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IN REPLY REFER TO:
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(PNR)SS

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
Pacific Northwest Region
931 Fourth and Pike Building
Seattle, Washington 98101

April 7, 1970

Memorandum

To: Superintendent, Craters of the Moon National Monument

From: Assistant Director, Support Services

Subject: Reintroduction of Bighorn Sheep

We note in your annual wildlife report narrative that a survey was made this winter on feasibility of reintroducing bighorns at Craters of the Moon. Lava Beds has been involved in similar surveys and has advanced to the stage of working out agreements with other agencies to begin work. From their discussions it appears that about $50,000 will be needed for fences and guzzlers and the re-establishment would take several years after programming and funding are secured.

We find no record of a RSP for your project and perhaps this should be the first step toward formal backing for such a project, especially if funds are going to be required.

Please keep us informed of your progress. We want to assure a good interchange of information so you and Lava Beds can both share in each other's findings.

Enclosed is an article from the latest Wildlife Review which may be of interest.

Stanley T. Albright

Stanley T. Albright

Enclosure

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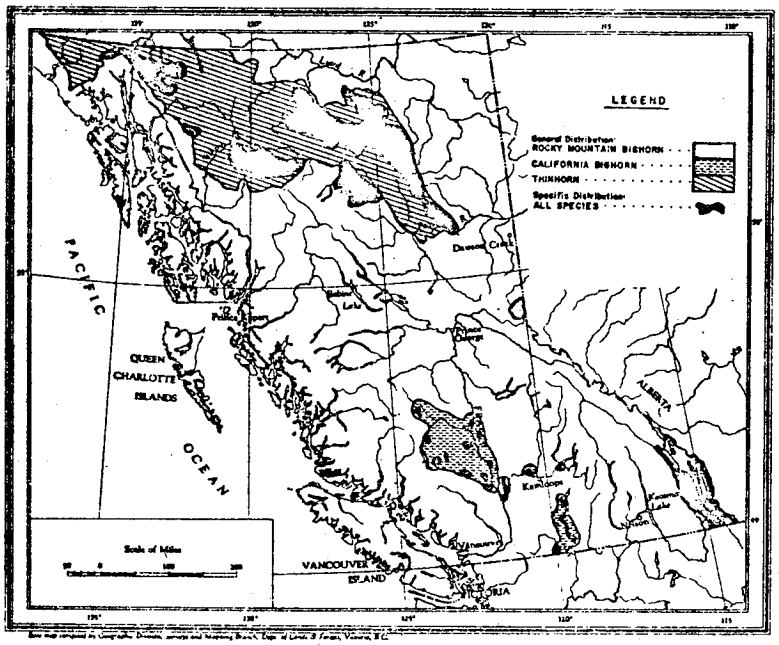
Mountain SHEEP in British Columbia

by Ian Smith and Ray Demarchi
illustrations by Pat Wright



NOTE.—This four-page insert represents the latest information pamphlet published by the Fish and Wildlife Branch. Copies may be obtained free of charge from Branch offices or from:—

FISH AND WILDLIFE BRANCH
Department of Recreation and Conservation
Victoria, British Columbia
1969

There are few outdoor experiences to match the thrill of spotting a wild mountain ram outlined against the sky, which explains why probably no other North American mammal is as eagerly sought by camera enthusiasts and hunters alike. Massive of horn, agile of foot, and elusive in habits, the mountain sheep symbolizes that which is alluring about the oudoors.

Distribution and Appearance

From the mouflons of the Mediterranean to the desert bighorns of Mexico, the wild sheep form a broken distribution through mountainous areas of Southern Europe, Asia Minor, South Central Asia, and Western North America. Two of the five main types are found in North America—the thinhorns of the north and the bighorns of the south. British Columbia contains representatives of both species, which are further divided into four subspecies. The California and Rocky Mountain bighorns occur below the 55th parallel, while the Stone and Dall thinhorns are found north of that line.

The Rocky Mountain bighorn occurs naturally in two separate locations in British Columbia—on the slopes of the Rockies from the International Boundary to Golden, and in scattered bands north of Mount Robson. In addition, small bands have been established from introductions at Squilax and Spences Bridge. The California bighorn is confined to the Okanagan, Similkameen, and South Chilcotin regions. A small introduction was also made north of Kamloops Lake.

The two bighorn subspecies are very similar in appearance, being brown with white on the belly, the insides of the legs, and the rump. Part of the muzzle usually is also white. The tail is small and dark, contrasting strongly with the light rump. The most distinctive feature of the mature male is a set of massive horns which spiral backwards from the top of the head, curling down around the small ears and then upwards above the nose as the animal grows older. Unlike the antlers of members of the deer family, which are shed annually, the horns of sheep consist of a bony core and an outer sheath which continues to grow throughout life. Because growth stops for part of the year, annual rings occur on the horns of both males and females, through which age may be calculated. An old male may have horns that complete a full circle, although the tips are often broken or "broomed." The record British Columbia bighorn, shot at Sheep Creek in 1920, was broomed, and yet the horns still measured 49½ and 48½ inches around the outside of the curl. The horns of female sheep are much less impressive, being thin and erect, much like the horns of female domestic goats. A large ram will stand about 42 inches at the shoulder and weigh in the vicinity of 300 to 325 pounds. The California bighorn tends to be smaller than the Rocky Mountain variety, and often has a more open curl to the horns.

Smaller still are the thinhorns, which range the northern part of the Province. A large Dall ram may reach 200 pounds, while Stone sheep average about 20 pounds heavier. The Dall sheep is found mainly in the Yukon and Alaska, but it occurs in the far north-western part of British Columbia as well. The pure form of the Dall sheep is found only in the St. Elias Range in this Province, while some Dall characteristics are found in sheep that inhabit the mountains adjacent to Teslin Lake. Dalls are the only white wild sheep in the world, but they are not true albinos since they possess the golden eye common to all mountain sheep. The horns of the male generally have a much more spreading spiral than those of the bighorn and are relatively less massive. The hoofs and horns are pale with a yellowish tinge and present a striking contrast to the white pelage.

Completing the Province's sheep population are the Stone sheep, which tend to be very dark except for white on the face, abdomen, insides of the legs, and rump patch. Their horns are midway in colour between the brown of the bighorns and the yellow of the Dall. In the northernmost parts of their range, Stone sheep may be much paler because of mixing of Dall and Stone characteristics, and sometimes only the saddle, tail, and lower legs are dark. These saddle-backed thinhorns are often referred to as Fannin sheep, and in the past were regarded as a separate subspecies, although they are not accorded this status now.

Habitat Requirements

Mountain sheep occupy a wide variety of habitat types, but several features are common to most of them. They prefer grasslands, which generally occur in the rain shadows of mountain ranges. In addition, in winter, sheep require areas of light snow so they may obtain food easily. Such ranges may be found on low-elevation, wind-swept, south-facing slopes or on high rounded alpine ridges where inversions cause warm temperatures and frequent strong winds keep the range relatively free of snow. Most sheep ranges are within easy reach of rugged cliffs interspersed with avalanche chutes and talus slopes, which the sheep use to escape from predators. This rugged terrain, adjacent to the winter ranges, also often doubles as the lambing-ground. The ewes and rams may occupy the same winter range but tend to remain somewhat separated.

Where possible most herds occupy distinct summer and winter ranges which may be up to 20 miles apart. Summer ranges are typically rugged alpine cirques, basins, and mountain ridges, and generally mature rams will occupy different ranges than the ewes, lambs, and young rams. The areas utilized by rams may be less rugged than the ewe ranges, but they are often close to heavy timber, which is used for escape from danger.

Food Habits

Unlike deer and moose, which are primarily browsers, the sheep tends to be a grazing animal and is therefore dependent upon grasses and grass-like plants for a healthy diet. Wheatgrass, bluegrass, and Junegrass are preferred, but many types of grass will be consumed if available. Even under ideal grazing conditions, however, perhaps 25 per cent of the diet may be browse, but extensive use of conifers is an indication that the animals are close to starvation and unable to obtain more desirable food.

During summer migratory sheep are able to vary their diet to include nutritious and succulent alpine species such as dwarf willow.

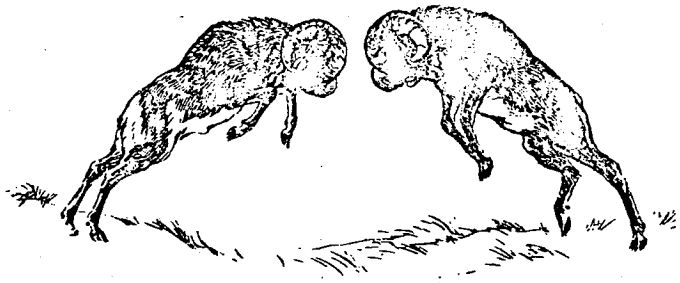
Breeding Habits

The mature rams rejoin the ewes and lambs in time for the rut, which is so timed that lambs are born during the earliest favourable month. Thus the height of the rut varies with elevation and latitude. Thinhorns tend to breed late, from mid-November to mid-December, while the Chilcotin bighorns mate from mid-September to late October.

Gestation lasts approximately 180 days, so that some lambs from early-breeding British Columbia bands are born in late April. The lamb may weigh only 7 pounds at birth, but will gain weight rapidly if conditions are right. While twinning may be frequent in healthy herds, twins are relatively rare in many herds in this Province. A false impression of twinning is often provided by the fact that lambs tend to play together, often without the mother close by.

Sheep become physiologically capable of breeding as yearlings, but normally ewes do not breed until after their second birthday, and rams do not take an active role in reproduction until after they are 3 years old.

When a ewe enters œstrus, she is immediately sought out by males of the herd, and the chase is on. Often up to six rams will run full tilt after a receptive female, with the most dominant male usually the closest. Sometimes the lead ram will break off the chase momentarily for a short fight with a rival, during which time a third male will often take advantage of the lull to breed the ewe. These chases are characteristic of the rut, with the males pestering the female until she becomes receptive. Often the ewe will appear to be fleeing as fast as possible; however, if for some reason the chase is broken off, she will often stop and wait for the rams to become attentive to her again. Since the ewes tend to come into œstrus singly rather than together, there is a maximum chance of pregnancy.



The males normally do not appear to suffer from their vigorous head-knocking fights during the rut. Typically, fights occur only between closely matched rams; if one has an inferior set of horns, he generally gives way to his adversary without a fight or with only a token tussle. However, when two evenly matched rams tangle, a terrific and lengthy contest may ensue. After some initial inspection, the rams will start to walk away, but suddenly will wheel about at a distance of perhaps 40 feet and race toward each other on their hind feet, lunging forward at the end in perfect synchrony to meet with a combined speed of 50 to 70 miles per hour and an estimated force of 2,400 pounds. To withstand such blows, sheep possess a double layer of bone at the point of impact. Rams have been known to blast each other in this manner over 40 times in a day. The object is to establish dominance in the herd, and therefore a ewe need not be present for such an encounter to take place. Thus these fights may occur at any time of the year, but they are more common during the rut. The winner of such fights assumes a dominant role in breeding.

Causes of Mortality

Mortality in big-game populations is a subject which requires a great deal more research. However, because of their unique life habits, a considerable body of information is available on the causes of sheep mortality. Like all wild animals, mountain sheep undergo a steady depletion of numbers, which results in very few individuals reaching the maximum life span of approximately 16 to 18 years. Most of this mortality occurs during the first year of life, and probably only 30 to 60 per cent of lambs survive their first year. However, once a lamb passes its first birthday, the chances are good that it will live to be 7 or 8 years old, after which mortality rates again increase. Of the sheep that die each year, most succumb on the winter range, so that whether the immediate cause is cold, predation, disease, or some other factor, there is good reason to suspect malnutrition as the main predisposing factor.

Malnutrition is associated with most mortality, whether the mortality is the normal type that occurs annually or some sort of die-off such as happened in the East Kootenay from 1965 to 1967. Most wild cloven-hoofed animals are limited by their food supply, so that some deaths due to causes associated with malnutrition may be considered natural each year. However, in many areas the ranges also support domestic stock, and thus can carry fewer wild sheep. When the ranges become too overgrazed, die-offs are inevitable, and mountain sheep herds have declined in most areas where the sheep are in competition with domestic stock.

Malnutrition was definitely a predisposing factor in the East Kootenay die-offs. The food supply had been critical because of overgrazing for a number of years, and during the 1964–65 winter there were abnormal snow conditions which led to near-starvation. The actual cause of the die-offs, however, was a disease syndrome, the pneumonia-lungworm complex. Lungworms are normally found in wild sheep, but that winter the infestations in the East Kootenay bighorns were abnormally high. In addition, a Pasteurella bacterial infection swept through the herds, and its spread was probably enhanced by the poor condition of the animals. As the infection spread, however, its effects gradually decreased. While the Bull River herd, the first to be affected, suffered over 90 per cent mortality, over-all losses for the East Kootenay population was estimated at approximately 50 per cent.

Predation is not an important mortality factor, since the animals taken by predators tend to be very young, very old, sick, or crippled to some extent, and therefore likely to die anyway. Predators include coyotes, wolves, cougars, and very occasionally bobcats, bears, and golden eagles.

Sheep Management

The management of sheep differs considerably from the management of other British Columbia big-game species because of two factors. First, the behaviour of sheep renders them more liable to decimation by uncontrolled hunting than are most other species. Whereas it would be impossible for hunters using normal methods to eliminate the deer and moose of this Province, it would be comparatively easy for shooters to cause the depletion of the more accessible bands of sheep. Since the numbers of bighorn sheep are already low (an estimated total population of 1,200 Rocky Mountain bighorns remaining after the East Kootenay die-off and an estimated 2,000 California bighorns), conservative regulations have been in force for many years. The second way in which the management of sheep differs is in the objective of the harvest. Whereas abundant species such as deer and moose are managed to provide the largest number of animals in the kill, sheep are managed to provide the largest number of trophy animals. Because, unlike many other big-game species, sheep mortality rates decline sharply after 1 year of age, it is possible to produce almost as many rams under a three-quarter curl restriction as under an any-curl law.

Sheep behave similarly to other cloven-hoofed animals, however, in that they will overpopulate their environment if given the chance. Where civilization has upset normal balances by changing habitat and removing natural predators, artificial control is often necessary. It is possible that had the surplus ewes been removed from the sheep ranges in the East Kootenay, the die-offs might have been lessened or even prevented.

Because of the limited numbers of bighorn sheep, there have been a number of proposals advanced to increase the herds. Since these animals are basically limited by the amount of grazing area available to them in winter, these proposals have centred about methods of increasing winter range. One method would be to reduce competing animal species, such as cattle; another would be to change the present vegetative cover by some method such as burning followed by seeding. Because sheep occupy extremely small winter ranges, each idea is quite feasible. Considerable research has been devoted to this topic with an aim of better understanding the needs of the sheep so that the most appropriate action may be taken.