



Whitetail and mule deer relationships in the Snowy Mountains of central Montana
by George Frank Kamps

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
Montana State University
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Abstract:

A study was conducted during the summers of 1967 and 1968 as well as the winter of 1969 in the foothill region on the north slopes of the Snowy Mountains in Central Montana to obtain quantitative data on the food habits, range use, and interspecific relationships of whitetail and mule deer. The vegetation of the study area was classified into five zones: agriculture, ponderosa pine, hawthorn-aspen, grassland, and Douglas-fir. All types and subtypes except the willow type within the zones were quantitatively described. Range use was determined largely from 3,274 whitetail and 3,777 mule deer observations along systematically traveled routes. Ninety-seven and 94 percent of the summer and winter whitetail observations, respectively, were in the agriculture and hawthorn-aspen zones. During late summer, 80 percent of all white-tail observations were in the agriculture types. The ponderosa pine type was an important type for rest and escape during winter. The grassland and Douglas-fir zones accounted for 63 and 83 percent of the summer and winter mule deer observations, respectively. During winter, 91 percent of the mule deer observations were in grassland types. Food habits of whitetail and mule deer were determined from the results of examinations of 190 feeding sites taken during summer and winter and from the results of analyses of 48 rumen samples' obtained throughout, the year. For whitetail deer, browse averaged 54, 41, 51, and 49 percent of the contents of rumen samples for summer, fall, winter, and spring, respectively. It was the most important forage class during all seasons except fall, when forbs constituted 46 percent of the diet. Grass use, mostly wheat, was greatest in winter when it averaged 27 percent of the total volume of rumen samples. Alfalfa was the most important single food item averaging 20 percent of the yearly diet.

Browse averaged 57, 55, 63, and 24 percent of the total volume of rumen samples for mule deer during summer, fall, winter, and spring, respectively. Forbs constituted the most important forage class in spring averaging 62 percent of the contents of rumens. Grass use was unimportant during all seasons except spring. Results of examination of feeding sites agreed closely with results of rumen analyses for both species of deer. For the summers of 1967 and 1968, fawn:doe ratios of whitetail deer were 101 and 93 per 100, respectively. For mule deer for the same years the figures were 76 and 62. Overlap in range use by the two species was not considered important during winter. During summer common use of range and food items occurred on some areas, but because food items used in common did not appear to be limited in supply or deteriorating in production, competition probably did not occur. Differences in areas preferred by the two species apparently enabled this range to support a larger number of deer than would have been possible in the absence of one or the other.

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GEORGE FRANK KAMPS

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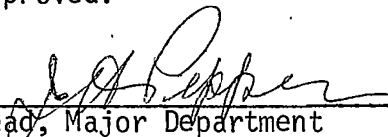
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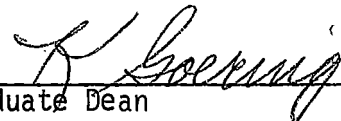
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ABSTRACT

A study was conducted during the summers of 1967 and 1968 as well as the winter of 1969 in the foothill region on the north slopes of the Snowy Mountains in Central Montana to obtain quantitative data on the food habits, range use, and interspecific relationships of whitetail and mule deer. The vegetation of the study area was classified into five zones: agriculture, ponderosa pine, hawthorn-aspen, grassland, and Douglas-fir. All types and subtypes except the willow type within the zones were quantitatively described. Range use was determined largely from 3,274 whitetail and 3,777 mule deer observations along systematically traveled routes. Ninety-seven and 94 percent of the summer and winter whitetail observations, respectively, were in the agriculture and hawthorn-aspen zones. During late summer, 80 percent of all whitetail observations were in the agriculture types. The ponderosa pine type was an important type for rest and escape during winter. The grassland and Douglas-fir zones accounted for 63 and 83 percent of the summer and winter mule deer observations, respectively. During winter, 91 percent of the mule deer observations were in grassland types. Food habits of whitetail and mule deer were determined from the results of examinations of 190 feeding sites taken during summer and winter and from the results of analyses of 48 rumen samples obtained throughout the year. For whitetail deer, browse averaged 54, 41, 51, and 49 percent of the contents of rumen samples for summer, fall, winter, and spring, respectively. It was the most important forage class during all seasons except fall, when forbs constituted 46 percent of the diet. Grass use, mostly wheat, was greatest in winter when it averaged 27 percent of the total volume of rumen samples. Alfalfa was the most important single food item averaging 20 percent of the yearly diet. Browse averaged 57, 55, 63, and 24 percent of the total volume of rumen samples for mule deer during summer, fall, winter, and spring, respectively. Forbs constituted the most important forage class in spring averaging 62 percent of the contents of rumens. Grass use was unimportant during all seasons except spring. Results of examination of feeding sites agreed closely with results of rumen analyses for both species of deer. For the summers of 1967 and 1968, fawn:doe ratios of whitetail deer were 101 and 93 per 100, respectively. For mule deer for the same years the figures were 76 and 62. Overlap in range use by the two species was not considered important during winter. During summer common use of range and food items occurred on some areas, but because food items used in common did not appear to be limited in supply or deteriorating in production, competition probably did not occur. Differences in areas preferred by the two species apparently enabled this range to support a larger number of deer than would have been possible in the absence of one or the other.

INTRODUCTION

The Snowy Mountains of central Montana are one of several locations in the state where whitetail deer (*Odocoileus virginianus*) now commonly occur in areas previously inhabited mainly by mule deer (*Odocoileus hemionus*). This range extension by whitetail deer appears to have had a deteriorating effect on some mule deer populations with a corresponding increase in whitetail numbers. In many areas the two species now occupy the same ranges during all or part of the year.

Intensive studies on range use and food habits of mule deer have been carried out in several areas of Montana. Included are those of Wilkins (1957) in the Bridger Mountains, Lovaas (1958) in the Little Belt Mountains, and Mackie (1965) in the Missouri River Breaks. Similar studies on whitetail deer are few. Allen (1968) studied whitetail deer on the Missouri River bottoms in central Montana. Schallenberger (1966) considered whitetail deer during an investigation of several big game species in the Sun River area, west-central Montana. Management in areas where whitetail and mule deer ranges overlap has been hindered primarily because of lack of data on interrelationships existing between the two. Martinka (1968) studied habitat relationships of whitetail and mule deer in northern Montana. Since no intensive work has been done in the Snowy Mountains, information for management of either species is generally lacking.

This study's main objectives were to determine food habits, range use and interspecific relationships of the whitetail and mule deer populations inhabiting the north slopes of the Snowy Mountains. Full time

field studies were conducted during the summers of 1967 and 1968 as well as the winter of 1969.

DESCRIPTION OF THE STUDY AREA

The Snowy Mountains, located 10 miles south of Lewistown, form a south-eastward extending range approximately 30 miles long and 15 miles wide. Elevations range from about 4,300 feet in the foothill area up to 8,533 feet. Many deep canyons extend from the edge into the central part of the mountains. Reeves (1931) described the area as consisting entirely of sedimentary rocks that have been arched upward in a huge elliptical dome. The rocks range in age from pre-Cambrium to Recent. Madison limestone is the main surface rock.

The study area (Figure 1), consisting of approximately 120 square miles on the north slopes of the Snowy Mountains, was mainly in the foothill region between 4,300 and 6,100 feet elevation. Rise in elevation was gradual in all but the uppermost part. Cottonwood Creek, Beaver Creek, and Rock Creek were the principle drainages. These streams were characterized by wide drainage basins separated by grassy or timbered ridges in the upper part and flat broad benches at lower elevations. Most of the study area was accessible by vehicle. Only about six square miles was publicly owned; this was mainly administered by the U. S. Forest Service.

Climatological data (Appendix, Table VIII) were obtained from each of two weather stations; temperatures from the Lewistown Airport weather station and precipitation from a station 10 miles south of Lewistown located on the study area at an elevation of 4,900 feet. The average temperatures of 62.5°F and 57.9°F for June-September, 1967 and 1968 were

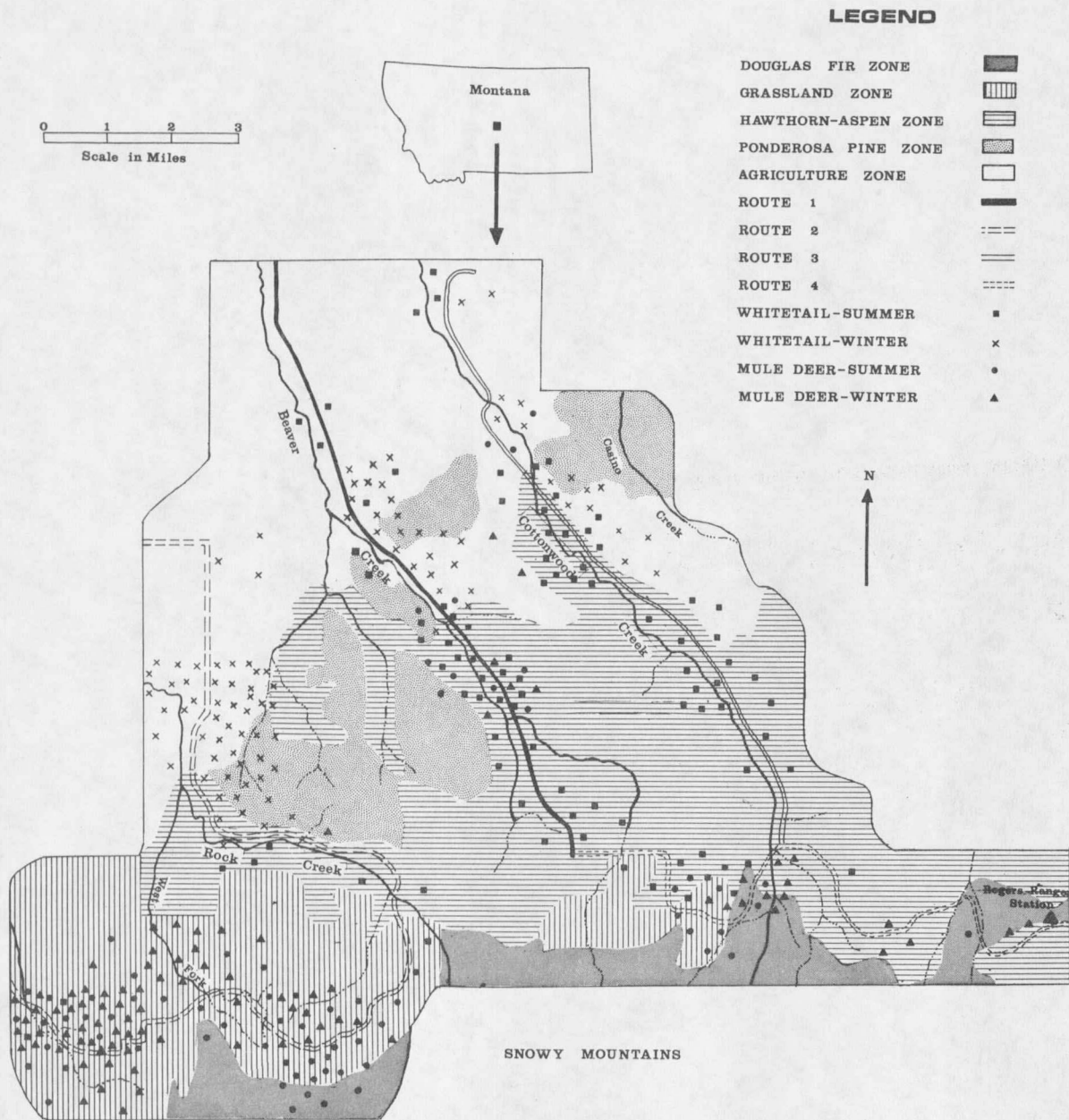


Figure 1. Study area showing vegetation types, observation routes and distribution of deer. Each symbol for distribution represents 1 percent of the total deer observed for one season. Observations constituting less than 1 percent of the total deer within one square mile were not included.

1.7°F above and 2.8°F below normal, respectively. Precipitation of 16.87 and 13.50 inches for these same periods was 6.23 and 2.86 inches above normal. During the winter of 1969, the average temperatures of 2.3°F, 17.8°F, and 24.1°F for January, February, and March were 17.9°F, 4.7°F, and 4.6°F below normal, respectively. Monthly precipitation totals of 2.20, .59, and .21 inches for the same 3 months were 1.12 inches above and .67 and .85 inches below normal, respectively. Although precipitation for the 3-month period was only .4 inches below normal, reports from local people were that snow accumulations were considerably below normal, especially at higher elevations. Following strong southwest winds, which began at the end of January, most ridges were partially or completely bare during the remainder of the winter period.

METHODS

Vegetation

To aid in determining range use relationships between whitetail and mule deer, the vegetation of the study area was classified into five zones with types and subtypes within the zones. All types and subtypes were quantitatively or qualitatively studied to determine their vegetation composition. A method described by Daubenmire (1959) was used on all but the agriculture and willow types. Species composition and canopy coverage of vegetation shorter than 3 feet were recorded for each of ten, twenty, or forty 20 x 50 centimeter plots placed at 10-foot intervals along each of 37 transects in representative stands. Transects were evaluated at various times so that both early and late-maturing plants would be included. Plants were collected and identified to aid in recognition of plants in the field. Identification of all specimens was verified by Dr. W. E. Booth of Montana State University. The average diameter breast high (d. b. h.) and density of trees in the aspen, cottonwood, pine, and fir types were determined by the point-centered quarter method (Cottam and Curtis 1956). For each type, 160 trees were measured. Intercept of shrubs over 3 feet high was measured along 800 feet of line transect to determine occurrence in the cottonwood type. Nomenclature of plants followed Booth (1950) and Booth and Wright (1966).

Distribution of Deer

Four observation routes, extending through all vegetation zones, types, and subtypes, were selected on the study area (Figure 1). Observations of deer, with the aid of a pair of 7 x 35 binoculars and a spotting scope, were made weekly during early morning and late evening along each of the observation routes from a four-wheel drive vehicle or snowmobile. These observations were referred to as route observations while those made at other times were termed miscellaneous observations. For each deer observation, the following were recorded: location by vegetation zone, type, and subtype; species; sex and age class; time; and geographic location. Vegetation types, which had shrubs or trees over 4 feet in height, were considered secure cover for deer and were designated cover types. During the summer of 1968 and the winter of 1969, the cover type nearest each observed deer was recorded.

Food Habits

Food habits were determined from feeding site examinations and rumen analyses. Feeding sites were examined immediately after being vacated by the feeding animal. Use of a twig or leaf of a browse plant, a stem or leaf of a forb, or one "bite" of a grass or grasslike plant constituted one instance of use. During the summer, the vegetation within each of ten 20 x 50 centimeter plots spaced at 5-foot intervals was evaluated according to species composition and canopy coverage at each feeding site. To evaluate food preferences, the

relative abundance of each plant as determined by percent canopy coverage was compared with its relative importance in the diet as determined by percent frequency of use in relation to other plants at feeding sites. A quart rumen sample from each of 48 deer was analyzed using a technique similar to that of Cole (1956) and others. The distribution of the samples was two for each species per month except for October with one and December with none for mule deer as well as February, April, and November for whitetail deer when the samples were three, five, and one, respectively. Twenty-two of the samples were collected by the area biologist from December-April of 1966 and 1967. The remainder were taken during my study. The aggregate percentage method (Martin *et al.* 1946) was used in tabulation of data for feeding sites and rumen samples by season.

Weights, Productivity and Population Characteristics

Sex, age, and whole and hog-dressed weights were determined from 37 deer taken from the study area. The number of embryos in females taken during pregnancy was recorded. Productivity and population characteristics were determined from classification of observed deer.

RESULTS

Vegetation

AGRICULTURE ZONE

The agriculture zone, occurring between 4,300 and 4,600 feet, occupied approximately 22,000 acres and included five vegetation types (Figure 1).

Agriculture Type. This was an extensive type occupying most of the bottomland areas adjacent to the creeks as well as the broad flat benches between drainage basins. Grain, mainly barley (*Hordeum* spp.) and wheat (*Triticum aestivum*) was grown on the drier benchlands while hay crops, usually alfalfa (*Medicago sativa*) mixed with brome (*Bromus* spp.) or timothy (*Phleum pratense*), were most important on the more mesic bottomlands.

Cottonwood Type. This type which occurred only along the bottomlands of Cottonwood Creek, was dominated by narrowleaf cottonwood (*Populus angustifolia*). Most trees were mature or old, averaging 12.5 inches d. b. h. The sparse density of 186 trees per acre allowed a tall understory of shrubs to persist. Percent line intercept for shrubs over 3 feet tall was as follows: red dogwood (*Cornus stolonifera*), 20; western serviceberry (*Amelanchier alnifolia*), 9; and chokecherry (*Prunus virginiana*), 8. Although not included in sampled stands, willow (*Salix* spp.) commonly occurred in very sparse cottonwood stands. Characteristic short shrubs were red dogwood, rose (*Rosa* spp.) and snowberry (*Symphoricarpos* spp.) (Table I). Cutleaf coneflower (*Rudbeckia laciniata*)

