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CATTLE ON GRIZZLY BEAR RANGE

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INTRODUCTION

Bear predation in the United States involves two kinds of bears, the grizzly (*Ursus horribilis*) and the black (*Ursus americanus*). Because the grizzly today occupies a restricted range and the black bear is widely distributed, most ideas about bear predation concern the latter. It appears from the information gathered by the author that the two species differ in their propensity for preying on cattle, so cannot be lumped together in considering the bear predation problem.

The grizzly has long been famous as a cattle killer, but except for a few incidents given by Seton (1929, Vol. II, p. 28) there is little information in the literature on the subject. The Alaska brown bear, closely related to the grizzly has been accused of killing cattle on Kodiak Island but a study made by Sarber (1939) showed that most of the cattle deaths were due to malnutrition and that the bears were largely feeding on carrion rather than on their kills. In this study a few deaths were attributed to the bears but the physical condition of the animals at the time of attack was not known to be normal.

In the area where the grizzly was

[1] Observations were made by the author, by Ranger Verland Taylor, who cooperated with him throughout the study, by O. J. Murie, and by the cowboys. At all times good cooperation was received from Supervisor Arthur Buckingham and his staff, herders, and cattlemen.

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observed, predation on cattle was rather consistent, while the information received in letters from range men indicates that black bear predation on cattle is highly sporadic. In a letter from a Regional Forester is this statement about the black bear: "The predation is mostly confined to sheep, although in one case . . . a calf was attacked. . . . The predation, so far as livestock is concerned, has always been spotted and occurs in unpredictable locations. It quite frequently happens that predation by bear is heavy in a certain area one year, and then for a number of years no losses occur." A district forest ranger in Wyoming mentions a number of cases of bear predation on sheep and then writes as follows about cattle: "No cattle have been killed by bear on this district for the last fifteen years."

A forest ranger in Colorado writes: "The killing of sheep by bear in this section is common, however I have had rare reports and in only one case have I ever found any cattle that I believed was killed by bear, although they work on nearly every carcass I find on the range, and for this reason one doubts most of the cattle killings reported for bear."

Another Forest Service ranger in Colorado, after describing the killing of a yearling steer, writes: "There are an average of three or four authenticated cases of predator bear killings on this district annually."

A hunter in Idaho, in writing about domestic sheep that the bear had killed, states: "As for how they kill cattle I have never had the experience for there are no cattle killing bear in this vicinity." Possibly where domestic sheep are found, they serve as a buffer for cattle since they are more readily taken by bears.

A Forest Service ranger in Colorado forwarded a letter from a stock man in which the black bear was accused of killing six cattle. The tenor of the letters received is much the same, the black bear occasionally kills cattle but the time and place are usually unpredictable.

Range men and oldtimers hold many shades of opinion on the subject of bear predation on cattle. This is to be expected, at least in the case of the black bear, because of the sporadic nature of its predation. One field man might happen to have seen several cases of predation, while another could easily have spent a lifetime on the range without seeing an unquestionable bear kill. A body of acceptable information has not accumulated on the subject. There have been so many misinterpreted cases, and the bear has been unjustly accused so often, that every reported incident is seriously doubted by experienced range men. A bear story ranks with the fish story so far as reliability is concerned. One experienced range man related that he had made over forty investigations of alleged bear kills without finding evidence in a single case to convict the bear.

An acquaintance cited a case, on which information is had from several sources. In a small area over fifty dead cattle presumably had died from larkspur poisoning. And bears had not yet fed on the carcasses at the time of his inspection. Later the herder found the carcasses, noted that bears had fed on them, and accused the bear of killing

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the cattle. The author is personally familiar with a number of misinterpretations of this nature. The feeding on a carcass by bear is so commonly used as evidence that the bear has done the killing, that any reported bear-killing episode must necessarily be received with skepticism.

Observations on bear predation were made in Jackson Hole, Wyoming, more specifically on the Spread Creek and Black Rock Creek ranges in the mountain country of Teton National Forest. This is an excellent summer range, with many open parks along the streams and in the forests of lodgpole, douglas fir, spruce, fir, and aspen. About 1600 cattle (not counting the calf crop) for which grazing permits have been issued by the Forest Service, are brought onto the ranges in the middle of June. They gradually work up the stream bottoms until they reach the high divide in the Twogwotee Pass region. In the fall of the year the movement is reversed and by the last of October the cattle are again off the forest. There is relatively little herding, but salt is distributed over the range and a drift fence at the mouth of Flagstaff Creek keeps the cattle on Spread Creek from moving to the higher ranges before they are ready for use. At the proper time the gates are opened and the cattle drift up the creek bottoms to new grazing. Some of the cattle drift to the higher country of their own accord, many tarry and are driven up later.

On these ranges the black bear and the grizzly are both present, and, over a period of years, have been reported as preying on cattle. Considerable control of the bears has been practiced both officially and unofficially. In the early thirties an extensive trapping campaign is reported and in recent years there has been more moderate control officially and by the cattlemen. However in 1945 a cattleman stated that "we gave the bears *hell* two years ago" but the author was unable to ascertain how many bears were killed. Along with the killing of bears for control purposes there has been some hunting by sportsmen. It is extremely difficult to estimate the bear population on the area. In 1946 there were at least four adult grizzlies operating on the range. Black bears were not especially plentiful although tracks and an occasional bear were seen. Their tracks were seldom observed on the cattle trails where grizzly tracks were regularly noted.

The studies on bear predation here reported were made in 1945 and 1946. They were begun in the latter half of June about the time the cattle moved onto the Forest, and each year, due to another assignment, were terminated in early August. However the author was on the range at the time that most of the predation was taking place.

CATTLE LOSSES IN 1945

Among the 1648 cattle (not including the 1945 calf crop) reported on the Spread Creek, Black Rock Creek allotment, there were 25 known casualties. Of these four were due to unknown causes, 11 to disease or poisoning, and 10 to bear predation. There no doubt were other losses not discovered but it is thought that the majority of them were found. Figures for actual losses are usually not obtainable because most cattlemen do not keep an accurate check on their losses. On adjacent ranges which were not studied, a few

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loss figures were supplied as follows: In 92 head grazing on Pacific Creek there were two losses, one due to poisoning, the other to an unknown cause. On Lava Creek where 245 cattle summered there were four losses, two of which were reported as bear kills. Of 891 cattle on the Moran allotment only one loss was reported. These cattle, in general, were ranging lower than the ones studied, which would suggest that they were on ranges on which grizzlies were scarcer, although this is not definitely known. Black bears would be expected to be about as numerous here as on the range studied.

Cattle on the range die from a number of causes. It is generally believed that the principal losses on Teton National Forest are due to larkspur poisoning. Small losses due to poisoning are apparently common, and occasionally there have been large losses. In the fall of 1941 it was reported that 107 cattle were found dead from poisoning on a Gros Ventre range. On this same range nine calves are reported to have died a few days after feeding on alkali mud. How many cattle die from disease no one knows.

The 25 known losses observed in 1945 on the Spread Creek-Black Rock Creek ranges are listed in three groups as follows: cause of death unknown, disease or larkspur poisoning, and bear predation.

CAUSE OF DEATH UNKNOWN

The cause of the death of four animals, a yearling and three calves, was not learned. Two of the calves died in a pasture on the lower margin of the range. They were assumed to be bear kills by the herder but the only evidence to support this view was the fact that the bears had fed on the carcasses. Calf droppings, typical of white scours, seen in the pasture, were suggestive. At the mouth of Flagstaff Creek a yearling and a calf had died but the remains were too fragmentary for a diagnosis. The herder called them bear kills. They may have been, for a little later some bear kills were found in this area but, on the other hand, some carcasses were found in the area which were not bear kills.

LOSSES FROM PLANT POISONING OR DISEASE

Eleven of the 25 losses were due to disease or larkspur poisoning. The post mortem appearances of larkspur poisoning and some diseases are so similar that it is not always possible to differentiate between the two categories in the field. The ages of the 11 animals were as follows: One calf, five yearlings, two two-year-olds, one three-year-old, and two adult cows. Two of the deaths were definitely due to disease rather than plant poisoning. One of these, a two- or three-months-old calf, had a congestion of pus in the lungs. In this area at the time there were small bloody droppings which indicated that at least another calf was ailing. A yearling heifer, noted on July 26, had definitely died from disease. The flesh of the neck and shoulder was highly inflamed. There had been much internal bleeding and the lungs were full of blood. In the liver there were numerous rounded, hard, cheesy yellow balls about one inch in diameter and the liver adhered to lesions in the omentum. There were lesions in the stomach wall, one of them almost penetrating it. The flesh of some

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of the other animals was highly inflamed and in some cases there was a focal point, made up of a yellowish, gelatinous substance. The lungs were sometimes full of blood and a bloody liquid was at times in the chest cavity. A yearling died from an injured shoulder which was greatly swollen, but showed no external bruises. For the most part the animals were in good flesh.

LOSSES ATTRIBUTABLE TO BEARS

Relatively few range men have observed incidents in which there was definite proof that a bear had killed cattle. Because so few have been described and because it seems especially important to give the circumstances on which judgments were based, each case is described in some detail.

There were 10 casualties on the Black Rock-Spread Creek range which were attributed to bear predation. Nine of the remains were examined by the author, and the tenth was described to him by Ranger Verland Taylor, a trustworthy observer who was with the writer in the examination of several of the other cases. It is thought, because of general circumstances, that the grizzly rather than the black bear, killed the cattle, but there is definite proof of this in only 3 cases, and fairly good proof in two cases.

Cases I and II. On July 13 at 1:45 P.M. over a hundred cows on the bottoms along Buffalo Fork were in a noisy turmoil. The vanguard was met at the edge of the woods near Black Rock Ranger Station. There were a number of lost calves, and many mothers were bawling loudly. Realizing that something had caused this troubled activity the writer moved along slowly just inside the margin of the forest. When about a third of a mile from where he first met the cattle, ravens were seen ahead of him and one in particular was noticed with a piece of red meat in its bill flying in a direct line over the tree tops. Looking back along the line of flight a raven or two was noticed on a knoll under some lodgepole pines and aspens at the edge of the forest. There, the warm carcasses of a yearling heifer and a calf were found. While the carcass of the yearling was being examined, 15 or 20 nervous cattle approached curiously to watch. The yearling lay 40 yards from a salt lick and the calf was 70 yards from the yearling.

The observer hurried to camp for cameras and returned to the carcasses with Ranger Verland Taylor. They carefully examined the animals where they lay, then partly skinned them out and looked at the internal organs.

The yearling lay on its side on a gentle slope. The brisket was exposed for a length of 20 inches and the flesh on it and down over the adjoining ribs had been eaten. There was a large opening into the abdominal cavity through which the stomach and intestines had been cleanly removed. After their removal the carcass had been pulled down the slope about 10 feet. The liver, lungs, and heart were in place. Dorsally on the base of the neck were tooth wounds, two on one side and five on the other, which were undoubtedly made by a bear. The tooth wounds were about one-half inch in diameter, large enough so that an entire finger could be inserted. The two on one side were 2 and one-quarter inches apart; the five on the other side from 1 inch to 3 and one-

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half inches apart. All these tooth wounds appeared to have been made by the canine teeth. One set of teeth had apparently remained fixed and the other set shifted some in the biting. The dorsal processes of two cervical vertebrae had been severed. There were five shallower tooth marks around one eye; one of the teeth had crushed part of the zygomatic arch. Deep tooth wounds were also present on both sides of the vertebrae in the lumbar region. One of the teeth had penetrated the dorsal process of a vertebra. The bites here were obviously about as damaging as they were on the neck and probably had a paralyzing effect on the animal. (A ranger familiar with cattle said that on several occasions he had struck a cow on the small of the back with a board and temporarily paralyzed her. Once, in a tight spot in a corral he disposed of an elk in the same way.) The bite wounds had bled a little, more on the neck than on the back.

It appeared that the yearling may have struggled some after first being attacked. For a distance of eight yards there were drag marks and blood on the ground and sagebrush. Between this scuffled area and the spot where the animal had finally fallen, a distance of ten yards, there were no marks, indicating that the animal had run a short distance before being brought down.

The yearling was fat. The internal organs seemed healthy except for the lungs which had a few scattered nodules that contained pus in the tissue. The lung infection seemed too slight to have reduced the vigor of the animal, although there is the possibility that the infection, although slight itself, might have indicated the presence of a serious ailment. However it can probably be assumed that the animal was strong. The contents of the stomach consisted of grass and a little willow. Larkspur was not abundant in the area so it seemed doubtful that the animal was affected by poisoning.

The wounds on the calf were similar to those on the yearling. Here also the meat on the brisket had been eaten and the stomach and intestines cleanly removed through a ventral opening into the abdominal cavity. There were deep, crushing bites in the neck near the skull and in the lumbar region of the back. The teeth had penetrated the axis vertebra and almost severed the spinal cord. The atlas was torn loose from its articulation with the skull. On the shoulder was what appeared to be a claw scratch. The heart and lungs appeared normal; the liver had been eaten. The stomach contained grass and a trace of willow. This calf, about two and one-half or three months old, was fat and apparently in good health.

The two animals had been killed about noon, for the tooth wounds felt hot to the fingers when inserted in them. Apparently the bear or bears had been frightened from the carcasses. Due to the hard grassy ground, no bear tracks were noted in the area so it was not learned for certain whether the bear making the attack was a grizzly or a black bear. However grizzly tracks were seen a mile from the kills, and the distance between the tooth marks on one side of the neck indicated that the bite was made by a grizzly rather than a black bear.

Case III. On July 19, near Sagebrush Flat on Spread Creek, the remains of a yearling which had been eaten by a

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bear were examined. A grizzly had been seen near the carcass a short time before. The bones were scattered but the hide was largely intact. There were tooth holes in the hide at the base of the neck and in the lumbar region of the back. The size of the holes and their spacing were such that they undoubtedly had been made by a bear. The evidence here is perhaps not so conclusive as it would be if the fresh carcass had been examined, but in the light of the information gained later about the kills there is no doubt about the cause of this yearling's death. The carcass was in rather dense woods near the creek bottom.

Case IV. On August 3, while the author was in the field with Forest Supervisor Buckingham and Ranger Verland Taylor, four cattle carcasses were found. Three of them were considered bear kills.

In the afternoon, about a half mile above the mouth of Grizzly Creek on Spread Creek, ravens called attention to the fresh carcass of a female calf which we judged to be about three months old. The remains were in a swampy spot in the willows at the edge of a grove of lodgepole pines where cattle had been bedding down. Deep tooth wounds on both sides of the neck, high on one side and low on the other, indicated that a bear had killed the calf. The dorsal process of a vertebra had been severed at its base. There were also tooth marks on the shoulder. The paunch and intestines had been removed. The brisket and the meat off the adjacent ribs and proximal ends of the front legs were eaten, and a considerable amount of meat had been eaten off the hindquarters. The liver, heart, and lungs were gone. A pool of water nearby, over which the carcass had been dragged, was discolored by blood. The animal appeared to have been killed sometime during the morning. Two or three miles above the spot we had seen several cows traveling and it occurred to us that they may have been frightened by the bear. Beside the carcass in the soft mud was a clear impression of the front foot of an adult grizzly. The track measured six inches wide.

Case V. About a quarter-mile above the drift fence on Flagstaff Creek three ravens were seen to fly from a spot where a calf, about 6 weeks old, was found. There was a hole in the hide close to the skull and the neck was deeply bruised on the other side. This bruise appeared to have been made by a bear's paw. The meat was eaten off the brisket and proximal ends of all the legs, and the heart, lungs, and liver had been eaten. The intestines and stomach had been carefully removed. The mother was nearby and 30 or 40 cows were feeding in the area. This appeared to be a fresh bear kill because of the severely bruised neck and the neat removal of stomach and intestines. Furthermore, a grizzly had killed a yearling only a few hundred yards away.

Case VI. Beside the trail about a quarter-mile from Case V we came upon the carcass of a fat yearling which had been dead about two days. The flesh was eaten off the brisket, ribs, and proximal ends of all four legs. The stomach and intestines had been carefully removed. A deep bite in the neck had partially disarticulated the second and third cervical vertebrae. At the

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kill there was a grizzly track which measured just short of 6 inches wide. The track was slightly smaller than the one seen at Grizzly Creek earlier in the day but the difference in measurement could have been due to the variation in impressions. In the lungs were a scattering of small nodules full of pus such as had been found in the yearling killed July 13. Whether or not these indicated poor health is not known, but the writer believes they were not significant. Cases V and VI were about three miles from Case IV.

Case VII. On August 4, on the Spread Creek trail about a mile and a half above Grizzly Creek, a fresh grizzly track (about 6 inches across front foot pad) was seen in the trail. A short distance farther on, marks in the grass and willows showed where something had been dragged. Following the drag marks through the growth of willows the remains of a calf (2 or 3 months old) were found, largely eaten. The neck was eaten but on the hide there was a tooth pattern indicating that a bear had bitten the calf in the neck near the skull. The flesh side of the skin was bloodshot. There was also a tooth pattern on the hide over the lumbar part of the back indicating a bite there. The entrails had been removed but had disappeared. A cow with a big bag, perhaps the mother, was seen a quarter of a mile away. It appeared that the calf had been killed on the trail which here passed through a dense stand of willows. The drag marks started on the trail. This kill was about a mile above a kill noted near Grizzly Creek on August 2.

Case VIII. On August 7, accompanied by O. J. Murie, the author rode down Flagstaff Creek, up the North Fork of Spread Creek, and back to Twogwotee Cow Camp by way of Bull Creek. On Flagstaff Creek a short distance from where a calf had been found killed on August 2, the carcass of another calf was found which appeared to have been dead four or five days. On August 2 the presence of a cow with a big bag in addition to the cow showing concern over the dead calf being examined had been noticed. It seemed that a second calf which was not found had been lost. The state of decay of the calf found on August 7 was similar to that of the calf which had been dead since August 2. There was not much remaining of the carcass but on the hide there was a tooth pattern indicating that a bear had bitten the calf on the dorsal part of the neck. In the light of the attending circumstances it seemed certain that this calf was killed by a bear.

Case IX. On August 7 the fresh carcass of a calf about two months old was found at the edge of the willows on the stream bottom, 100 yards from the drift fence at the mouth of Flagstaff Creek. Much of the flesh had been consumed. On the neck, dorsally, near the skull, there were two tooth wounds on one side and three on the other. The teeth had penetrated deeply into the flesh but had not crushed the vertebrae. There was also a bite on the shoulder and here the teeth on one side had grazed the hide a short distance before penetrating. A grazed line, 2 inches long, on the hide of the base of the neck, may have been made by a claw. The entrails had been removed. After examining the carcass we felt certain that a bear had killed the calf. This

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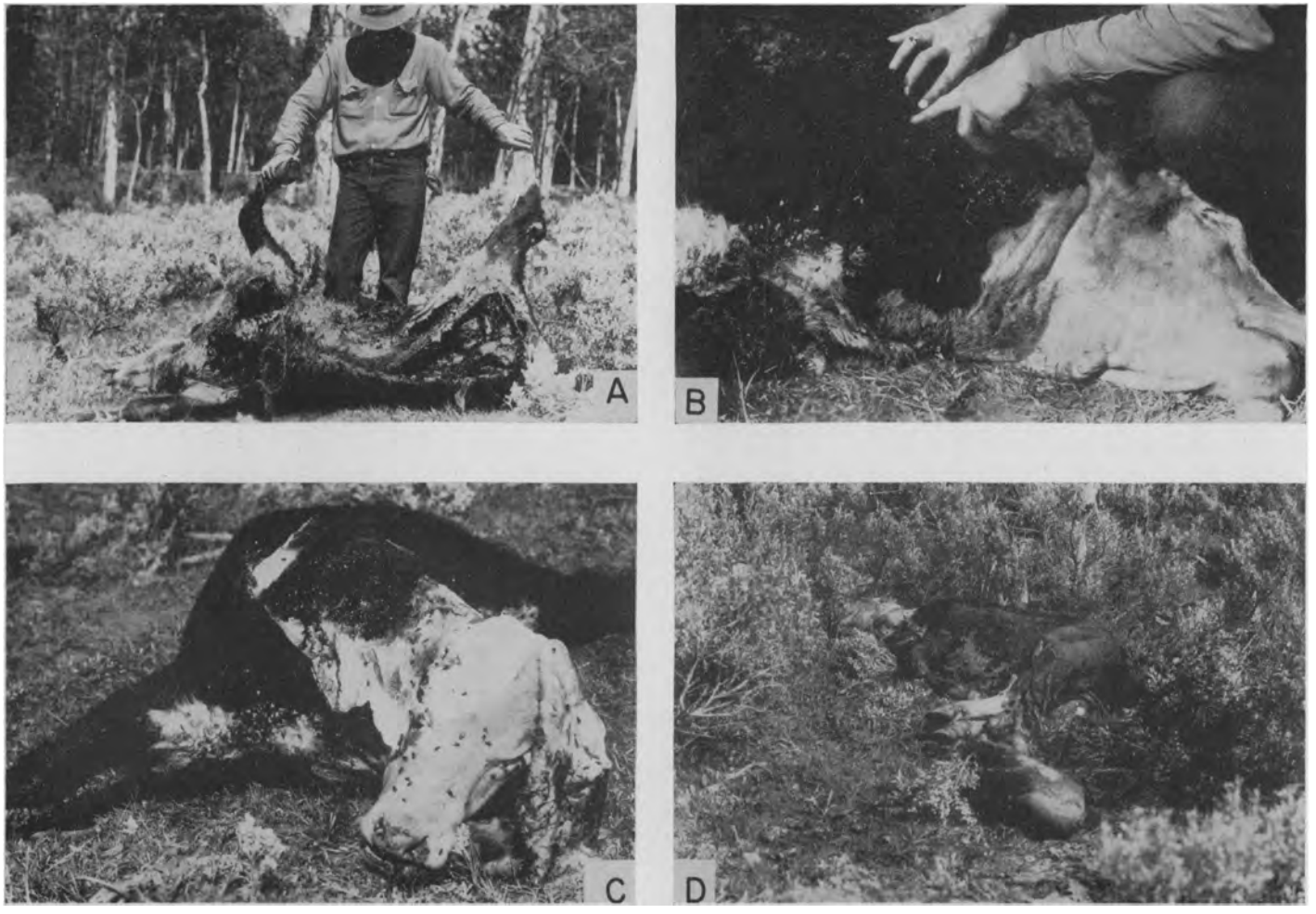

PLATE 1. *A*. The remains of a yearling killed by a bear. The bear had fed on both sides of the brisket and between the hind legs. This carcass was still warm when discovered. *B*. The fingers show the location of five tooth holes which extended into a vertebra that was bitten through. *C*. The skin over the neck has been removed to show the location of the bloodshot area at the base of the neck where the bear bit the yearling. *D*. The paunch of this calf was removed by the bear. Removing the paunch of a kill seems to be regular procedure.

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carcass was only a few hundred yards from three other bear kills on Flagstaff Creek.

Case X. On September 26 Ranger Verland Taylor found a calf killed on Spread Creek not far from Grizzly Creek, where a kill had been found on August 2. The liver, lungs, and heart were still in place. The stomach and intestines had been removed. There were deep tooth wounds in the lumbar region of the back but none on the neck. The animal had apparently just been killed for it was warm and only a few mouthfuls of flesh had been eaten. Taylor, who had helped examine cattle killed by bears, was certain that this was a bear kill and was of the opinion that he had frightened the bear from the carcass.

CATTLE LOSSES IN 1946

The official loss figure on the Spread Creek-Black Rock Creek ranges for 1946 was 24. Of these, 11 were attributed to bears. The writer examined 11 of the 24 carcasses. Two of these died from unknown causes, two from causes other than predation, and seven from bear predation. Three animals that had apparently been attacked by a bear and escaped were also examined.

CAUSE OF DEATH UNKNOWN

About a mile below Flagstaff Creek the carcasses of two yearlings had been eaten by bears but the cause of death could not be determined.

LOSSES NOT DUE TO PREDATION

A cow and a yearling died from causes other than bear predation. The yearling, a fat steer, collapsed while being driven by the cowboys. As soon as the animal fell one of the cowboys bled it above the tail. This seems to be a standard remedy on the range for cattle when poisoning is suspected but apparently there is no experimental proof that the sick animal is benefited. In a short time the steer died. Its stomach was full of a lush green sedge so it is possible that bloat was the cause of death. There was nothing to indicate the cause of the other animal's death, but it apparently was not a bear kill, because there were no tooth marks on the hide.

CATTLE-BEAR INCIDENTS IN 1946

In 1946 remains of a yearling and six calves that were thought to have been killed by bears were examined. Also, two calves and one yearling were seen that appeared to have been attacked by a bear and escaped, judging from the marks on the animals. The dead yearling had been killed by a large grizzly. It is fairly certain that the grizzly rather than the black bear is also involved in the other incidents because the tracks of three grizzlies, besides the one that killed the yearling, were constantly seen on the trails where the kills were found and no black bear tracks were noted in this area during the predation period. Two of the grizzlies, small males, were trapped at kills by the cowboys. In the fall a huge male grizzly was killed on Baldy Mountain, less than five miles from the spot where the large grizzly had killed a yearling. In addition to these three grizzlies, four others were reported to have been killed in the region. Early in the season a female grizzly is reported to have been killed by a cattleman on lower Spread Creek. In the spring of the year, in the Black Rock

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Creek area, two or four grizzlies seen at a bait are reported to have been shot by hunters. A male grizzly was also shot in the fall over on Whetstone Creek about 10 miles from Black Rock Creek.

Case I. On July 5, along Black Rock Creek, the fresh carcass of a yearling was found. It was lying on its back on an open bar about ten yards from the water. Because the flesh at the base and inside of each leg had been eaten, the legs had fallen away and lay sprawled outward on the ground. The flesh had also been eaten off the ribs and brisket, and the vital organs were gone.

Marks on the head showed that a bear had killed the animal. The teeth of one jaw had penetrated deeply below an eye, and those of the other jaw had crushed through the base of the nasal bones and torn the rostrum wide open. The entire head was bloody. There were a few miscellaneous tooth or claw marks on the dorsal side of the neck and on the back, but these were not serious. The killing bite had been inflicted on the face. The carcass had been dragged five yards from the paunch, which had been removed at the spot where the animal fell. The ground was stained with considerable blood where the yearling had first been brought down. At the carcass and in its vicinity were large grizzly tracks, a front track measuring six and three-fourths inches in width.

During the night the same grizzly, judging from track measurements, had returned to the kill and eaten heavily, for only the hide and bones remained the next morning. The hide, with leg bones attached, had been dragged up a steep bank into the woods. In the evening when the kill was first examined eight or nine cows were grazing about one third of a mile away. They were gone in the morning except for a cow with a big bag that was wandering about bawling, looking for her calf. The bear may have killed the calf, for the bear's tracks were seen in the area where the cow was searching.

Case II. On July 7 a cow with a big bag was bawling at Lily Lake near Spread Creek. Four days later the dead calf was located not far from where the bawling cow has been seen. Only the hide and a few bones remained. The pattern of a bear's bite on the dorsal side of the neck, close to the skull, and the bloodshot hide around the bite holes, indicated that this was a bear kill. There were also tooth marks on the hide over the shoulder and lumbar regions. The calf was two or three months old. The writer could not determine the kind of bear that had done the killing but grizzly tracks were seen in the trail nearby.

Case III. On July 16 below Flagstaff Creek, a yearling heifer was noted that had been bitten in the face by a bear and escaped. There were tooth marks on both cheeks and on the upper part of the nasals. The tooth pattern conformed to the jaw spread of a bear. The teeth had not penetrated the nasal bones but had broken through the hide and slipped along the surface of the bone. The failure of the teeth to penetrate the bone was probably the reason for the heifer succeeding in making her escape. There were fly larvae in some of the wounds, and the entire face was greatly swollen. The heifer was thin and sluggish. There was a slight scratch on the shoulder that may have been made by a claw. This heifer was again

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examined on July 26. The swelling on the face had gone down, but the animal was poor, and tired quickly when chased It was apparently recovering, but cattlemen say that recovery in such cases is extremely slow.

The cowboys reported that they had also seen a yearling steer that had escaped with bear scratches or bites on the shoulder, and a calf that had suffered a bite on the neck. The steer was quite sick when first seen but appeared to be much better a few days later.

Case IV. On the North Fork of Spread Creek a half mile or so above Flagstaff Creek the remnants of a calf, largely eaten, were found on July 15. There were tooth marks in the hide on the dorsal side of the neck, which indicated that this was a bear kill.

Case V. On July 15 a small calf, about a month old, carried bite wounds on the neck and the small of the back. The wound on the neck caused the calf to carry its head tipped to one side. The calf was so small that it was surprising it had escaped, but possibly the mother had interfered with the attack.

This wounded calf was suffering from diarrhea and was sluggish. It was not feeding normally for the mother's udder was greatly distended. The diarrhea may have been a result of the wounds, or possibly the calf had been sick at the time it was attacked.

A herder stated that one summer he had found some small calves wounded by bear and had concluded that the cubs of a female grizzly that was later killed had been attacking the calves.

Case VI. On July 26, accompanied by two cowboys and a state game warden, the writer examined a large calf that had recently been killed by a bear on Grizzly Creek. The teeth had penetrated the hide on both sides of the neck near the skull. The axis was chipped and loosened from the atlas. The flesh around the bite wounds was bruised and torn as though the calf had struggled in the death grip. There was a small bite in the lumbar region of the back but this wound was not serious. The liver, heart, and lungs were eaten, and the flesh had been eaten off the brisket and the ribs so as to almost disjoint the shoulders. The flesh on the inside of the hind legs was also eaten.

A trap set at this carcass was twice sprung by a bear before a grizzly was taken. Grizzly tracks were seen in the sand and trails at the mouth of Grizzly Creek less than a mile from the carcass.

Case VII. At the mouth of Grizzly Creek on July 26 a short distance from the above kill, the skin and head remains of a small calf were examined. There were tooth marks typical of bear on the neck close to the skull, and dried blood on part of the skull.

Case VIII. On July 26, about two miles above Grizzly Creek on the North Fork of Spread Creek, the skin remains of a calf showed the tooth pattern of a bear on the neck region and in the lumbar section of the back.

Case IX. Near the mouth of Flagstaff Creek a large calf had been killed on July 27. It had been severely bitten at the base of the neck. Fresh grizzly tracks were in the trail nearby.

Case X. On July 29, on Bull Creek, a calf about 4 months old which had apparently been wounded by a bear and escaped was examined. On either side of the backbone in the lumbar region were

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tooth marks apparently made by a bear. There were four claw scratches on one shoulder, spaced as though made by one rake of the paw. The wounds contained considerable pus and fly larvae.

DISCUSSION AND SUMMARY

KIND OF BEAR KILLING CATTLE

It cannot be definitely stated that the predation observed was all done by grizzlies but the field circumstances strongly indicate the grizzlies rather than black bears were responsible for the losses. In 1945 only three of the kills were unquestionably made by grizzlies but the spacing of the tooth marks indicated that two others were also attributable to the grizzly. The tracks in the trails in the area where all the kills were made, and the short distances of these kills from known grizzly kills, made it highly probable that the grizzly was the predator in each case. Likewise in 1946 it seemed that the grizzlies were doing the killing. In one case grizzly tracks were at the fresh kill. And in the area where the other six kills were found and the three wounded animals were noted, grizzly tracks were regularly seen on the trails and no black bear tracks were observed in the area during the period when the predation took place.

NUMBER OF BEARS KILLING CATTLE

It is important to know if only certain bears take to killing cattle or if all bears kill when there is an opportunity. The sporadic occurrence of cattle predation by the black bear suggests that the habit is not general among the blacks. On the other hand the consistency of predation over a period of years on the grizzly range studied, suggests that grizzlies are more disposed to attack cattle. A number of grizzlies have been taken off the cattle range over a period of years but the predation has persisted. It could be that the grizzlies in the particular range studied have been acquiring the cattle killing habit by example and that always a few grizzlies with the habit have managed to carry on. It seems more likely that the grizzly, although mainly a vegetarian, is much more inclined to hunt cattle than is the black bear, and that on grizzly range some loss of cattle from the bears is generally to be expected. In 1946 at least two grizzlies were killing cattle.

INDICATIONS OF BEAR ATTACK

The most characteristic mark on cattle attacked by a bear was a bite on the dorsal side of the neck. In such cases two or more tooth marks made by the canines were present on either side and the teeth often penetrated into the vertebrae. Several cattle were also bitten in the lumbar region of the back which is a vital spot vulnerable to a bear's bite. Sometimes there were bites in both the neck and the lumbar region of a victim. Occasionally an animal was bitten in the head. A yearling was killed by a bite on the face, and another yearing was severely wounded by such an attack but escaped. The cowboys reported the death of a yearling that had been bitten in the face, and that another yearling had escaped with bite wounds on the face. O. J. Murie, on the Gros Ventre River a few years ago, in the fall of the year saw an animal that appeared to have a bear bite on the rostrum. A hole penetrated the nasal passage from above so that each time

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the animal breathed the vapor could be seen issuing from the hole.

Occasionally an animal that had escaped a bear carried claw marks as evidence of the attack. A cattleman reported seeing a calf a few years ago with claw marks on both hindquarters. It appeared that the bear had grabbed him too far back to hold him. In 1946 on the high meadows of Pinnacle Butte O. J. Murie examined a yearling heifer that had escaped from a bear attack. There were two deep claw marks on the left side high up over the hip, and one hole on the right side. There were also several long scratches posterior of these, and one on the withers. Apparently the bear had tried to seize the animal but his claws had slipped, dug the holes, and the heifer had escaped before a bite could be managed. A rancher in the Dubois area reported a calf that had been similarly raked and had escaped. The claw marks on the shoulder of a calf that escaped even though it had also been bitten in the back have already been mentioned.

The author's observations indicate that the paunch and intestines of an animal that has been killed are immediately removed intact from the body cavity. On the other hand the viscera appear not to be removed from animals fed upon as carrion, at least not if the carrion is old when discovered by the bear.

Sometimes animals that die from disease or poison have an inflamed condition under the hide which resembles a bruise such as a bear might inflict. The inflammation is usually on the surface and only in local spots does it extend for any depth into the flesh. The inflammation on the neck of one of the dead calves was interpreted to be due to a blow from a bear because over the whole area the congestion extended deeply into the flesh and was localized. In a diseased condition the congestion is more widespread and on both sides of the body.

It seems almost too elementary to mention that the eating of a carcass by a bear is not proof that the bear killed the animal. Yet on such evidence bears are regularly accused of predation by bear trappers and cattlemen.

METHOD OF ATTACK

Traditionally, the grizzly's technic for killing cattle was supposed to be a crushing blow on the skull with a powerful forepaw. However, as has been discussed, death in every predation case examined except one, was definitely due to bite wounds.

In attacking, it appears that the bear seizes the victim with its arms, and then bites. The animal that has been seized and manages to pull away is the one most likely to be scratched. Those on which the bear manages to inflict a deep bite are probably less likely to be raked with the claws.

The actual attack has seldom been witnessed. Seton (Vol. II, p. 30. Lives of Game Animals) gives an incident in which a grizzly was holding a four-year-old steer with its fore feet and biting at its neck. In Alaska the writer once watched the attacking method of a grizzly which was fighting off five wolves that were protecting their den site. The wolves had surrounded the bear and were attacking from behind one at a time. To protect his rear the grizzly was making quick turns and lunging at the attackers. Each time he

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lunged, both huge arms were stretched forward in a grasping position. There was no "swiping" at the wolves. Apparently the bear was endeavoring to catch them between his paws. If he had succeeded, his next move would no doubt have been to administer a bite.

There are not many observations on the hunting methods used by the grizzly. Some have said that the cattle, especially the yearlings, are curious, surround a bear, and come so close that the bear can rush out and seize an animal. Seton (Vol. II, p. 30) cites one such incident. A cattleman told me that from a distant ridge he had seen a group of cattle converge on a black bear in a thicket. When the cattle had approached within a few feet of the bear, it rushed out and killed one of them.

The writer has observed cattle showing great curiosity a number of times. While he was examining the first bear kill, a group of cattle crowded close to the carcass. It seems plausible that the curiosity of the cattle would frequently give the bear an opportunity to catch one of them.

One cattleman was supposed to have tracked a bear that followed a cow four or five miles before killing her. In one case which I observed, it appeared that a bear had come upon a calf on a trail through dense willow. Here the visibility was so limited that the bear could have come within a few yards of the calf before being discovered. At salt licks and in groves where cattle bed down during the day there might be opportunities for bears to make a close approach before being discovered.

AGE OF ANIMALS KILLED

Of the 17 kills recorded, 4 were yearlings and 13 were calves. Of the 3 animals that had been wounded but escaped, 1 was a yearling, and 2 were calves. Probably because of their smaller size, the yearlings and calves are taken rather than the adults. Some people state that yearlings fall prey to bears because cattle are especially curious at this age, and approach a bear so closely that they are easily captured. Older animals may be more bear-wise, and keep at a more discreet distance.

PHYSICAL CONDITION OF THE CATTLE KILLED

In some predator-prey relationships it appears that the catching ability of the predator is closely matched by the escape ability of the prey. Under such circumstances extensive predation may occur only when the prey species is at some disadvantage, such as weakness resulting from disease, or inadequate diet. With this in mind the remains of the cattle killed were examined for indications of abnormal conditions.

The victims of predation which were still largely intact all appeared to be in good flesh. The internal organs were missing in many cases, but where examinations could be made it appeared that the animals were in good health. The lungs of two yearlings had a few nodules with a pus-like substance in them but the infections were so slight that it did not seem that they were significant. It was especially interesting to learn the extent of the feeding on larkspur because bears are frequently accused of causing the death of animals

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that have eaten this poisonous plant. An animal sick from larkspur, if he has not eaten too much, will recover if undisturbed, but might succumb if forced to exercise. Some cattlemen think that many poison losses are due directly to bears disturbing the sick animals. A reliable observer informed me that he had once seen a poisoned animal collapse after being disturbed by a bear. Although larkspur was common over most of the range, the stomach contents of the bear kills whenever available for examination contained very little larkspur, so that it seems unlikely that larkspur poisoning was an important factor in the predation. Apparently the bears were, on the whole, preying on healthy animals.

SEASON AND LOCATION OF BEAR PREDATION

Cattlemen reported that bear predation takes place during the entire period that cattle are on the forest. On the Spread Creek range most of the kills occurred when the cattle were in the Flagstaff and Grizzly Creek areas, which was in July and early August. As soon as the cattle passed on to the higher, more open ranges, the losses due to bears largely terminated. This appears to have been the situation for several years back. The explanation for this is not clear.

TIME OF DAY AND PREDATION

At least some of the cattle were killed during the daylight hours, two of them about noon. Since bears may be active at any hour, one would expect kills to occur at any time of day. Possibly cattle are most vulnerable when resting in the shade of a grove of trees, but there is no evidence one way or another on this point.

NATURAL FOOD SUPPLY AND PREDATION

It is possible that predation in some areas increases in years when natural foods, such as berries or acorns, are scarce. No information on this phase of the problem was secured. Berries are always rather scarce on the ranges studied, so the size of the berry crop probably was not significant in this case. There is the possiblity that the predation subsided in late summer because the bears moved to other areas where berries were more plentiful, but no evidence of such movements are had.

METHODS OF CONTROL

Bears are usually controlled either by trapping or hunting with dogs. From the standpoint of selectivity each method has its proponents, and some experienced control men feel that both methods are effective. No doubt the wrong bear may at times be taken by either method. In the use of dogs for running a bear down, it is stated that a pack may switch trails and end up by bringing to bay an innocent bear. And in trapping at a kill, there would always be the possibility of catching an innocent bear. Roughly it would seem that mistakes would be greatest where bears were most plentiful. Many feel that the use of dogs is more humane than trapping. Certainly if traps are used they should be attended daily. This would be no hardship for the

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trapper for if he is trapping bears selectively there would be only a few traps to attend. Perhaps the most important requirement in obtaining selective control, whether dogs or traps are used, is a wholesome viewpoint in the personnel doing the controlling. The results of either of the above methods would probably be fairly satisfactory where there was a sincere, intelligent effort at selective control.

In the studies made it was found that the grizzlies returned to the kills even though they had been handled considerably. Three carcasses found on August 2, 1945, had all been revisited by the bear on August 4. If traps had been set at these kills at the time the carcasses were discovered the killer would no doubt have been taken. But a black bear, which was apparently innocent, might have been taken even the first night, for at the time it was feeding on the carcass of a diseased animal only a mile from a kill. The two kills on the Buffao Fork were not visited by bears the first four nights. The fifth night a bear fed on them. In view of the long interval since the kills had been made, there could be no assurance that it was the killer that returned. If trapping is the method used to control bears the greatest degree of selectivity would be gained by setting at fresh kills. There would be relatively little selectivity in setting at an old kill or at carcasses at random if bears were abundant.

CONCLUSIONS

The studies on Teton National Forest show a conflict between grizzlies and cattle on a common range, It is not known what proportions of the grizzlies take to killing cattle but it seems probable that a majority of them may becomes involved. If a large percentage of the grizzlies readily prey on cattle, then selective control, the kind of control which might be considered, would have little point from the standpoint of maintaining a grizzly population.

On the Teton cattle range the cattlemen have urged drastic control of all bears, some stating that a small black bear may be as harmful as a large grizzly, because they think that its mere presence might stampede cattle sick from poison and cause their deaths. On the other side we have the ranchers, sportsmen, wilderness campers, general recreation seekers, and wildlife conservationists, who wish to preserve a grizzly population in the region. Some in these groups have felt that if only a few bears are killing they should be selected for elimination. Others have stated that the cattle losses are relatively light and should be assumed by the stockmen for the privilege of using these lands which rank so high in recreation values.

Because the grizzly range in the United States is now so greatly restricted it is believed by many that the grizzly should be given special consideration in this region. A satisfactory solution will require land-use planning on a high plane, with all social needs carefully considered.

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