Food habits, range use and interspecific relationships of bighorn sheep in the Sun River area, west-central Montana
by Allen Dee Schallenberger

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in Fish and Wildlife Management
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Abstract:
Field studies were conducted during 1964 and 1965 on big game winter range in the Sun River Canyon' of west-central ,Montana. The primary objective was to gather quantitative data' on winter food habits and range use of bighorn sheep to aid in evaluating range use relationships of bighorn sheep, elk, mule deer,whitetail deer and horses. The physiography of the area was described. Seven habitat types were recognized as follows: bunchgrass, rocky reef, old burn, Douglas fir, lodgepole pine and quaking aspen which were sampled quantitatively and bottom which was described.

Observations were made of horses during summer and of other species during winter to evaluate range use. Numbers of observations were 2,997 for bighorn sheep, 906 for elk, 1,123 for mule deer, 669 for whitetail deer and 20 for horses. Percentages of observations for each animal species recorded in bunchgrass, rocky reef and old burn habitat types respectively were 37, 31 and 24 for bighorn sheep; 38, 0 and 20 for elk; 17, 26 and 36 for mule deer; and 24, 4 and 2 for whitetail deer. Southward facing slopes provided 79, 67, 75 ,and 54 per cent of the bighorn sheep, elk, mule deer and whitetail deer observations respectively.

Autumn food habits of bighorn sheep were determined by analyses of 15 rumen samples. Volumes of 'Gramineae, forbs and browse were 86.5, 8.9 and 1.9 per cent respectively. Food-habits in winter were evaluated from feeding site examinations of 67 bighorn sheep, 18 elk, 34 mule deer and 25 whitetail deer groups respectively. The data indicated percentage use of grass, forb and browse forage classes in winter was 36, 21 and 43 for bighorn sheep; 37, 22 and 42 for elk; 5, 22 and 73 for mule deer; and 5, 30 and 65 for whitetail deer respectively. Plant species significant in food habits of both bighorn sheep and elk in bunchgrass and old burn habitat types were bluebunch wheatgrass, Idaho fescue, rough fescue, silky lupine, arrowleaf balsamroot, buckbrush and fringed sagewort. Among browse species, fringed sagewort ranked first in use by bighorn sheep and sixth for mule deer. Western serviceberry, quaking aspen and choke cherry were also used in common. The five forbs with highest percentages of use by bighorn sheep were also the ones mule deer utilized most. Common use of several plant species by bighorn sheep and whitetail deer was recorded in' bunchgrass and Douglas fir habitat types. Bighorn sheep seldom grazed bunchgrass "flats" frequented by whitetail deer. One feeding site examination of horses during summer indicated 95 per cent of their diet was grasses. Bunchgrass and browse utilization transects revealed overuse of key plant species. The data indicated severe competition between bighorn sheep and elk on parts of winter range that were jointly used. The data also suggested serious competition between bighorn sheep and mule deer in areas where there was overlap of winter range. Bighorn sheep and whitetail deer competed for forage in the Douglas fir habitat type during periods of cold, windy weather. Summer use of bunchgrass and rocky reef habitat types by horses possibly resulted in less forage for bighorn sheep during winter.

FOOD HABITS, RANGE USE AND INTERSPECIFIC RELATIONSHIPS OF BIGHORN SHEEP IN THE SUN RIVER AREA, WEST-CENTRAL MONTANA

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ABSTRACT

Field studies were conducted during 1964 and 1965 on big game winter range in the Sun River Canyon of west-central Montana. The primary objective was to gather quantitative data on winter food habits and range use of bighorn sheep to aid in evaluating range use relationships of bighorn sheep, elk, mule deer, whitetail deer and horses. The physiography of the area was described. Seven habitat types were recognized as follows: bunchgrass, rocky reef, old burn, Douglas-fir, lodgepole pine and quaking aspen which were sampled quantitatively and bottom which was described.

Observations were made of horses during summer and of other species during winter to evaluate range use. Numbers of observations were 2,997 for bighorn sheep, 906 for elk, 1,123 for mule deer, 669 for whitetail deer and 20 for horses. Percentages of observations for each animal species recorded in bunchgrass, rocky reef and old burn habitat types respectively were 37, 31 and 24 for bighorn sheep; 38, 0 and 20 for elk; 17, 26 and 36 for mule deer; and 24, 4 and 2 for whitetail deer. Southward facing slopes provided 79, 67, 75 and 54 per cent of the bighorn sheep, elk, mule deer and whitetail deer observations respectively.

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Bunchgrass and browse utilization transects revealed overuse of key plant species. The data indicated severe competition between bighorn sheep and elk on parts of winter range that were jointly used. The data also suggested serious competition between bighorn sheep and mule deer in areas where there was overlap of winter range. Bighorn sheep and whitetail deer competed for forage in the Douglas-fir habitat type during periods of cold, windy weather. Summer use of bunchgrass and rocky reef habitat types by horses possibly resulted in less forage for bighorn sheep during winter.

INTRODUCTION

One of the largest herds of bighorn sheep (Ovis canadensis canadensis Shaw) in Montana ranges in the Sun River drainage in the west-central part of the state. A portion of the herd winters in the lower Sun River Canyon area. According to Knight (1965), U. S. Forest Service records show that this area was set aside for game winter range in 1929. Prior to this time as many as 500 cattle were summer residents and several hundred were spring and fall transients. At present the Forest Service allows approximately 125 horses on portions of the range for about six months during summer and autumn. The area is also used for winter range by large numbers of elk, mule deer and whitetail deer.

I conducted full time field studies on the Sun River winter range from June 8 to September 23, 1964, and from December 29, 1964, to March 28, 1965. Supplementary data were gathered during October and November 1964, and May 1965. The primary objective was to gather quantitative data on winter food habits and range use of bighorn sheep to aid in evaluating range use relationships of bighorn sheep, elk, mule deer, whitetail deer and horses. Several authors including Couey (1950), Smith (1954) and Sugden (1961) have studied winter food habits of bighorn sheep and range relationships with other species. Findings from these studies were of aid in evaluating my data.

DESCRIPTION OF AREA

Sun River Canyon is located in the Sawtooth Mountain Range. According to Deiss (1943), the range was formed by the Lewis overthrust which moved Proterozoic and Paleozoic shales and limestones over younger Mesozoic sediments. Glacial action and water erosion have modified the range to a characteristic series of closely spaced parallel reefs running in a north to south direction (Fig. 1). The reefs have steep east facing sides with vertical limestone cliffs several hundred feet high. West facing sides slope gradually and are covered by scattered patches of timber. Elevations vary from 4,590 at Gibson Dam to 8,330 feet on Castle Reef at the eastern edge of the mountains. Most reef tops are at 5,000 to 6,000 feet elevation.

Boundaries of the 23 square mile study area (Fig. 2) were Arsenic Creek and North Fork of the Sun River on the west, Gibson Reservoir and the Sun River on the south, Wagner Basin and Castle Reef on the east, and heads of Mortimer and Hannon Gulches on the north.

Climatological data recorded at Gibson Dam (U. S. Dept. Commerce Weather Bureau, 1929-65) indicate mean temperature is 41.4 degrees with extremes of 100 and -42. Mean annual precipitation is 17.5 inches. From November 1, 1964, through March 31, 1965, the number of days with 18+, 12-18, 6-12 and 6 inches or less of snow on the ground were 6, 31, 49 and 65 respectively. Strong westerly winds and "chinooks" remove most of the snow cover from sparsely timbered slopes within a few days after snowstorms. Precipitation throughout the study period was greater than normal with almost 11 inches above the mean recorded for 1964. The worst flood in the

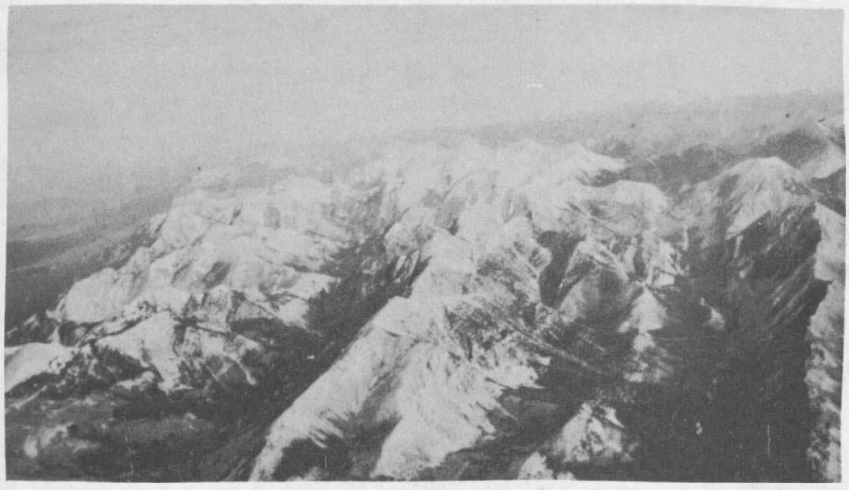

Figure 1. Aerial Photograph Showing Parallel Reefs on the Study Area.

history of the area occurred in June 1964. Much of the stream bank cover in side canyons and along Sun River was destroyed.

Seven habitat types were recognized as follows: bunchgrass, rocky reef, bottom, old burn, Douglas-fir (Pseudotsuga menziesii), lodgepole pine (Pinus contorta) and quaking aspen (Populus tremuloides). Similar classifications were given by Couey (1950). All habitat types were generally found throughout the study area with old burn and lodgepole pine most common in the eastern end. Relative occurrence of forested and open types is shown in Fig. 3.

Bunchgrass Habitat Type

Greatest relative occurrence of the bunchgrass habitat type (Fig. 4) was in Scattering Springs-Reclamation Flat area, Big George Gulch and in Wagner Basin (Fig. 2). Typical locations were flats, small hills at bases