1899 (78) and the U. S. Forest Service was established in 1905 (79). In 1908, the Forest Service closed to grazing the area south from the Tepee Creek-Buffalo Horn Creek divide and the Taylor Fork-Sage Creek divide, and Shed Horn Mountain, "to protect the elk which come out of the park to graze in the winter. If horses and

A forest service report in 1935 stated that except for private land, important elk range within the forest boundary in the upper Gallatin was not being grazed by domestic livestock. Fish and Game Department Photo.

cattle are permitted to graze there all summer there will be nothing left for the elk" (142). A letter to the editor of a Bozeman newspaper in 1954 by the wife of one of the ranchers affected by the closure confirmed this date (57o). This is the first known reservation of land for wildlife in Montana.

Elk were reportedly suffering again in the spring of 1911, but an investigation found "no great mortality" (145a). A Bozeman newspaper (145a) noted that some people wanted to feed hay to the elk but "That is the worst thing for the animals." The paper pointed out that feeding was not natural and the elk, once fed, would stay and wait for more hay rather than go in search of natural forage and, "many more elk die where the state and county establish feeding places for them than in regions where they are forced to rustle for a living" (referring to an ill-fated feeding program on the range of the Northern Yellowstone elk herd).

More land was closed to grazing in 1911, which riled up the stockmen and "Considerable feeling is being aroused" (146c). Petitions were circulated and congressmen were contacted in an effort to retain the closure in order to reserve forage for the elk and to keep sheep from impairing the natural beauty of "the grandest and most attractive entrance to the Yellowstone National Park;" sheep were accused of converting many "mountain beauty spots" into "worse than deserts" (146c). Tackling stockgrowers in Montana in those times must have required considerable courage.

According to the Park County Woolgrowers, "game preserves are the breeding grounds of dude sportsmen, guides and coyotes, and the representatives of the stand for these elements should not receive the support of the taxpayers" (146c). Proponents of the preserves replied that they favored the policy of "the greatest good for the greatest number," and if the point was reached where "must all the sheep go, or must all the elk," they would ask for removal of the elk, but "such is not the case" and they believed wise handling of the area would provide range for the elk "without undue hardships on the welfare of any of our industries" (146c).

The area remained closed to grazing (146d) and pressure mounted to reserve more land for elk. The owner of a camp in the Gallatin Canyon, "somewhat of an authority on the big game conditions in this part of the state," reported he feared there would be "an early and complete extermination of the elk unless measures are taken to save the elk ample winter range, instead of giving it over to the cattlemen" (146e). He said the cattle, when driven up from the valley in the spring, "immediately strike the hills that are first bare early in the season, forcing the elk off the range into the deep snow" and the cow elk that were calving and weak from the winter "are unable to support themselves in addi-

tion to the calf, and death results." His account appears somewhat colored for propaganda purposes; elk losses in recent years have occurred well before calving time.

The Gallatin National Forest Cattle and Horse Association announced in 1915 that it had appointed a committee to investigate the Gallatin Canyon situation and report to the Montana Stockgrower's Association since "false statements" had appeared in eastern magazines that the elk were starving and driven from the range by stockmen, while investigations made by the stockmen and Forest Service officials "show that the elk are well fed and in splendid condition" (65a). The grazing restrictions continued and later that year the Forest Service reported that all livestock were prohibited from 46,480 acres and sheep were not permitted on an additional 124,000 acres, "The areas thus reserved furnish an abundance of winter range for the elk" (65b), a somewhat over-optimistic appraisal.

The heavy grazing pressure and the presence of hay in the lower part of the basin combined with severe weather in 1917 to cause the first reported heavy winter loss of elk in the Gallatin Canyon (172a). Some 50 carcasses were lying in fields along the West Fork by March 21, where the elk had attempted to get into haystacks, and more were dying daily. The snow was deep on the stream bottoms and hillsides in the West Fork drainage, but in the game preserve area the hills reportedly were blown bare of snow and the elk were in fair condition. A West Fork rancher was "outspoken in advocating steps to procure hay for these animals in the winter seasons, as is done in the Jackson Hole Country. 'They should take some of the money they spend for game wardens and put it in winter feed for the elk if they wish to preserve those animals . . . .'" The situation closely resembled the origins of the hay feeding program in Jackson Hole (1). Whenever hay and elk have gotten together in the West Fork drainage the results have been similar to those of 1917.

The deputy game warden and the forest supervisor reported on April 26 that the elk were in "fairly good condition considering the long winter and heavy snow" (67b). Proportionately, they found fewer dead elk up in the mountains than where elk "had gotten at the hay belonging to people in the canyon early in the winter and would not then get out and rustle as they should." Apparently the fact that the actual elk winter range is only a small portion of the entire area because of limitations caused by snow was not appreciated, it was stated, as many others would state in the years to come: "There is plenty of feed in the mountains . . . but the snow has been so deep the elk have not been able to get at it as they should." A later survey located 233 elk carcasses, while a count conducted over a two week period by six men turned up 1,518 live elk (172b).

A proposal in 1919 to allow livestock grazing in the game preserve as an emergency measure during an extreme drought met with relative indifference from stockmen, probably because of the short-term implications (39). After 1919, grazing was not permitted above Porcupine Creek on the east side of the river (7).

Elk have pawed away the snow to get at sagebrush. U. S. Forest Service Photo.

Negotiations for use of land in the Gallatin Canyon between ranchers, dude ranchers, sportsmen, the Forest Service, and the Northern Pacific Railway Company broke down in 1932 and the Bozeman Chamber of Commerce appointed a sub-committee, the Gallatin Conservation Committee, to act as mediator (5). The Conservation Committee, which was to have considerable future influence in the management of the Gallatin elk herd, claimed membership from all of these factions plus the Montana Fish and Game Department and the National Park Service. The Northern Pacific Railway Company dedicated some 37 sections of its land east of the river to elk use in 1933, releasing National Forest land in the Meadow and Dead Horse drainages that previously had been grazed by livestock in lieu of the Railway lands, with the result that "there is little or no conflict between sheep and elk either on summer or winter range" (3). A Forest Service report in 1935 (176) stated, "None of the important elk range within the forest boundary is at present being grazed by domestic stock at any time of year, private land excepted."

The era of the open range and heavy livestock grazing in the Gallatin Canyon had done its worst and passed into history.

CONTEMPLATION

The elk group of the genus *Cervus* originated in Asia and apparently reached America during the Pleistocene Epoch (129), probably crossing on the land bridge at the Bering Strait. Man apparently entered North America by the same route at about the same time, some 10,000 to 30,000 years ago (96). The first human visitors to the area of Yellowstone National Park likely were hunters following Ice-age mammals at the end of Pleistocene glaciation, although confirming evidence has not been found (96). The Gallatin elk, the soil, the vegetation and the other elements of the biota presumably developed together. Expanding and contracting glaciers allowed plants and animals to occupy these areas only to be driven back again and again, developing qualities in the flora and fauna that permit survival under unusual hazards (28). Patten (131) wrote that the present vegetational patterns in the Gallatin Canyon developed in the cool, moist climate that has followed a warm, dry period which ended some 4,000 years ago.

The first non-aboriginal visitors to the Gallatin elk winter range apparently found a well-balanced environment. Hayden (99) noted that the grass was "good," and "excellent" in places. To escape the wind, de Lacy's party (76) camped in a "grove of willows" along the river near the center of the winter range. The early stockmen commented about the "excellent grass" in the basin (11b), and horses wintered on the slopes with no difficulty (12b).

Much of the winter range is heavily timbered and rocky with little forage. Large areas become covered by deep snow and usually are not available to elk. The vegetation on these sites, mostly north slopes and grassy bottoms, has generally recovered from the period of livestock grazing. Elk use these areas for feeding when they can, sometimes through an entire winter, but during severe winters the elk must find forage on sloping ground with generally southerly or westerly exposures where the snow melts off or blows away. These exposures are drier and have poorer soil development than the sites protected by snow and they are grazed by elk every winter. Packer (130), in 1963, found 97.5 percent ground cover and nearly pristine conditions in two study plots on sites usually protected from elk by snow, but only 26 to 33 percent ground cover on grazed plots. Willows and other browse plants are also important forage sources, especially during really severe winters, since they are available above the snow. Elk eat conifer needles, limbs, and bark when they are starving (116, 152). Thus only a relatively small portion of the entire area of the winter range is available to elk for feeding during extensive periods of severe winters. Hodder (101) aptly described the situation when he wrote, "If it were not for the irregular terrain and steep slopes, this range would not be able to continually support significant numbers of game through the winter season."

Howard (104) wrote:

> *A principal factor governing distribution and density of mammal populations is the suitability of the respective habitats—the combination of vegetation, soil, and other environmental factors which enables various species of wildlife to live in a particular locality. It has been my observation that a wildlife habitat which has evolved over long periods of time undisturbed by man and which is composed only of native plants and native animals, creates a well-established, stable, soil-vegetation complex which is NOT delicately balanced. Natural changes (e.g., by disease) or man-caused changes (e.g., by shooting) in the density of any one of the native*

Skeleton of an elk that died from malnutrition but with a full belly in the Gallatin canyon. Coyotes and ravens stripped the flesh away, leaving the rumen contents, mostly conifer needles, limbs, and bark. Fish and Game Department Photo.

> *species of browsing, grazing, seed-eating, or predatory mammals may affect the balance of nature in a natural community. Such changes, however, usually do not precipitate a dramatic chain reaction of responses by the other components of the community, since there will be little direct disturbance of the vegetation-soil complex. Stable, balanced biomes become disrupted and precipitate marked chain reactions usually as the consequence of some human disturbance such as the introduction of alien species of plants or animals, farming, grazing, logging, or use of fire.*

The Gallatin elk herd was subjected to great human disturbances. Heavy grazing by livestock undoubtedly affected the vegetation and soil; migration and distribution patterns of the elk were disrupted; meadows were cut for hay, which was staeked and partially available to the elk; roads, trails, and dwellings were constructed; some logging was carried out; fires were suppressed, which probably reduced the regeneration of browse plants such as aspen and willows.

Howard (103) noted that hunting game animals such as deer at certain intensities can stimulate their reproductive responses and actually result in increases in the size of the population. If the overpopulated herd is then protected from hunters and predators, the deer will damage their habitat and reduce its carrying capacity, but the deer will gradually become to some extent self-limiting and slowly arrive at a balance with the reduced habitat. Howard (104) stated that members of a species become their own brake to counteract their great reproductive potential, and populations of wild animals do not completely exhaust the food within a sizeable area, which would result in death of all who live there, just as they do not build up to a solid mass if provided with all the food they can eat. He (103) studied exotic mammals in New Zealand and observed that if left alone an introduced species would build up in numbers to a peak in excess of its forage supply. Thus it would cause drastic declines in the vegetation and malnutrition in the mammals until finally both declined to stability. The vegetation would be greatly modified in the process and often much of the soil would be lost through erosion. Howard noted that spasmodic and fluctuating shooting pressures exerted on these mammals induced undesirable reproductive surges which only delayed reaching stability, but if control efforts were persistent enough they could lessen the impact on the habitat.

Peek (134) pointed out that Montana elk herds adequately hunted and on good winter range had greater reproductive rates than those herds on poorer winter range. The Sun River elk herd, on good winter range but inadequately hunted, had a low reproductive rate. Knight (111) studied the Sun River situation in detail and found that herd segments which usually inhabited a game preserve during the hunting season had low reproductive rates. This suggested a balance with their habitat. The herd segments which did not inhabit the preserve and bore the brunt of hunting pressure had much higher reproductive rates. A significant reduction of the Northern Yellowstone elk herd in 1962 (half the herd) apparently resulted in a slight increase in its reproductive rate and a significant increase in calf survival (94).

Protected within Yellowstone National Park and by generally short and early hunting seasons the Gallatin elk herd was subjected to spasmodic and fluctuating hunting pressure. This hunting pressure through the years was probably more effective in stimulating elk reproduction and maintenance of a herd too large for the deteriorating range than in controlling or reducing the herd. Peek et al. (137) pointed out that hunting apparently did not control the herd during the period 1932-1965 since the mean hunter harvest levels were less than the annual herd increases, yet the herd size declined over the period at a rate which averaged two percent a year.

The effects of predation and hunting by Indians upon the elk herd in primitive times are conjectural. Cougars and wolves were soon greatly reduced in Yellowstone National Park (128) and the remainder of the winter range (69, 174, 175). Both Hayden (99) and de Lacy (76) noted abundant signs of Indians in the basin, but the Indians were gathered up from the Yellowstone region and removed to reservations before 1880 (96).

Several investigators have found, at least under some conditions, that predators apparently were unable to

control the size of the populations of their prey (75, 104, 147). Errington (80) believed that predation losses were usually compensated through reproductive responses by the prey, and that the prey population was seldom reduced below certain security levels with the surplus doomed to some form of death anyway. He had a high regard for the predatory capability of the dog family, however, stating it "not wholly beyond comparison with man in potential destructiveness, may exert pressures that really count."

Pimlott (138), expressing some preliminary thoughts, stated that no broad definitive statement can be made on the role of wolves in controlling the populations of their prey. Recognizing the reproductive responses demonstrated by ungulates to either adverse or favorable environmental factors, he pointed out that intrinsic population controls do not keep the populations of species such as deer and moose from increasing beyond the sustaining levels of their food supply. He suggested that these species may have had very efficient predators, causing them to evolve ways and means of keeping abreast of mortality factors rather than ways and means of limiting their own numbers. He proposed that many ungulates, particularly those of the forest, and their predators may have evolved in relatively stable environments which could not support high densities of the prey population. But man created great imbalances in these environments. Some imbalances, such as the opening of dense, mature forests, were favorable to species such as deer and moose. This resulted in higher populations than ever before and the predators were then unable to control them. He suggested, from his studies in Ontario, that one wolf to 100 deer might be at equilibrium, but wolves apparently self-limit their own density and would be unable to exercise control if the ratio became greater to deer or if the density of the deer increased to over 20 per square mile.

Malin (119) believed that hunting by aboriginal man was a very important factor in primitive equilibriums, and Martin (120) hypothesized that overkill by man may have caused the extinction of many large Ice-age mammals in North America.

Errington (80) pointed out that frequency of encounter is a major factor in predation stating, "we may . . . see parallel connections between abundance of game and ease of predation by wolves." The Gallatin elk during mild winters could disperse over large areas of the winter range and retain strength and energy. They would not be abundant in the sense of density, but when concentrated on open areas during severe winters they were both abundant and easier to catch, just as they are most easily "caught" during severe winters by modern hunters. Pimlott (138) concluded that large ungulates are usually the primary prey of wolves during both winter and summer, with the younger age-classes of the prey utilized heavily during the summer.

Errington (80) noted that primitive man, and wolves to some extent, could be diverted from a particular prey species by the availability of another, more preferred species. He wrote that Indians lived mostly on surpluses and tended to be wasteful when game was easy to get, conservative when necessary. Father De Smet (72) spent the winter of 1844-45 with the Kalispell Indians in a valley on the Clark's Fork River and described how these Indians took advantage of severe conditions:

> *At the beginning of winter, as soon as the snow begins to fall in abundance, thousands of deer come down from the mountains. Sometimes the snow attains a thickness of two and three feet, and when the surface is frozen, it often happens that forty hunters will kill 300 in a day. . . . But if the snow is light, the Indians go hungry, and though the ground is frozen they have recourse to the Camas-root, which is very abundant in that region. . . .*

Errington (80) remarked that ungulate prey often finds good security against predators and man in first class habitats, but that poorer habitats may be untenable. The quality of the winter habitat available to the Gallatin elk is influenced greatly by snow and weather conditions. Borg (33) observed that predation on roe deer in Sweden was much greater during severe winters with heavy snow than during mild winters. Pimlott (138) noted that intensive utilization of prey animals is a characteristic of wolves, but utilization was observed to be less complete during a winter with severe snow conditions.

Hypothetically, wolves and Indians were important in maintaining a dynamic balance between the elk herd, the range, and the soil in the Gallatin Canyon. Although their actions probably caused reproductive responses in the elk, any increased numbers of elk could presumably be carried without damage to the range during mild winters, to be eliminated during severe winters when it really counted. Indians and wolves would have killed elk as long as elk were reasonably available and they would not have stopped because of a designated bag limit, on a designated date, or at some designated boundary line as modern man does to restrict himself from taking really significant harvests during severe winters. Wolf predation on calf elk may have acted as a depressing influence to help stabilize herd size without great population highs. By chasing and harassing the elk, wolves and Indians probably had considerable effect also in protecting the open slope areas. Olaus Murie (129) thought predators may have been an important influence during severe winters in reducing elk herds too large for their winter range. Mech (121) found that wolves apparently were stabilizing moose with the winter range on Isle Royale. Moose repeatedly increased

in numbers and depleted the range to their own detriment before wolves became established on the island, but have not done so since that time.

Man severely altered the dynamic balance in the Gallatin Canyon by livestock grazing and ranching, eliminating predators, removing the Indians, creating a game refuge, interfering with elk migration and range use patterns, hunting enough to stimulate herd reproduction but not enough for effective herd reduction, and suppressing fires. Possibly under natural conditions the elk herd built up in numbers until it damaged the vegetation and soil, causing the herd to decrease in size until the soil and vegetation recovered, then recovering the herd size again, in a continuous cycle. But it seems very unlikely that the animal-vegetation-soil complex ever naturally dipped to low points in the cycle similar to the low point of today, else the development of soil and vegetation would have been badly disrupted and much different conditions would have been found by the first non-aboriginal visitors. How all the various environmental influences interacted to create a dynamic balance is not understood, but man's influence upon it is undeniable.

OBSERVATIONS AND CALCULATIONS, 1919-1936

Graves and Nelson (90), in 1919, reported that elk in the Gallatin Canyon used wind-swept ridges and high slopes during the winter and they believed sufficient range was available for the herd estimated at 1,600. Recognizing the relationship of elk management to land management, they thought the herd could be increased to 3,000-5,000 elk after further restrictions were imposed on livestock grazing and favorable land exchanges were negotiated.

Heavy grazing by elk was reported in the Daly and Tepee drainages in 1920 and 1921 and aspen there was overused, but the elk were in excellent condition in the spring (69). Heavy grazing was observed in these drainages again in 1923 although the forest ranger was not sure it was quite enough to constitute overuse; elk took 100 percent of the willow browse (70). The ranger estimated the elk population at 3,000 and the carrying capacity of the range at 10,000.

Grazing in Specimen, Wickiup, Black Butte, Daly and Tepee drainages was heavy in 1924 and browse in the game preserve was 100 percent utilized (173). Hunting pressure reportedly held elk back in the preserve. This was believed responsible for the heavy grazing there compared to the light use observed in other areas, although 500 elk were seen in the Taylor Fork drainage, 350 in the Buffalo Horn and Elkhorn drainages, and 300 in the Porcupine drainage. The size of the herd was estimated at 2,000. The ranger estimated that 100 elk died from "natural causes" during the winter (41 carcasses were located), but he thought the range could carry 7,000 elk if "proper distribution" was obtained. From his later report (following) one gathers that he probably meant 7,000 could be carried if all the forage on the winter range could be utilized by the elk. He stated, however, "To date these estimates have been very much a matter of speculation," and he believed a range reconnaissance was necessary "before any definite estimates can be made."

This ranger, the following year (174), noted that the range carrying capacity estimates varied between 3,187 and 10,000 elk and he wrote, "When an estimate is made of the range when the forage is available and no snow prevents the elk from getting the feed, then estimates of from 5,000 to 10,000 head are about as far as we can go." But he realized these figures "during the peak of the snow conditions . . . were entirely too high," then the elk were limited largely to "windswept ridges and southern exposures" and "there was scarcely range enough to feed the 2,000 head of elk that were out of the park this winter." He recognized there was "more than enough range for the present number of elk using the Gallatin, before the snow conditions get bad, and again in the spring, after the snow leaves, but the weak link in the chain is the peak of the bad snow conditions, usually during February and March, when 2,000 head of elk found it difficult to find enough feed to

Feeding elk have pawed away the snow while feeding on willows. U. S. Forest Service Phata.

keep them alive." He lowered his estimate of the range carrying capacity from 7,000 elk to 2,500 elk, noting that overgrazed conditions near the park boundary had occurred as long as records of elk conditions had been kept. He observed that on windswept ridges and south exposures the elk "fed everything that could be reached, leaving all exposed areas as bare as a floor." In the spring, 57 elk carcasses were found.

A law was passed in 1929 moving the boundary of Yellowstone National Park to its present location (154).

The range carrying capacity was still estimated at 2,500 elk in 1933, and the size of the herd was estimated at 2,350 (175). Overgrazing and trampling by elk were damaging range sites from Black Butte to Crown Butte, "where the concentration of elk is always heavy." The more palatable forage plants were disappearing and soil erosion was evident. Damage was also observed, "to a more limited extent," on south slopes in the Taylor Fork drainage, with "a few traces of it" in the Porcupine drainage.

An intensive survey of the winter range was made by a Forest Service technician during the 1934-35 winter (176). He found that elk fed heavily upon browse plants during severe winter periods and reported that willow, the most abundant and palatable browse, was overused by elk. The willow was stunted and dying out along the Gallatin River down to Black Butte Creek and along Taylor Fork, Porcupine Creek, and lower Daly and Tepee Creeks. Over-all, he found that grass was the forage utilized most by the elk during the winter and "weeds" were second in importance until late December when browse replaced them in second place. As a result of his findings he wrote:

> *. . . for reasons of good game management as well as for humane reasons, it would be better to base the number of elk to be maintained in the area on the carrying capacity of the range during the critical period of the abnormally severe winters, rather than on that of the abnormally mild ones. Certainly the herd should be reduced to the point where it would reasonably well survive the average winter.*

On that basis he recommended a carrying capacity of 1,125 elk.

A Forest Service report for 1935-36 (153) stated that the winter had been exceptionally severe and "the entire winter range area accessible during the critical period showed serious advanced signs of overgrazing in shoestring and sheet erosion and in the killing off of the more palatable species of forage plants." The report commented, "Many areas where elk have congregated look and smell like the sheep bedgrounds that we have fought so strenuously to eliminate in our stock range management. In many places the elk have eaten the willow and aspen so closely that they have driven the beaver out." This was especially noticeable along the river just above Snowflake Springs. The report also stated, "Nothing but an immediate radical reduction in numbers will relieve this overgrazing problem." The report noted that livestock had been eliminated except for that belonging to local homesteaders and continued, "It is doubtful whether it will ever be possible to influence the drift of elk farther northward into the Gallatin Canyon than they now go. Even if it were possible to extend this drift, the amount of additional range made available would be limited and of low carrying capacity."

This report observed that if similar overgrazing occurred on a livestock range the number of livestock would be reduced and it recommended cutting the elk herd down to 75 percent of range capacity in order to allow the range to recover. It pointed out that killing willows and other shrubs along the river would have a detrimental effect on the fishery, and the overgrazing and erosion on south slopes and windswept ridges together with heavy utilization of willows and aspens was ruining the scenic values of the canyon. The report concluded, "The number of elk in the Gallatin Herd should be reduced to the capacity of the critical period range which has been computed at 1,000 head." It advocated that elk be trapped and transported elsewhere or that government hunters should shoot elk if sport hunting could not reduce the herd enough.

Thus, early estimates of the range carrying capacity, 3,000 to 5,000 and even 10,000 elk, were reduced to 1,000 after studies of the range and the ecology of elk.

Another Forest Service report for the 1935-36 winter (152) observed that the diet of the elk was about 85 percent grass, 10 percent weeds and five percent browse. However, during a critical winter period, grass made up only 15 percent of the diet, weeds five percent, and browse 80 percent, and the most important browse plant, willow, was 100 percent utilized on practically all winter range sites. In March 1936, 2,218 elk were counted along with the carcasses of 121 dead elk (153).

Transportation of elk was once a very difficult affair. In 1927 it took this caravan 13 days to transport elk from the Moiese Bison Range to the Fisher River.

INDECISION, 1937-1947

Rush (150) described a public reaction to game management in 1933:

> *There is a marked apathy towards big game in this Region, especially toward management. It seems that the people want the game, they want it where it will be easy to kill, they want the minimum number of restrictions on hunting and killing but they do not want to go to any trouble to inform themselves of the facts necessary for an intelligent understanding of the factors controlling the production of game animals.*

Public interest in management of the Gallatin elk herd intensified during the 1930's and 40's. The Conservation Committee of the Bozeman Chamber of Commerce, organized originally in 1932 to mediate in disputes over use of lands in the Gallatin Canyon (5, 41d), made annual spring and fall rides in the winter range area "to study game and feed conditions" and often publicized its conclusions in the Bozeman newspapers (41c).

During a ride in April 1937, the Committee saw mountain slopes almost bare of forage and beginning to erode, willows and aspens killed from overbrowsing by elk, and conifer trees stripped of needles and twigs as high as elk could reach (48a). Realizing that practically none of the elk winter range was now grazed by livestock and that snow conditions limited the amount of winter range available to the elk, the Committee arrived at its first crossroads and announced support for the range carrying capacity estimated by the Forest Service—1,000 elk.

The Committee, pointing out that the condition of the range was a result of "overutilization by too large a herd of elk," after the fall ride recommended that immediate steps be taken to reduce the size of the game herd, "before further damage takes place, to a point where the winter range will carry it" (40).

The recommendation to reduce the Gallatin elk herd was rebutted in a letter to the editor of a Bozeman newspaper, entitled, "Depletion Of Elk Herd In Gallatin Recommended" (48b). The letter complained that the Committee was made up mostly of federal and state employees and private individuals and was poorly represented by sportsmen while, it claimed, a "goodly number" of sportsmen were qualified to judge range conditions and many thought a reduction in the herd was not necessary. This led a Committee member to reply in another letter to the editor entitled, "Elk Problem Explained" (48c). This letter derogated the thought that "only big game hunters were competent to pass judgment on such matters" and stated it was obvious the winter range "was steadily going downhill under the concentrated grazing of around 2,000 elk during January, February and part of March." It related that 2,200 elk were counted in the herd in 1936 and over 2,100 in 1937 with no allowance for any elk not seen. The letter noted that one did not have to be a hunter or stockman to evaluate the damage to the range, but could "just drive up the canyon and without getting out of the car note the condition of the grass, small trees, and

shrubs along the road from Taylor's Fork [sic] to Specimen Creek." It reiterated, "the essense of the whole problem" was that the amount of forage available to elk was limited by snow during three critical months of the winter while "During the other nine months of the year there is ample feed for ten times the number of elk." The letter pointed out that three possible solutions to the problem had been considered: reseeding work on the present winter range; inducing the elk to work further down the canyon in the winter; and reducing the herd by a longer hunting season. Reduction of the herd "seemed the only workable answer." The letter commented that on the range available during the critical months "there is not enough feed on the whole area to interest the worst grass pirate that ever herded a band of sheep."

Despite the letter, the Committee did not push for reduction of the herd. It recommended a hunting season quota of only 500 elk for 1938, even though 2,021 elk were counted during the previous winter (49). In 1939, although it had observed soil from Lava Butte eroding down over the sagebrush to the edge of the highway (157), the Committee decided, "there is sufficient winter grazing except in the severest winters, for the herd of 2,500 elk" and again recommended a hunting season quota of 500 elk (41d).

The local sportsmens' clubs were bickering over the exact location for the game preserve boundary. The Bozeman Rod and Gun Club petitioned to move the boundary north to Buffalo Horn Creek from its location between Tepee Creek and Buffalo Horn Creek (41a). It was opposed by the Bozeman Chapter of the Western Wildlife League, which obtained 500 signatures on a petition to keep the boundary at its present location (41b).

It is apparent there was sympathy within the Conservation Committee for a larger range carrying capacity estimate, and in 1941 the Committee adopted a "Plan of Management—Gallatin Elk Herd" (4). The plan was based on estimates of the amount of range available to elk during the winter—10,514 acres within Yellowstone National Park, and 33,149 acres below the park. The carrying capacity of this range was estimated at 560 elk within the park and 1,320 below for a total of 1,880, rounded to 2,000. Thus the Committee came to its second crossroads and made a major break from the previous carrying capacity estimate of 1,000 elk. The plan stated, however, "The range outside the park is restricted to an area as low as 16,000 acres during severe winters for a period of approximately 30 days." It did not mention that range within the park was nearly untenable for elk during such conditions. The plan, by its own calculations, recommended a carrying capacity over twice as large as the available range warranted. Although the plan was unanimously adopted by the Committee, several members seriously questioned the methods used in estimating the carrying capacity and suggested the Montana Fish and Game Department should undertake a study to determine the optimum size of the herd (158).

Soil eroding from Lava Butte during spring runoff. Fish and Game Department Photo.

In 1941, although the carrying capacity was now set at 2,000 elk and the size of the herd was estimated at 2,600 (2,225 counted), the Committee recommended a hunting season quota of only 400 to 500 (158), and in 1942 recommended a quota of only 500-600 for the herd estimated at 2,850 (159).

The sportsmen still argued about the location of the game preserve boundary. A suggestion that the boundary be moved to a timbered area to provide cover for migrating elk found support at an open meeting in the spring of 1942, although some thought this would not be effective, "the reasoning was that a line would be patrolled, no matter where" (50a). Opponents circulated a petition against the move because they thought the change "would tend to keep the elk in the park rather than give the animals a chance to migrate to lower country" (50b).

In the spring of 1943, 185 elk carcasses were found (160). A Bozeman newspaper noted that a count of 2,063 live elk relieved apprehensions that too many animals (1,177) had been killed during the hunting season the previous fall. "Since the estimated carrying capacity of the range has been placed at 2,000, it is very evident that the 1942 kill was not excessive" (42).

The Conservation Committee recommended a hunting season quota of 500 elk for the fall of 1944, since the herd of 2,700 was "about 500 head more than the number that is estimated can be safely carried on the critical winter range" (51). A Forest Service official rec-

ommended "fencing off of barren areas of winter range that have been heavily grazed by game . . . for rehabilitating the forage stand" (51).

The Conservation Committee thought the slopes in the Daly and Tepee drainages showed "definite improvement" in 1945, but noted that the principal grass there now was western wheatgrass "which ordinarily appears and persists after over-use has eliminated the more desirable native grasses. Density is light and the pedestaled stools show that sheet erosion is continuing" (161). The Committee also observed serious deterioration of the browse plants, but concluded that browsing "is considered a supplementary activity and adds little to the volume of food available to the elk." It apparently forgot the importance of browse to the elk during critical winter periods, as pointed out in early studies. The next fall, the Committee noted that "Forage in areas of light winter use was abundant," but in the vicinity of the Buffalo Horn - Elkhorn - Porcupine drainages the "Members of the party were impressed by the almost complete absence of aspen reproduction within the area and the extent to which willows had been consumed and partially killed. Lodgepole, fir and spruce reproduction likewise showed the effects of game use" (163). Forage outside the exclosure in the Meadow drainage was "extremely short" while forage inside was "nearly normal," which "clearly demonstrated" the differences between grazed and ungrazed sites, "The effects of erosion was [sic] evident both inside and outside the exclosure, but inside healing of gullies had begun while outside unretarded erosion continued." At the previous spring meeting, a hunting season quota of 400 elk had been recommended for the herd estimated at 2,000 to 2,500 before calving (162); now Committee members debated the advisability of increasing the quota because of the overused range conditions they had observed (163), but no change was made. A Forest Service official discussed the usual history of game herds—early abundance; depletion through hunting; recuperation through protection, game preserves and public cooperation; eventual overuse of the range by the enlarging herds; malnutrition of the animals. He commented, "Opposition against bringing herd numbers to conform with range capacity was common and in some cases it took a disastrous winter to impress the necessity for so doing." A dire prophesy was soon fulfilled for the Gallatin elk herd.

The winter of 1946-47 was the most severe on wildlife in many years (74). Inclement weather conditions occurred by October 4 and the elk migrated despite hunting pressure until large numbers reached Taylor Fork and Porcupine Creek (74). The hunter kill was not exceptional until four or five days before the Fish and Game Commission gave two-days notice that the season was closing (52a). The checked kill on October 31 was 231 but on the closing date, November 2, it reached 877, which was more than double the quota (52b). The total kill, including crippling losses, was estimated at 957 elk, which alarmed some people but, as pointed out in a Bozeman newspaper, this was probably none too many because of the severe winter and the deteriorated condition of the range (43).

Rain fell in December, deep snow in January, "extreme overutilization" of critical sites occurred in February, March was cold with more snow and elk began to die (74).

Feeding hay to the elk was suggested by late February (44), and a "limited feeding program" was soon started with hay furnished by the Fish and Game Department and most transportation provided by volunteers (53a).

Feeding hay to elk is an attempt to have more elk than the natural range will support. There is no other possible reason to feed. But feeding can, at best, only compound the existing imbalance between elk and range. Feeding hay to elk is not successful. Anderson (1) pointed out that even though actual losses of elk by malnutrition is no longer significant on the feed grounds at Jackson Hole, the reproduction of this herd is very poor and he concluded:

> *Nearly fifty years of extensive winter feeding has not proved to be the solution to the "elk problem." Elk population and range trends are both downward, pointing to a bleak future if the causes are not corrected. At the same time, artificial feeding in Jackson Hole constitutes both a symptom of abused range and a cause.*

Feeding elk in the narrow, steep confines of the Gallatin Canyon has been even less successful than on the broad flats of the Jackson Hole feed grounds where the elk remain almost immobile while waiting to be

Elk being fed hay on the Porcupine Game Range. Fish and Game Department Photo.

Some elk did not survive winter during the first organized attempt to feed elk.

fed. Feeding elk in the Gallatin Canyon concentrates many animals into small areas and makes them dependent upon an unnatural food source that apparently provides minimal requirements at best in this environment. Concentrated masses of hungry elk seek out almost everything remotely edible in the feed ground vicinity, leading to immense damage to forage sources. Feeding inhibits the elks' initiative to disperse and seek better foraging areas. Feeding in the Gallatin Canyon has probably led directly to the deaths of more elk than to the saving of elk lives, while it has led indirectly to herd misfortune by accelerating range deterioration. Another important drawback to elk feeding is the philosophy it imbues that elk herds too large for their range need not be reduced to regain the natural dynamic equilibrium in the animal-soil-vegetation complex, but rather that overpopulated herds should be tolerated, or even encouraged, and fed at times.

Arguing against public requests for feeding is very unpopular and difficult when elk are dying from malnutrition. No doubt those who advocated feeding in 1947 were unaware of the ecological implications and believed feeding was a correct and humanitarian gesture. When the game warden found 30 elk carcasses by mid-March, he considered the situation critical and hay was given to all elk accessible for feeding (53b). The sportsmen, who previously had spent much of their time arguing with each other about the best location for the game preserve boundary, responded to the call with alacrity donating transportation, $194, and 451 bales of hay. They assisted the Fish and Game Department in feeding elk from March 14 to past mid-April (53c).

That spring 299 elk carcasses were counted below Yellowstone National Park, and the total winter kill was estimated at 400 (81).

The harmony apparent during this critical winter was shattered at the spring meeting of the Conservation Committee when a prominent member, a private citizen, reported "he did not feel that the Committee was redeeming its responsibility if it knowingly allowed continued range deterioration" (164). The Committee had arrived at the third crossroads in its role as advisor on management of the Gallatin elk herd. After considering the severe winter just past and the heavy loss of elk, the Committee lowered its estimate of the range carrying capacity from 2,000 elk to 1,500 elk, although hedging somewhat by recommending only a gradual reduction from the present herd of 2,000 to 3,000 elk down to the 1,500 level (53d). Committee members also expressed the need to explain the range situation to the public (164).

During the fall ride the Committee members once again observed deteriorated range conditions and soil erosion and were impressed with the relatively limited amount of range available to elk during the winter. They now seemed more determined than ever to reduce the herd (165). The Committee's annual recommendation for the elk hunting season took a new approach. Instead of a maximum harvest quota, the recommendation proposed taking a minimum of 300 elk "The maximum to be so adjusted that not over 1,500 head, including the Buck Creek band, will be wintered on the Gallatin elk range." The Committee recognized that its estimated range carrying capacity of 1,500 elk might even be too high and suggested that further reductions might be required (53e). Members again expressed a need to inform sportsmen about the deteriorated range conditions (165).

During the 1937-47 period, the accepted range carrying capacity gyrated from 1,000 to 2,000, and back down to 1,500 elk. Continuing deterioration of the range was reported from the herd estimated to number in the area of 2,000 to 3,000 elk. Some 400 elk did not survive a severe winter during which the first organized attempt to feed the elk was made.

HERD REDUCTION ATTEMPTS FAIL, 1948-1954

The winter of 1947-48 was severe, and the Montana Fish and Game Department fed hay to some of the Gallatin elk from February 19 through March 21 in an "experimental program" employing airplanes (for locating elk), toboggans, and snowmobiles (54a, 81). Despite the feeding, 103 elk carcasses were counted in the spring (81).

In a newspaper account of the Conservation Committee's spring ride of 1948 this loss was referred to as "average," but the basic problem was repeated, "Whether sportsmen and conservationists wish to face the picture or not . . . the problem is one of too many elk for available critical winter range . . . 'and cannot be halted until a balance is struck between available winter range and elk numbers . . . Depletion of the Gallatin winter elk range has been going on slowly but steadily for a period of 20 years or more . . . The public has been slow to recognize this fact . . .' " (54b). In the fall, the Committee backed its convictions by recommending a hunting season quota of 800 elk (54c) for the herd estimated at 2,200 to 2,300 head (45b).

Sportsmen, because of a misunderstanding over an aerial count, believed there were only 1,372 elk in the herd and they were very perturbed about the recommendation to harvest 800 head since this would theoretically leave only about 500 (45a). The Southwestern Montana Federated Wildlife Clubs voted "to back the efforts of the Gallatin Sportsmen's Association of Bozeman in preventing the extermination of the Gallatin Elk Herd." The Gallatin Sportsmen's Association had recommended a quota of only 200 elk contending that the quota of 800 was based on the condition of "two or three small rocky slopes in Teepee [sic], Daly and Black Butte Creeks . . . that represent less than one percent of the total critical winter elk range." The Association reported local residents believed there was more grass outside the range exclosures than inside, "Their theory for this is that the plowing effect of the elks' hoofs turn under native grass seed and that their droppings have fertilized the ground." The Association "urged that before using extermination of the elk herd to try to make grass grow on rock bars that the livestock trespass be stopped and the two or three small hillsides in question be fenced with an elk-proof fence to keep the elk off," reporting that "old-time residents . . . testified that these few rock bars never did grow much grass but have more grass now than they ever had."

Gaab (81), in a study conducted that year, found that the recollections of some "old-time residents" were none too good: "Interviews with local people recall that up until the early 1900's, it was a rarity to kill an elk in the West Gallatin Canyon."

Although Fish and Game Department officials attempted to mollify the sportsmen by explaining the discrepancies in the elk count figures (45b), the plan to reduce the elk herd failed when the quarrel ended in a compromise quota of 500, newspapers reported:

Elk on a hillside at the Porcupine Game Range await evening dusk before drifting onto the meadowlands. Fish and Game Department Photo.

> *The Fish and Game authorities could not have set a number averaging the numerical recommendations of the contesting organizations any more equitably even with the use of differential calculus* (45c).

The checked harvest was 476 (166).

After considerable internal bickering in 1949, the Committee recommended a realistic harvest quota of 700 elk (167) for the fall herd estimated at 2,010 (166) and this time, largely because of poor range conditions due to "drought," the sportsmen agreed (46). The harvest was 703 elk (137).

The elk herd was in trouble again during the severe winter of 1951-52 and some loss of elk was expected (55a). Elk were fed. A Fish and Game Department employee justified feeding, rather than reducing the herd through larger harvests, by stating, "If we had tried to kill the ones that were going to die, we also would have killed many that are still alive" (55b). "Experimental" feeding was carried out from February 24 to April 12 and winter losses were light until a raging blizzard with 30 inches of snow struck in late March, then losses became heavy (82).

A checked harvest of 896 elk the previous fall, nearly 200 over the quota of 700, helped to relieve conditions, but this large harvest plus an estimated winter loss of 300 caused some Fish and Game employees to believe the herd had been reduced too much and they recommended low hunting season quotas for the next year or two (55c). Apparently they did not consider the thought that nature had indicated through the loss of 300 elk that the carrying capacity figure set by man was too high.

The greatest losses of elk that winter occurred in the Porcupine drainage where elk were fed, and in the

Taylor Fork drainage where there was no feeding; the elk ate browse extensively, "sagebrush, evergreen needles and aspen shoots and bark," and three year's growth of willow in some areas, since they were unable to "make the customary use of many exposures," because of the snow (55c).

In 1953, a Fish and Game Department range technician reported, "based on a range survey map made in 1933 which he indicated may not be too reliable, the Gallatin elk range was increasing in number of forage acres. The 'range was, generally speaking, improved considerably over 20 years for which information was available.' The increase was mainly in density of forage . . ." (56). This observation was refuted by a Yellowstone National Park biologist who stated, "the elk range within the park (in the upper Gallatin) 'definitely shows deterioration in the loss and size of vegetation.' He also said the park service is not in accord with the state game department on the elk range conditions. He said the forage was 'licked clean' in the Black and Crown Buttes areas during the past two falls and winters" (56).

The Fish and Game Department range technician two years later estimated the carrying capacity of the range for an average winter at 1,324 elk (101), so he could not have believed then that the range had improved significantly. His carrying capacity figure was based on the "average" acres available to elk, which he estimated at 45,944 in December, decreasing to 24,660 in March. Peek et al. (136) estimated that as few as 14,000 acres are available during severe winters, and the "Plan of Management—Gallatin Elk Herd" (4), prepared by the Conservation Committee in 1941, estimated the available range below the park during severe winters at 16,000 acres.

The Fish and Game Department considered extending the 1953 hunting season beyond the announced closing date of November 15 if an additional elk harvest was needed in the Gallatin Canyon (56). Only 76 elk were killed in the fall (110) and opposition began to form against reopening the hunting season. In November, the Gallatin Sportsmen's Association announced it was against the use of a permit system for elk hunting, and was joined by "the dude ranchers, packers and outfitters, farmers and land owners of the upper Gallatin Canyon" in opposition to reopening the hunting season (47). The Fish and Game Department, in late December, proposed a special reopened hunting season for a part of the Gallatin elk winter range to take another 500 elk (57a). The Department had counted 2,137 elk in the Gallatin Canyon after the regular hunting season, an unexpectedly high count, and some officials thought a number of elk from the Northern Yellowstone herd must have crossed over into the Gallatin Canyon for the winter. The Department wanted to reduce the herd to 1,500, the carrying capacity figure "established to the satisfaction of game and range management people of the state and federal agencies."

Various methods have been used to mark elk so they may be recognized from a distance. Light-colored neckbands as seen here are easy to spot from aircraft. Fish and Game Department Photo.

Present knowledge about the variances inherent in counting elk in the Gallatin Canyon (117), and the slight exchange of marked elk observed between the Gallatin and Northern Yellowstone herds (137), suggest the extra elk were in the herd all the time, but just were not detected previously. In any event, there were too many elk.

A front page headlined newspaper story on January 5, 1954, told that over 150 people had attended a public meeting in Bozeman to discuss the special season, voting 62 for the season, 59 against, "However, there were no conclusions reached or recommendations made one way or another" (57b). Those in favor of the special season discussed the deterioration of the range and contended "the Gallatin elk herd had been maintained for years at a size that was too large for available critical range." Those opposed disagreed with the range carrying capacity estimate, "went so far as to indicate the winter elk range is improving," questioned the accuracy of the elk counts, and claimed "it is not certain there will be any appreciable winter kill and that feeding is the answer to sustaining a larger base herd in the Gallatin area."

A front page headlined story on January 8 told that a Gallatin Canyon dude rancher, representing 154 people, sought an injunction against the special season (57c). The dude rancher's petition claimed the "base" herd had been larger than the present herd in 19 of the past 34 years; the present winter was one of the mildest since 1895 so adequate range was available for the herd; a Fish and Game Department technician said the range was improving; elk distribution was good and there was light snow so there was "little problem and no danger of a great winter kill." He also stated that killing female elk which were four months pregnant "will result in the loss of two for one," and shooting would ruin the good distribution of the elk and frighten them back into the park.

The petition did not mention, of course, that forest rangers, game managers and the Conservation Committee had reported for years there were too many elk

on the range and 2,000 was far above the accepted range carrying capacity estimate of 1,500. The early winter may have been mild, but severe winters would come eventually and, in fact, elk were fed in the canyon before spring arrived. The Fish and Game Department range technician was virtually alone in his comment about range improvement, but he did not make his estimate of the range carrying capacity, 1,324, until a year later. The hiatus between the regular and the special hunting seasons could afford elk an opportunity to get out of the park and yet permit herd reductions. The special season was confined to only a small part of the entire winter range area, the east side of the river from Elkhorn Creek to the park boundary (57a). Practically all of the cow elk pregnant in January had also been pregnant in late October and November during the regular hunting season (108, 127).

A front page headlined story the next day told that the injunction was denied (57d). Hunters from throughout the state and from out-of-state were headed for the Gallatin Canyon (57d). The Fish and Game Department had made a serious error in not limiting the number of hunters by use of permits.

A front page headline for January 10 proclaimed: "Elk Season Opens With Bang! 4-5000 In Canyon" (57e). The newspaper related that the season opened with a "roar like an express train . . . . The highway was choked in places where hunters stopped to park their cars and trucks," but the kill of elk was "relatively light." After three days the kill reached 230, and the concentration of hunters dropped considerably after the opening weekend (57f). But the damage to public relations had been done.

A group of "Gallatin Canyonists" wrote to the newspapers describing the special season as "one of the most disgraceful, misguided, and mismanaged perfidy [sic] of justice, to both sportsmen and game animal, that has ever presented itself in the Gallatin area," calling the "firing line" on the Northern Yellowstone range "a Sunday School picnic by comparison" (57g). An editorial in a Bozeman newspaper referred to the special season as "The gory mess created by the Montana State Fish and Game Commission," and stated, "Most Gallatin County residents, we believe, are disgusted with the whole bloody affair and hope they can soon forget the slaughter sanctioned by state officials" (57h).

But the season, far from a slaughter, attained only about half the quota of 500 elk as hunting interest waned near the end of the season. On January 17 a group of hunters got elk from a herd of about 40 head but they said "there were too few hunters around to deplete the herd very much" (57i).

Now the Fish and Game Department was castigated from all sides. The best record remaining of this criticism is letters to the editors of the Bozeman newspapers. One letter writer wanted to feed the elk, claiming this would keep them off the poor range sites and feeding elk beside the road would provide a fine sight for the Sunday drivers so "In time the Gallatin herd would be just as widely advertised as the herd in Jackson Hole" (57h). He apparently did not realize that hay-fed elk continue to eat any natural food available.

Another writer acknowledged that the present range was abused, but he believed the Gallatin basin was not natural elk winter range since he thought elk originally migrated out of the mountains each fall (57j). He advocated feeding the herd and "Perhaps in time a compromise can be worked out with Mother Nature to where a fair-sized and healthy herd can be maintained." Nature makes no compromises.

Many writers blamed poor range conditions on domestic sheep grazing (57k, 57l, 57o, 57p). An old-timer wondered why there was concern about the range, since he thought it had improved greatly after livestock were removed (57l). No doubt much of the range had improved, but not those portions used heavily by elk (130, 148). Another writer suggested balancing the range and feed with the herd by handling elk feeding as a "livestock operation" (57n). He too recognized the range damage, relating, "An old timer of Park army patrol days, returned from Iowa to say that it hurt him to see the change on Tepee and Daily [sic] in the past forty years." But feeding elk is a much different proposition than feeding cattle. Another letter, written in a humorous vein, stated if elk were to be fed, why not domesticate them and halter break a few? (57m). Others (57k, 57q) though, were anything but humorous as they asked for some form of "good management and winter feeding" (57p).

There was less snow than usual that winter and ridges and south-facing slopes were blown bare (57s). The Fish and Game Department had been well bloodied in attempting to reduce the herd by means of the special season and now seemed, unofficially, somewhat resigned to feeding elk as a regular management procedure. The elk were described as in "good condition" during March, but "Several tons of hay have been fed in the Porcupine area where elk depleted the natural feed. State game officials said the feeding was done with the hope that it will supplement the small amount of feed and browse on ground where grazing pressure is the heaviest" (57s).

The attempts to reduce the Gallatin elk herd had been generally unsuccessful, resulting instead in antagonism against the Fish and Game Department and in increasing public sentiment both against reopened hunting seasons and in favor of elk feeding. On March 5, a call by the Gallatin Sportsmen's Association for only one elk hunting season the next fall was front page headline news (57r). Ten years were to pass before another reopened special hunting season was attempted in the Gallatin Canyon.

THE LAST CROSSROADS, 1955-1958

Trouble brewed again during the winter of 1955-56. By then the Montana Fish and Game Department had named Joseph Townsend as District Game Manager in charge of the Gallatin Canyon. Townsend, and Leroy Ellig and Joseph Egan who followed, revitalized the effort to manage the Gallatin elk herd.

Although the Fish and Game Department kept the hunting season open until nearly 1,000 elk were harvested that fall, 2,177 elk were counted in the herd after the season had closed (168). After severe weather occurred, some "Gallatin Resort Operators," through a public letter, kicked-off an attempt to get the Department to feed elk claiming a "deplorable situation" was developing "leading to the starvation of hundreds of elk" because of icing and crusting snow conditions (58a). The letter stated, "it is not even sound reasoning to believe that fewer elk will live where a greater number will starve in this situation because it is weather conditions and not the shortage of grass that has created the problem." The resort operators offered to contribute their time, labor and equipment to a feeding program if the Department would supervise and furnish the hay and they thought the Department should store hay as a regular practice, to be available for feeding elk during severe winters. They complained, "It is inconsistent with humane treatment that the department will allow animals to die of starvation and will not do all within their power to relieve this suffering."

The resort operators got little satisfaction from the Fish and Game Department, so they appealed to the governor and his representative visited the area (58b).

A Department-sponsored article on elk feeding in a Bozeman newspaper described the undesirable effects of feeding. It noted destruction of the range around feeding sites, concentration of elk and disruption of natural distribution, and the lack of success resulting from feeding in the Gallatin Canyon as illustrated by the high losses sustained during the winter of 1951-52 despite feeding (58b). The article stated the time to worry about "top heavy" elk herds is when hunting seasons are set, not when elk are starving. It described the winter range as capital investment, elk as dividends, concluding: " 'Let us not kill the goose that laid the golden egg' by indulging in greedy practices that have proven unwise, unsound and destructive."

But the Department once more carried out "temporary and experimental" elk feeding (58c). A Department representative observed the next spring that during the past winter dead elk had attracted attention and people wanted to do something about it, but when soil began to erode off the winter range in the spring "few noticed and fewer wanted to do something about it" (58d). He noted "the only possible objective of feeding elk is to maintain a herd too large for the winter range to support." He described starving elk as symptoms of the real problem, which was overuse of the range by "too many elk for too many years," and stated that feeding elk was only treating the symptoms, while the solution to the real problem, more winter range per elk, had been recognized for years. He believed there were two ways to reach the solution: to provide more winter range for the elk herd, or provide a smaller herd for the winter range. He indicated both ways would be used, by purchase of private land, although the possibilities were limited, and by reduction of the herd, which he considered essential if a viable elk herd was to be maintained in the future.

Some 150 elk carcasses were counted that spring (58d).

This is a view across the Gallatin elk winter range toward Black Butte. Note the vigorous stands of willow and good plant cover in the 1924 photo.

The photo taken in 1949 shows willow stands and ground cover thinning out from too much use. Trees now show a browse line.

Willows continue to thin out as shown by the 1961 photo. Soil erosion caused by overgrazing and trampling is evident as rocks are bared. U. S. Forest Service Photos.

1924

1949

1961

The Conservation Committee considered the situation and reached its fourth, and last, crossroads that fall, lowering its estimate of the carrying capacity of the winter range back to 1,000 elk (58e). A motion that the Fish and Game Commission be asked to feed the elk in the event of a long, hard winter was also passed. The Committee had now gone in a full circle, around four crossroads, from its original range carrying capacity estimate of 1,000 elk in 1937, to 2,000 in 1941, 1,500 in 1947, and back again to 1,000 in 1956.

The reestablishment of the carrying capacity estimate at 1,000 elk was one of the last meaningful acts of the Upper Gallatin Conservation Committee. The stand between those members who wanted to maintain the herd by feeding and those who wanted to maintain the herd by restoring the range had hardened, negating the Committee's effectiveness as an advisory or mediating body.

The prestigious Montana Wildlife Federation, composed of conservation groups from throughout the state, gave its support to reduction of the Gallatin elk herd to the new range carrying capacity estimate (58f). Progress in the program was evident that winter when only 1,230 elk were counted after a harvest of approximately 1,155 elk through the hunting season, which had been extended until December 12, and through the direct reduction of 20 more within Yellowstone National Park (169).

But feeding proponents were just beginning to fight. At a dude ranchers' association meeting that fall a Bozeman preacher discussed "the destruction of the Gallatin elk herd because of charges that the animals are causing erosion" (83).

An editorial in a local newspaper in 1957 discussed two talks given to the Bozeman Rotary Club, one by a biologist from the Fish and Game Department and the other by a dude rancher who favored feeding the elk and, "The two talks and the conclusions reached by the

1924

Looking across the Gallotin River toward Crown Butte in 1924, one saw an abundance of willow in the river bottom and good plont cover on even the poorer sites.

By 1961 willows are mostly gone. Poor soil sites show acceleroted erosion and streom bank erosion is notable where streamside vegetotion is gone. U. S. Forest Service Photo.

1961

During 1937 a Gallotin National Forest report on game used this illustration to show extensive damage to willows from overbrowsing. The area is neor Snowflake Springs. U. S. Forest Service Photo.

By 1961 there were only vestiges of once extensive willow stands that provided winter food for elk. U. S. Forest Service Photo.

speakers were as different and divergent as the backgrounds of the men involved" (84a). The biologist had described the overstocked range and the plans to reduce the herd to 1,000 head, "He is also opposed to any feeding of elk, no matter if the animals are starving. Elk, to him, are apparently only statistics, not animals that can live and suffer and die." But the dude rancher "thinks the present winter range can support 4,000 elk if they are properly distributed." The dude rancher had maintained it was necessary to feed the elk during the severe winters that come "perhaps once every three or four years," and he stated: "The feed is there but because of ice and other weather conditions the animals cannot get to it. No matter if the herd numbers 4,000 or 1,000 the animals must be fed or many will starve." The editorial commented that the dude rancher's knowledge of elk "comes from practical experience, observation and association. Moreover his opinions are backed by a majority of the ranchers and residents of the upper canyon country." The editorial presumed the biologist was college educated, "But those of us who have lived in the valley a long time are prone to be a bit skeptical about these men scientifically trained in pursuits pertaining to agriculture and animals," and claimed to have observed college instructors fail, with but few exceptions, when they attempted practical jobs in farming and stockgrowing, "The higher they were academically the more marked has been their failure." The editorial stated that hunting license sales, hunting parties and summer tourists brought $450,000 into the community yearly, which was now "an industry threatened by extinction by an arbitrary ruling by biologists of the game commission." It concluded that the elk "damned by having the hunting season called a 'harvest' by the state commission, denied human aid — with hay going begging in the nearby Gallatin — when ice covers the grass, because elk feeding wasn't written down in the book; what hope is there for the Gallatin herd unless we Mon-

tana people bestir ourselves and insist on a more realistic administration of the elk program," which included forcing "a little more horse sense into game management."

The dude rancher, speaking to a Bozeman sportsmen's organization, recommended the Gallatin elk herd should "be increased rather than diminished, claiming there was ample grass to support 3,000 or even 4,000 animals and stating in his opinion the key to the situation lay in a flexible hunting season that would allow the animals to follow natural migratory channels and obtain a wider distribution" (84b).

These comments about distribution were very similar to those made by the forest ranger in 1924 (173), who stated, "When an estimate is made of the range when forage is available and *no snow prevents the elk from getting the feed* [emphasis supplied], then estimates of from 5,000 to 10,000 head are about as far as we can go." But he recognized these estimates were "entirely too high" during "the peak of the snow conditions" when the elk were limited largely to "windswept ridges and southern exposures." Elk distribution and migration in the Gallatin Canyon were influenced primarily by snow and weather conditions.

A Fish and Game Department report for 1957 (73) remarked that the assignment of a range technician to the Gallatin Canyon could not be justified unless the elk herd was reduced, since gathering information to further document the declining condition of the range would only be of academic interest.

The Conservation Committee, in the fall in 1958, was again caught in the squeeze between the hay feeding-big herd proponents and those who favored a smaller, balanced herd with no feeding. A private citizen, who had been a member of the Committee since 1933, stated: "the purpose of the committee was to advise and make recommendations to the managing agencies and not to dictate what these agencies had to do." Another member thought the Committee had outlived its usefulness (170). The decision was made to reorganize the Committee with a constitution, formal by-laws, and a board of directors (170). Thus passed a venerable conservation organization.

A new organization, entitled The Upper Gallatin Conservation Association, claimed to be the successor of the Conservation Committee. But the new Association's chairman appeared to be interested in more than mediation when he stated, "We are convinced that if the association is broadly representative and well supported by an interested membership it will have a great deal of influence with the various agencies who control the future of the Upper Gallatin" (59).

The revitalization of the Montana Fish and Game Department's role in the Gallatin Canyon in 1955, and its efforts through 1958 to reduce the elk herd to the capacity of the range, had met with strong reactions from proponents of elk feeding, eroding away neutral ground and causing the demise of the Conservation Committee. However, its end came only after that organization had completed a full circle around the four crossroads and again lowered its estimate of the carrying capacity of the range to 1,000 elk. While the elk herd was hunted heavily during this period, it also was fed.

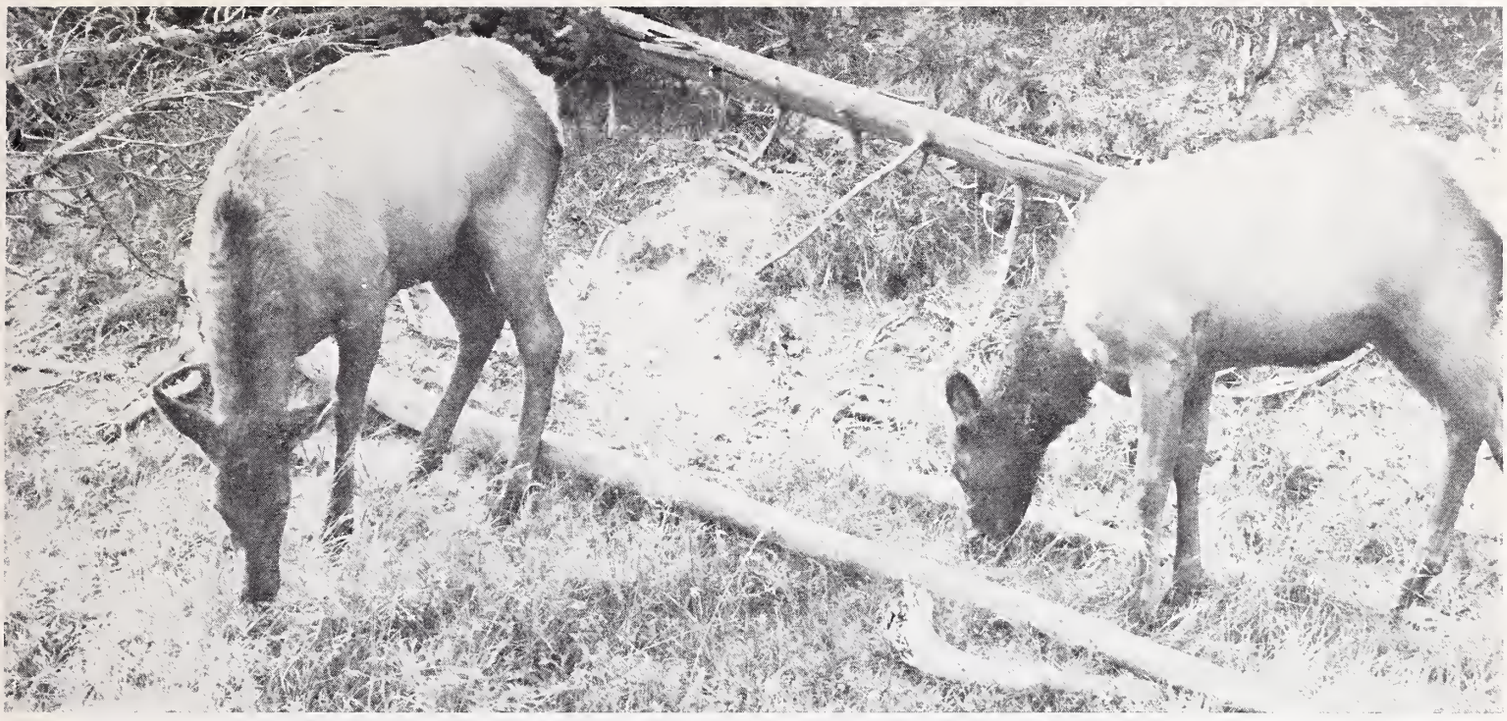
SKIRMISHES, 1961-1963

The Montana Fish and Game Department, the U. S. Forest Service, and the National Park Service developed a cooperative plan in 1961 for improvement of the Gallatin elk herd. The basis of the plan was to balance the size of the herd with the range resources using special hunting seasons to reduce and control the number of elk (7, 124b). If necessary, elk would be killed within Yellowstone National Park by park rangers or trapped and shipped out for transplanting. The plan also called for intensified range studies.

The plan met with considerable opposition from some sportsmen (85a), who seemed in favor of trying the old palliatives again rather than to agree to reduction of the herd (124b).

The chairman of the new Upper Gallatin Conservation Association also announced his views in the spring of 1961 contending, "Elk were originally a plains animal and as far as can be ascertained there were no elk in the mountain country until the latter part of the last century" (124a). He believed problems developed because hunters disrupted elk migrations, killed off the migration leaders, and confined the animals to a small portion of this unnatural mountainous winter range. He recommended closing the hunting season for three years to improve elk migrations or having only early seasons which would close before the elk migrated from the park. He noted that early seasons had been held for two years, however, "nature has not seen fit to cooperate." These winters had been mild and "Since there is no lack of feed the elk have not been forced to migrate," which indicated that more than hunting and leaders affected the migrations. He stated, "until proven otherwise . . . the solution of the elk problem lies in proper distribution by migration, to available winter pasture. Failing this the arbitrary reduction of the herd is the only other but very unsatisfactory solution."

As pointed out earlier, elk migrations in the Gallatin, even during the first years of sport hunting, were controlled primarily by weather conditions and efforts to improve migrations (by the game preserve) were ineffectual. Early hunting seasons provided fine recreation but benefited primarily the dude ranchers because



Visitors to Yellowstone National Park that view elk on summer range find it difficult to understand why these animals should have range problems. Fish and Game Department. Photo.

hunters had to use horses and pack gear at that time of year. While exceptionally early winters did force elk out of the park at times and into areas open to hunting, extended or reopened hunting seasons held the most promise for obtaining sustained harvests from the herd. A Montana Fish and Game Department report in 1912 (2) described some of the ramifications of early versus late hunting seasons:

> *There is a diversity of opinion among the sportsmen of Montana as to the season for hunting large game. Some claim the present 60 days open season [October 1 to December 1] is proper and others that the season should be from September 15 to November 15. Both contentions possess merit — the earlier season favors the non-resident hunter and the licensed guides of the state, while the present season gives an opportunity to the resident hunter to hunt after the usual snow fall, the latter part of November.*

The Association, in June, reiterated its request for an early hunting season and announced its opposition to any late hunting (85b). A dude rancher joined in, stating, "We feel that distribution is the salvation of the Gallatin Elk herd," and he suggested the governor would take a direct hand in its management (124c). The president of the Billings Rod and Gun Club took exception to this, pointing out that the dude rancher "has a financial interest in the elk herd which he didn't mention," and stressing, "As sportsmen, one of the most important jobs we can accomplish is to keep politics out of fish and game affairs" (124d). This was an admirable goal, but politics will always have an effect on the management programs and policies of any conservation agency.

Severe winter conditions occurred exceptionally early that fall and elk migrated from the park during the hunting season. Hunters flocked to the area as they always have during these conditions and were obtaining an excellent harvest when the season closed in early November. The elk migrated among and past the hunters and soon were distributed throughout the winter range.

The Association now had the elk distribution it wanted. As expressed, "We feel that elk distribution is now excellent," they called for a stop to all hunting for the winter, estimating the harvest at over 800 (60a). The Association, whose chairman had stated the elk would not migrate because of hunting, now observed, "the elk migration got caught in the peak of the hunting season," but claimed most of the credit for the good migration and said, "we feel that the early closing of the 1960 hunting season was the main contributing factor" (85c). The checked harvest was 580 elk (116).

The chairman of the Association had stated that if good distribution of the elk did not solve the problem in the Gallatin Canyon, then "the arbitrary reduction of the herd is the only other but very unsatisfactory solution" (124a). But now the Association saw indications that a severe winter was approaching, and despite the good distribution of elk, was "seriously concerned over the threat of heavy winter kill, irrespective of the size of the herd," and offered, "our services in helping the Fish and Game Dept. to be prepared to meet

This spruce tree was browsed high and severely. Such browse lines are a common sight around hay feeding sites on the Gallatin elk range.

this threat by stock piling hay or any other measure they may wish to take" (60a).

Some 1,430 elk were counted on January 18, 1962 (91) but, contrary to the new cooperative plan, a reopened hunting season to reduce the herd to 1,000 was not held that winter (60b). The Fish and Game Department soon provided hay for about 600 elk (91).

Dude ranchers who helped feed out the hay noted, "had it not been for the pressure put on by the group [Association], the Fish and Game Department would have let the elk starve" (91). Their spokesman inadvertently described again the small amount of range available to elk in the Gallatin Canyon during severe winters, and its depleted condition, by observing that early snows had covered slopes in the Wapiti drainage (primarily north-facing) which "were ordinarily about 80 percent available to forage until about Jan. 15," and "A majority of the feed on the southern slopes is gone now; that's why it's a critical time." He said he did not want to establish a "'feed camp' like the one at Jackson Hole, Wyo.," but advocated feeding only during severe winters. Feeding elk, however, has been called the beginning of the end, and most feed camps developed from similar small beginnings.

Management of the Gallatin elk herd was approaching a bitter, no holds barred fight between those who advocated management to achieve range recuperation by reducing the elk herd and those who advocated feeding instead, and the outcome was in doubt.

A new organization now joined the fray—The Gallatin Canyon Elk Protective Association, "interested in feeding (hay to) the elk herd in the upper Gallatin to keep them from starving to death," with the aim, "to protect big game in the Gallatin Canyon" (61a).

Another organization, the Manhattan (Montana) Wildlife Protective Association, also joined in stating, "The Game Department said the number of elk should be reduced, so there would be enough natural grass and browse to last them through the winter. We do not believe this is the answer. If there were only 10 elk left in the Canyon and if they were not fed half of them would die" (125a). This group organized a drive to obtain money and hay for feeding the elk, observing, "The Biologists say we are wrong to feed the elk but when they are starving there is only about one thing to do and that is to feed them."

A dude rancher summarized the feeding program in the Taylor Fork drainage, reporting he fed 38 tons of hay to 375 elk from December 12 to April 14 (86). He observed that elk made use of "any growing vegetation that was exposed" around the feeding area. He claimed to have found only 11 dead elk in the Taylor Fork area, estimating the entire winter loss at 200, and concluded, "had there not been a feeding program, I'm sure you will agree that this would have been a winter of calamity."

Immense damage was done to the vegetation in the vicinity of the Taylor Fork feed grounds. Sagebrush plants, valuable forage because of availability, were killed outright over several acres by elk. Willow, pine and even spruce trees were killed from over-browsing. Intensive searches were made with a dog and 94 elk carcasses were found on the winter range, about half of which were on feed grounds or in the immediate vicinity (115). An exact count of dead elk on the feed grounds was complicated by knowledge that some carcasses disappeared.

Only one of 150 willow plants examined on study plots in the spring was not decadent and only six were not severely hedged from browsing. Four-years' growth was removed from many plants (115). This pointed out again the importance of browse during severe winters. Grass sites used by elk were in deplorable condition (115).

In May 1962, the new Gallatin Canyon Elk Protective Association (GEPA) announced its plans, "to set up a feeding program, and to build up an emergency fund whereby feed and money would be available when needed . . . . Our purpose is not to interfere with the Fish and Game Commission, so long as the feeding is done adequately and at the proper time. Our committeemen in the Gallatin Canyon are well qualified to make these decisions and the organization will act accordingly" (125b). A spokesman for the group remarked, "I have yet to see a Biologist that can keep an elk from starving without feed. Right or wrong these elk had to be fed. We are satisfied that 80 percent of the elk in the Gallatin Canyon would have starved had it not been for the feeding program" (125c). He belittled efforts to balance the herd with the available forage claiming, "There was plenty of feed but the elk could not get it," and that if the herd had been harvested down to 50 elk, "without a feeding program we would have lost most of them." He stated that the mortality of elk in the feeding areas was about 3 per cent, but was 80 percent back in isolated areas and that about 1,000 elk were fed that winter.

Actually probably one-third, or at the most, one-half of the herd received any hay at all that winter. The loss of about 100 elk was less than seven percent of the 1,430 elk counted in January, and up to half of those losses were among elk on feed grounds. Elk had existed for many centuries on this range without hay feeding.

GEPA campaigned for recruits and money. It issued a call entitled "Hang Up Your Rifle Forever," which claimed (periods in original), "Even as you read this letter . . . . . The most magnificent of American big game animals . . . The Elk . . . is rapidly on its way toward complete extinction," with "Tons of meat . . . all gone to waste. Cows and calves . . . Proud and fearless Bulls . . . All of which have taken that 'Last step' . . . Tumbled into the Snow . . . to [sic] weak to go on . . . DEAD . . . Hang up your RIFLE . . . FOREVER . . . That is . . . Unless you . . . as a dedicated Sportsman . . . Do Something . . ." (125c). That something, of course, was to join GEPA.

The Fish and Game Commission "stood firm" at its meeting on a June morning in 1962, resolved to reduce the Gallatin elk herd to 1,000 head (61b). The Commission announced a hunting season beginning September 16 to close when the necessary number of elk were harvested. GEPA's chairman, and another member, attended the Commission meeting and opposed this season "in a spirited morning argument." They "agreed that the area . . . was overgrazed," but claimed it "was livestock grazing 'not above board' which was causing the range deterioration," and charged, "We feel we're being crowded out (of elk hunting)." They announced, "We want to save the elk for posterity," but the chairman of the Fish and Game Commission countered, "That's the same concern we have on this commission."

Trespass livestock could not be blamed for the poor condition of the range. A few dude ranch horses might stray onto areas of secondary importance to elk, but they were quickly rounded up and removed.

The Fish and Game Department's plan, as completely formulated, was to close the hunting season when the elk herd was reduced to 1,000 counted elk or, if mild weather persisted and the elk migration was slowed, to close the regular hunting season (to begin on September 16) in early November and then have a special, controlled, reopened hunting season on a portion of the winter range. The long term goal was to balance the number of elk with the capacity of the range (61c).

GEPA charged the plan was "designed for the eventual elimination of what is known as the Gallatin Elk Herd," expressed "complete opposition to the present regulations," and claimed the "Fish and Game Commission has ignored the natural migration pattern which resulted from regulations of 1959-60-61" (61d). GEPA further stated, "It appears that the department demands a short term elimination program instead of a long term management program that will assure hunter activity in years to come."

The winter of 1962-63 was mild and the hunting season was closed about a month before significant numbers of elk moved to the vicinity of the park boundary, where they remained all winter (116). Apparently "leaders" trained the previous year did not take charge of the migration. The hunting season was not reopened, although January found fair numbers of elk out of the park in the boundary vicinity (116).

GEPA spoke out again that spring, "Elk Association Outlines Policy For Commission," requesting an early hunting season that fall, and expressing opposition to reopened seasons and permit hunting (87).

At the Fish and Game Commission meeting in June 1962, the chairman of GEPA had recognized range deterioration, blaming it on livestock trespass (61b), but after he made a new inspection of the range in June 1963 he stated, "there is no sound reason to say the elk range can carry only 1,000 head of elk. . . . Both sides of the Gallatin River can easily winter 3,000 head or more" (62a). He claimed, "the range was in good condition 'with plenty of grass in the critical winter range. The open range was in better condition than some of the enclosures that have been there since 1933. All streams were running clear and there was no sign of erosion.'" But studies of exclosures in the Porcupine and Meadow drainages that summer showed 46 percent more ground cover within them than on comparable grazed areas adjacent to them (116).

The National Park Service, in an effort to be impartial, had a U. S. Soil Conservation Service technician survey the range within the park during the summer of 1963. He found areas usually unavailable to elk in generally good condition, but reported that the steep grassland sites had been severely grazed for many years and were in poor or low fair condition, the grasses there were all very low in vigor, the rabbitbrush was browsed extremely heavily, and there was much bare ground, erosion and soil displacement (148).

This exclosure in the Meadow drainage affords a comparison of vegetation that has been grazed by elk to ungrazed vegetation. Fish and Game Department Photo.

A shed built by the Gallatin Canyon Elk Protective Association to house hay for feeding elk. Fish and Game Department Photo.

GEPA constructed a hay shed across from the Fish and Game Commission's Porcupine Game Range that summer to store hay for feeding elk. GEPA's chairman announced, "The starvation of elk in early 1962 will not reoccur in the Gallatin Canyon and this association will continue to fight all factions to maintain an elk herd in the Gallatin Canyon which will provide adequate hunting and allow transplants to other parts of the state to assure continued big game hunting in the future," contending, "for government agencies to continue their planned elk elimination program is pure folly" (62b).

The adversaries took sides during this skirmishing, and positions solidified. Despite new management plans, elk were fed but no hunting seasons were reopened.

THE REDUCTION, 1964-1965, AND EPILOGUE

A very important new management technique was developed in Yellowstone National Park during the winter of 1962-63: driving elk by helicopters into concealed winged-traps (105). Public opinion was intense against the killing of elk by park rangers, but now significant numbers of animals could be removed from park ranges alive. A trap was constructed in the Gallatin Canyon within the park during the next summer.

The hunting season of 1963 closed during mild weather on November 3 with a kill of only 70 elk (106). Over 1,400 elk were counted in early December (117) and a reduction goal of 400 was established (106). Heavy opposition was expected against any reopening of the hunting season, so elk trapping began on January 8 and at first no criticism was encountered (106). The peace did not last long. On January 22, the Gallatin Canyon Elk Protective Association (GEPA) announced it was requesting a court injunction "to prevent trapping, killing and reduction of the elk herd in northern Yellowstone Park" (63a). GEPA's chairman stated: "reduction of the herd has caused an economic loss to dude ranchers and sporting goods dealers." He complained: "the Park Service is using a small, submarginal land area in claiming there is not sufficient feed in

Use of helicopters has modernized elk trapping. Here, elk being trapped in Yellowstone National Park are herded into the trap wings. National Park Service Photo.

the park to support a given number of elk" and he "declared public land is available adjacent to the park." The chairman took a dark view of the future, with "limited permit hunting of the wealthy," and exclaimed: "The simple pleasure of a Sunday drive into the elk herd area of the Gallatin Canyon is a thing of the past and our government agencies must be made to listen to the people before they destroy these values and our national heritage."

A more accurate aerial census was made on January 24 when 1,656 elk were counted, not including 262 elk already trapped and shipped out of the canyon, and trapping continued (63b). The hearing on the injunction was scheduled for February 3, but by then the trapping program was nearly completed (63c). A total of 417 elk was trapped that year, 377 were shipped out of the canyon to other ranges, 35 were marked and released for study purposes, and 5 escaped (106). GEPA had filed its suit in Montana, but jurisdiction was vested in the Federal District Court for Wyoming; because of this error, and because the Superintendent of Yellowstone National Park was ruled to be acting within the scope of his authority, the suit was dismissed (30).

Winter conditions became more severe and, in late March, GEPA started to feed elk (63d). The organization requested aid from the Fish and Game Department, but the Department did not commit itself to feeding and replied that it did not need assistance from GEPA (63d).

An article in a local newspaper on March 26 claimed elk, deer and bighorn sheep had been found dead of starvation, complained that the Department had "not fed a single elk, the animals are dying, starving," and noted, "The small bunk of stored hay of the Elk Association is now pretty well used up" (88a). The article stated GEPA was appealing for help since the Department had "not given us any assistance or feed up to this time," and remarked that one of the "basic rules" of the Fish and Game Commission was apparently "not to feed elk, no matter what the conditions." The article repeated the old outlook: "Almost everyone who is familiar with the situation says there is ample feed in the canyon for elk and other game, but it is inaccessible due to deep snow and ice." It related, "several years ago . . . sportsmen went over the head of the fish and game department and appealed to Gov. Aronson, with

successful results," but "This year the Elk Protective group decided to start their own feeding program, perhaps hoping the public indignation would force the fish and game people to take a realistic view of the picture."

GEPA announced: "A statewide fund raising drive . . . to feed 500 elk and other animals it alleged the Fish and Game Commission has neglected" (122).

GEPA had overplayed its hand in its efforts to promote elk feeding; conditions just were not severe that winter. The Fish and Game Department provided hay for only a small, isolated band of elk that had been baited into an unnatural wintering area near a dude ranch. Other elk were not suffering and winter losses were negligible. Only one dead elk was found later that spring during a cooperative aerial count of the herd (63f).

GEPA had succeeded in proclaiming far and wide that a wildlife problem existed in the Gallatin Canyon. GEPA's chairman exclaimed, after a meeting with sportsmen in Billings in which his request for support was rebuffed, "If we accomplished nothing else . . . we let people in other parts of the state know what we are fighting for and the truth of the present situation" (88b). The Fish and Game Department took advantage of this publicity to tell its side of the controversy and to prepare the public for the outcry ahead when the herd would be reduced. The director of the Department announced in late March, "Random feeding of hay to elk is not part of the Fish and Game Department's elk management program . . . Feeding . . . is an aftermath of too many elk on too little range for too long a time," and it is "a poor substitute for a program designed to balance animals with their food supply and merely tends to aggravate an already unhealthy situation" (63e). He pointed out that those who advocated elk feeding "are the same people who have resisted efforts to initiate a sane management program there" and who objected to removal of excess elk by any means, including hunting, trapping and transplanting, or direct reduction within the park. The director said if an insufficient number of elk was taken during the regular hunting season, the reduction would be accomplished by a reopened season after the elk had migrated from the park.

About 200 elk were harvested during the fall of 1964 (137). A proposal by the Fish and Game Department to reopen the hunting season in December, with the alternative of trapping elk within Yellowstone, was attacked by GEPA in letters to the Governor and the Department's director (92a). The letters brought up an old delaying tactic, the request for a cooperative count of the herd (by Department personnel and representatives of sportsmen's groups) before any further action was taken. It also claimed there was sufficient range for the elk and that a reopened hunting season would stop the migration and drive the elk back into the park. The letters stated that emphasis on restricting hunting in the old game preserve during the past few years, and the early hunting seasons, had "reestablished the elk migratory patterns," but failed to mention 1961 when the migration was "caught in the peak of the hunting season" (85c).

In a very decisive move, Department personnel counted over 2,000 elk on December 5, and over 2,000 were counted again during a quickly-organized cooperative census two days later (117). The Department announced a reopened hunting season to extend from December 27, 1964 to January 31, 1965, if necessary, with 1,000 special permits and 1,000 alternate permits to be issued in a drawing (92b). To eliminate hunter congestion and improve hunting success, each permit holder would be allowed to hunt only during a specified seven-day period in a specified area. The first hunting would take place next to the park boundary to discourage any movement of elk back toward the park. Only about 200 hunters would be allowed in the hunting area at any given time, and the season would close on 48-hours notice if it appeared the quota of 1,000 elk would be attained.

Once again management of the Gallatin elk herd became an issue for the courts. Nine Bozeman area residents obtained a temporary restraining order preventing opening of the game preserve to hunting and opening the special hunting season, with a hearing scheduled for December 21, one day before the drawing for the permits (92c). The plaintiffs brought up the arguments from former years in a letter to the editor—the elk herd had now migrated below the park "outside of the critical winter range" so a herd reduction was not needed; the hunting would be "wholesale slaughter;" the elk would be driven back into the park; and the elk should be fed if severe conditions occurred (63h).

Neither the District Court (92d) nor the State Supreme Court (92e) would halt proceedings and 100 permit holders began hunting on December 27 adjacent to the park boundary (63i).

The first hunters encountered some trouble from dude ranchers; one group complained (31a):

> We started walking up the canyon and had gone about two miles in the deep snow. Four men from one of the ranches passed us and laughed at 'those poor fools on foot.' They rode on ahead of us and got to within 200 yards of a herd of 26 elk. They had rifles, but did not fire a shot. They just hazed the elk back across the Park boundary. Then they turned around and rode back by us and once again ridiculed us for going up the canyon after the elk. 'There aren't any elk up there' is what the riders told us.

Hunters were also harassed in other ways: "One hunter was told in profane language that he would not

be able to get gas anywhere in the canyon," and horse rental was priced unreasonably high (31a). Further skulduggery was suggested in a local newspaper which reported several hundred elk were feeding along Porcupine Creek one morning, "but before daylight and while numerous game wardens were still asleep in the lodge on Porcupine numerous shots were fired in the air," and "Reports have it that it did not take the elk long to leave the Porcupine bottoms once the mysterious yet harmless shots began to make the welkin ring" (88d).

Opponents viewed the season as a "senseless slaughter" (88c) but the hunt progressed satisfactorily (132), which led to even greater criticism. Another article in a local newspaper, entitled, "Elk Hunt Degenerates Into Butchery Of Gallatin Animals," complained of "wanton butchery," of elk forced back into deep snow, of elk carcasses abandoned by hunters, accused game wardens of "sticking close to the highway and making no check on the killing," and quoted a local resident, "The whole picture is one of the most pathetic sights I have ever seen" (89a). The article appeared somewhat confused concerning the physical condition of the elk saying, "while they are in fine condition insofar as fleshing goes, they are suffering from being run to death and an acute hunger."

The hunt actually was orderly, intensively controlled and well patrolled (132). The Fish and Game Department had far too much at stake to allow anything less and had learned a painful lesson from the reopened season of 1954.

The opponents of the special season recommended putting game management directly into politics by asking for the election of Fish and Game Commissioners instead of their appointment by the governor (123). The opponents called the special season a "cruel hoax", said "the damage is done, and at least three or four elk will die of starvation and weather for every one killed. Instead of the elk being allowed to winter peacefully in the bottom lands and survive the winter very well, the Fish and Game Department has caused these elk to be driven into the higher mountain areas where a shortage of food and heavy snow and low temperatures practically insures a heavy death toll" (123). During the previous winter, however, these opponents to herd reduction had been demanding that the Department feed hay to the elk, then wintering "peacefully in the bottom lands." Over 700 elk were legally harvested during the special season (132) so if at least three or four elk died for every one killed, the entire herd would have been wiped out. The winter was extremely severe, but searchers the next spring found only 44 carcasses of elk where death was attributed to malnutrition (133).

The special season extended from December 27, 1964 to January 31, 1965, 2,007 permits were issued, 1,493 hunters participated, and 717 elk were legally harvested

A successful Gallatin Canyon elk hunter. Fish and Game Department Photo.

(132). Another 78 elk were killed illegally, were abandoned, or died of wounds, which is about the 10 percent usually estimated for such losses during elk hunts. Twenty-eight law violations were cited, indicating the game wardens were on the job (132).

Criticism continued in a local newspaper after the special season was over, an article likened the theories of game biologists to "the schoolchild idea of a parable —a heavenly story with no earthly meaning" (89b). This article expanded into genetics: "The real developers of our farm livestock today are the breeders who spend their days with a feed bucket in one hand, a pitchfork in the other and live, think, dream about their flocks or herds;" into economics: "Economists seem to glory in assuming divergent ideas from the same set of figures," and concluded, "Cattlemen, sheepmen, others whose knowledge has been honed on the wheel of competitive experience, will tell you there is ample feed in the Gallatin-Madison area, provided the elk are allowed to follow their natural migration pattern," and biologists are for the purpose of telling "these dumb sportsmen and ranchers a few of the facts of life. Obviously, they serve no other useful purpose." The article did not mention what was obvious—the reduction had the support of the people. The season could never have been held without that support.

Again came the letters to the editors. All of the writers were new since the last big write-in of 1954, except possibly those using pseudonyms, but the thoughts

This eroded hilltop shows the extremely heavy use that the windswept ridges get during heavy snow periods. Fish and Game Department Photo.

and suggestions in the two sets of letters—10 years apart—were practically identical.

One letter, published during the middle of the special season, called for feeding the elk that winter, then if herd reduction was necessary (which the writer did not believe) it should be carried out "earlier in the fall when the weather is not so severe" (31c). Another writer wondered, "If this land will take care of numerous bands of sheep and herds of cattle, why isn't there enough grazing land for more than 1,000 head of elk" (89a). He stated, "the elk ran on this range for 100 years that we know of and the brush and grass was [sic] there then. It [sic] will be there one hundred years from now unless domestic sheep eat it [sic] off." Another letter writer had praise for GEPA, wondered why there was a winter range problem since he was sure more elk had been on the range in past years, and asked if cattle and sheep could be causing the trouble (31b). He called, "sportsmen arise!" And asked for lobbying in the legislature before big game hunting became the sport for "only a wealthy few."

Presumably, letter writers are motivated to write primarily against things, but some letters were in favor of the Fish and Game Department's program (31e, 63g, 64a, 64b). The Montana Wildlife Federation stated that none of its member clubs had protested against the special season (31d).

The Department, during that most severe winter, was forced to feed some elk and GEPA also did some feeding (89c). A small band was fed again where it was baited into an unnatural wintering area near a dude ranch and some elk were fed in the trouble spot of old—the West Fork. Ironically, the West Fork lies near the foot of the winter range and getting elk into this area during the winter was one of the goals of those who thought wider distribution of the elk would solve the problems in the Gallatin Canyon. Elk moved into the West Fork drainage that winter apparently because of hunting pressure, but they got into trouble there again just as in severe winters of the past. Aerial surveys after the special season revealed that many elk had moved lower in the canyon than usual (133).

Any implications that the herd had been decimated were expurged when nearly 1,500 elk were counted in the Gallatin Canyon the next winter (32).

Opponents of reduction of the Gallatin elk herd received consideration of their complaints in the next session of the State Legislature but, after an extensive investigation, the Legislature lauded the Fish and Game Department for its management programs (93):

> *The report by the House fish and game committee said charges of mismanagement by the department of the Sun River and Gallatin Elk preserves were unwarranted and stemmed from "a minority group with an economic interest."*
>
> *The special committee was composed of the standing House fish and game committee . . . . The committee endorsed the fish and game department's elk management policies in both the*

Gallatin and Sun River areas but recommended the department make a more determined effort at public relations with sportsmen's groups.

It said it found that most criticism of the department was coming from minority groups such as outfitters and guides and dude ranchers and "was of a purely mercenary nature."

Trapping elk with helicopters had opened new horizons in elk management by permitting significant reduction of elk herds without killing elk. Events culminating in two Congressional Hearings (8, 29) demonstrated that a great many people, even when they fully understood the need to reduce elk herds on depleted ranges, found the killing of elk by park rangers repugnant. Most of these people had no objection to trapping and transplanting elk, however. Helicopter trapping provided a vital new lever to the agencies responsible for the Gallatin elk herd. While they had been understandably reluctant to utilize hunting or direct reduction to trim the herd, they demonstrated in 1964 that the public would countenance reduction of the herd by trapping and transplanting. After 1964 if the herd was not reduced by sport hunting, many elk could be removed by trapping. With this leverage the agencies moved to successfully reduce the herd the next winter.

The initiation of the reopened hunting season in 1965 was aided immensely by the two aerial counts of 2,000 elk each, made in December 1964, one a cooperative count. During many winters, or even series of winters, weather conditions were not conducive to good counts of the Gallatin elk (117) and herd size became a matter of contention. However, the two December counts left no doubt that the herd was grossly oversized.

The strenuous and often acrimonious efforts to promote feeding the herd in 1964 had the effect of underlining the management agencies' repeated warnings that a serious problem existed in the Gallatin Canyon and that something had to be done about it. The successful reopened hunting season, despite the ludicrous last ditch actions of some opponents and the editorial attacks of *one* local newspaper, clearly indicated that the public supported this management effort.

Epilogue

The Gallatin elk herd had finally been reduced nearer to range capacity, but the struggle went on. Management was much less restricted in scope after the successful reopened season of 1965, and reopened seasons and trapping and transplanting were used alone or in conjunction during following winters. In 1968, the Montana Fish and Game Commission when discussing elk management in Montana stated (9):

The Gallatin portion of the Northern Yellowstone elk, historically a trouble spot, requires close continuous attention as weather plays such a crucial and unpredictable part in the proper harvest. The special late seasons have accomplished much toward adequate management of these elk and making more elk hunting available.

Opposition to these management efforts was, if anything, even more virulent than before. The skirmishing in the Gallatin Canyon will doubtless continue as long as elk and people inhabit this beautiful area.

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