



Nutritional values of major mule deer winter forage species in the Bridger Mountains, Montana
by Mary Alice Morton

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Fish and Wildlife Management

Montana State University

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Abstract:

Nutritional parameters of major mule deer winter forage species and maximum potential forage production of herbaceous plants were evaluated within each of four different habitat types on the west slope of the Bridger Mountains in southwestern Montana. Habitat types sampled were: *Agropyron spicatum*/*Festuca idahoensis* h. t., *Purshia tridentata*/*Agropyron spicatum* h.t., *Purshia tridentata*/*Artemisia tridentata* h.t., and *Artemisia tridentata*/*Festuoia idahoensis* h.t. Six major forage species, big sagebrush, bitterbrush, arrowleaf balsamroot, common salsify, Idaho fescue and downy chess brome were sampled during early, mid, and late winter during 1974-75 and early and mid-winter 1975-76. In addition, samples were taken of Rocky Mountain juniper, chokecherry, nootka rose and Douglas fir. Big sagebrush had the highest protein content of the browse species, 9.8 percent during the winter of 1974-75 and 9.4 percent in 1975-76, while nootka rose had the least, 5.2 percent in 1974-75 and 5.4 percent in 1975-76. Arrowleaf balsam-root had the highest protein content of the herbaceous species, 6.3 percent in 1974-75 and 5.8 percent in 1975-76, while downy chess brome had the least, 2.6 percent in 1974-75 and 4.0 percent in 1975-76. Big sagebrush had the lowest crude fiber level, approximately 17.0 percent during both winters. Downy chess brome had the highest crude fiber content, approximately 40 percent during both winters. The evergreen species, big sagebrush, juniper, and Douglas fir, had the highest content of crude fat during both winters and downy chess brome had the least. Arrowleaf balsamroot had the highest level of ash content during both winters and also contained the greatest amounts of calcium during 1975-76, 2.61 percent. Chokecherry and juniper were also high in calcium content (1.53 and 1.04 percent, respectively). Several significant differences were found in nutrient levels of certain species from different habitat types. Significant variations from year to year were also noted. Four herbaceous species provided an estimated total of 104,095 kilograms of plant matter within the combined areas of the four habitat types at the onset of winter in 1975. Arrowleaf balsamroot was the most abundant species in three of the four habitat types, accounting for 65 percent of the total production. Idaho fescue was most abundant in one type, comprising 28 percent of the total. Downy chess brome and common salsify provided 6 percent and 2 percent of the total, respectively.

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by

MARY ALICE MORTON

A thesis submitted in partial fulfillment
of the requirements for the degree

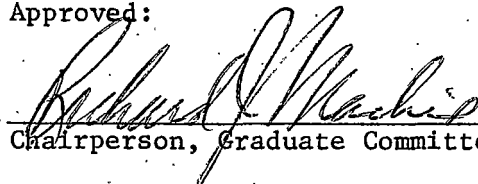
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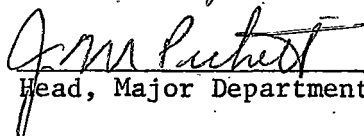
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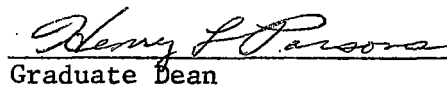
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ABSTRACT

Nutritional parameters of major mule deer winter forage species and maximum potential forage production of herbaceous plants were evaluated within each of four different habitat types on the west slope of the Bridger Mountains in southwestern Montana. Habitat types sampled were: *Agropyron spicatum/Festuca idahoensis* h.t., *Purshia tridentata/Agropyron spicatum* h.t., *Purshia tridentata/Artemisia tridentata* h.t., and *Artemisia tridentata/Festuca idahoensis* h.t. Six major forage species, big sagebrush, bitterbrush, arrowleaf balsamroot, common salsify, Idaho fescue and downy chess brome were sampled during early, mid, and late winter during 1974-75 and early and mid-winter 1975-76. In addition, samples were taken of Rocky Mountain juniper, chokecherry, nootka rose and Douglas fir. Big sagebrush had the highest protein content of the browse species, 9.8 percent during the winter of 1974-75 and 9.4 percent in 1975-76, while nootka rose had the least, 5.2 percent in 1974-75 and 5.4 percent in 1975-76. Arrowleaf balsamroot had the highest protein content of the herbaceous species, 6.3 percent in 1974-75 and 5.8 percent in 1975-76, while downy chess brome had the least, 2.6 percent in 1974-75 and 4.0 percent in 1975-76. Big sagebrush had the lowest crude fiber level, approximately 17.0 percent during both winters. Downy chess brome had the highest crude fiber content, approximately 40 percent during both winters. The evergreen species, big sagebrush, juniper, and Douglas fir, had the highest content of crude fat during both winters and downy chess brome had the least. Arrowleaf balsamroot had the highest level of ash content during both winters and also contained the greatest amounts of calcium during 1975-76, 2.61 percent. Chokecherry and juniper were also high in calcium content (1.53 and 1.04 percent, respectively). Several significant differences were found in nutrient levels of certain species from different habitat types. Significant variations from year to year were also noted. Four herbaceous species provided an estimated total of 104,095 kilograms of plant matter within the combined areas of the four habitat types at the onset of winter in 1975. Arrowleaf balsamroot was the most abundant species in three of the four habitat types, accounting for 65 percent of the total production. Idaho fescue was most abundant in one type, comprising 28 percent of the total. Downy chess brome and common salsify provided 6 percent and 2 percent of the total, respectively.

INTRODUCTION

Until the late 1940's mule deer (*Odocoileus hemionus*) were a scarce sight in the Bridger Mountains of southwestern Montana. Local residents reported increasing numbers in the 1950's and this increase was documented by Wilkins (1957) who undertook the first study of mule deer range use, food habits and population distribution on the Armstrong Winter Range. Browse utilization and condition surveys were conducted by the Montana Fish and Game Department in the spring from 1957 through 1960 and 1965 through 1967. Schwarzkoph (1973), who performed a study similar to that of Wilkins, reported a dramatic reduction in population numbers and continued deterioration of the range. Buscis (1974) evaluated ecological conditions and habitat relationships on this browse-type winter range as well as the production and utilization of important browse forage species. Data on the nutritional composition of major winter forage species, both browse and herbaceous, were lacking. The present study was established: (1) to provide base information on the nutritional composition of several major winter forage species; (2) to evaluate nutrient content of these plants on different habitat types; and (3) to provide information on the contribution of certain herbaceous species to forage production.

Field studies were conducted on a full time basis during the winters of 1974-75 and 1975-76 and part time during the spring,

summer and fall of 1975.

DESCRIPTION OF THE STUDY AREA

The Bridger Mountains (Fig. 1) are located in southwestern Montana, northeast of Bozeman. The range extends from Bridger Canyon 37 kilometers (23 miles) northward to Blacktail Mountain. The geology of the Bridger Range has been described by McMannis (1955).

The Armstrong Mule Deer Winter Range is located on a westerly projection of the main Bridger Range 32 kilometers (20 miles) north of Bozeman. Buscis (1974) described the area as encompassing 510 hectares (1260 acres) of lower mountains and footslopes bordered by North Cottonwood Creek on the north and Bill Smith Creek on the south. The northern portion of the study area is generally of west-facing aspect dissected by east-west drainages. From the central portion to the southern boundary of the study area the aspect shifts to the southwest and south, dissected by northeast-southwest and north-south drainages. Slope gradients are severe, commonly being 50 percent or more.

Buscis delineated fourteen different habitat types, arranged in a mosaic-like pattern on the study area (Fig. 2). In this study, four major-use habitat types were chosen as sites for sampling principal mule deer forage species. These habitat types were selected on the basis of previous studies conducted on the winter range. Although vegetational classification schemes of Wilkins (1957) and Schwarzkoph (1973) differ from the present one, both authors cite the sagebrush-

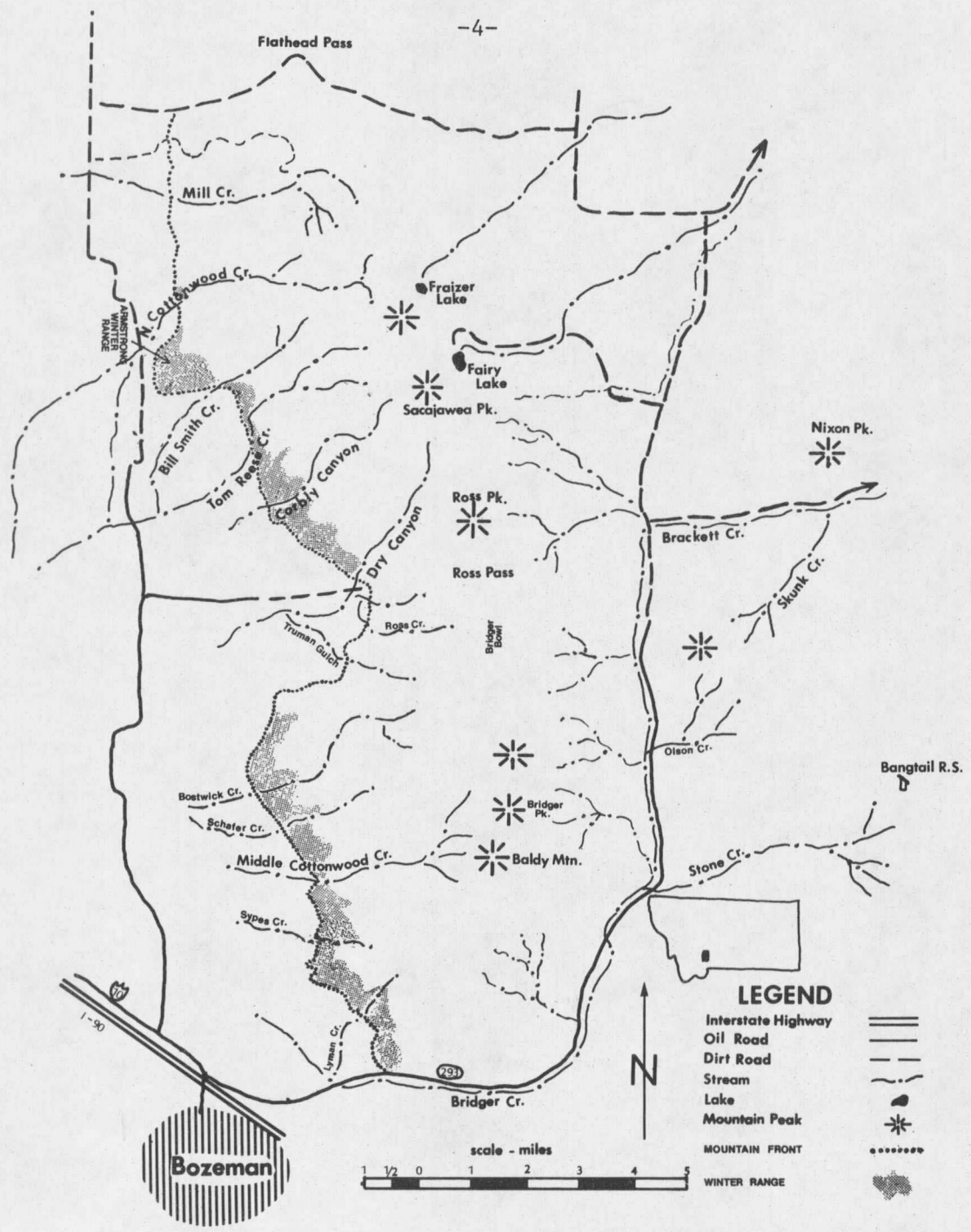


Figure 1. Map of the Bridger Range showing major features and location of the Armstrong Winter Range.

