



Range relationships of mule deer in the prairie habitat, northcentral Montana
by Gary Lynn Dusek

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 in the Cottonwood Creek area in the prairie habitat of northcentral Montana during summer and winter to obtain quantitative data on seasonal distribution, range use, food habits and interspecific relationships of mule deer and cattle. Vegetation of the area included three major types: Silver Sage, Big Sage, and Grassland. Canopy coverages and frequencies of occurrence were determined for low-growing taxa on representative sites in each of the types. Use of vegetation types by mule deer during both summer and winter was determined by recording the location of 1,812 and 1,086 observations of mule deer from the ground and air, respectively. The Big Sage and Grassland Types combined received 81 and 99 percent of the use for summer and winter, respectively. Sixty-four percent of the 2,332 observations of cattle for the period May 1 to November 1 occurred in the Silver Sage Type compared to 31 percent in the Grassland Type. Both mule deer and cattle used the Silver Sage Type during late summer. Food habits of mule deer were determined from the examination of 29 rumens and 79 feeding sites. Volume of browse averaged 43, 81, 60 and 59 percent of the rumen contents for summer, fall, winter and spring, respectively. Forbs constituted 54 percent of the rumen contents for samples taken in summer. Yellow sweetclover, snowberry, rubber rabbitbrush and creeping juniper were the most important items in the diet during summer, fall, winter and spring, respectively. Grass constituted 17 percent of the diet during spring but was insignificant during other seasons. Grass accounted for 67 and 85 percent respectively, of the summer and early fall diets of cattle as determined from the examination of 52 feeding sites. Forbs, including yellow sweetclover, were important in early summer. Greasewood, snowberry, and chokecherry were shrubs used by cattle. Hog-dressed weights averaged 70 percent of whole weights of 18 mule deer. Kidney fat indices for mule deer collected between January and June averaged 108, 36, 20 and 11 percent, respectively, for yearling females, older females, male fawns and yearling males.

An average ovulation incidence of 2.0 and a conception rate of 90 percent were determined for females collected from January to April. Fawn:female ratios for winter were 106:100 and 104:100 as determined by ground and aerial observations, respectively. There appeared to be some land use but no significant forage competition between mule deer and cattle.

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RANGE RELATIONSHIPS OF MULE DEER IN
THE PRAIRIE HABITAT, NORTHCENTRAL MONTANA

by

GARY LYNN DUSEK

A thesis submitted to the Graduate Faculty in partial
fulfillment of the requirements for the degree

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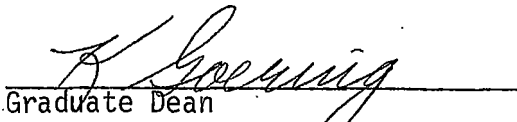
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Approved:


Head, Major Department


Chairman, Examining Committee


Graduate Dean

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ABSTRACT

A study was conducted in the Cottonwood Creek area in the prairie habitat of northcentral Montana during summer and winter to obtain quantitative data on seasonal distribution, range use, food habits and interspecific relationships of mule deer and cattle. Vegetation of the area included three major types: Silver Sage, Big Sage, and Grassland. Canopy coverages and frequencies of occurrence were determined for low-growing taxa on representative sites in each of the types. Use of vegetation types by mule deer during both summer and winter was determined by recording the location of 1,812 and 1,086 observations of mule deer from the ground and air, respectively. The Big Sage and Grassland Types combined received 81 and 99 percent of the use for summer and winter, respectively. Sixty-four percent of the 2,332 observations of cattle for the period May 1 to November 1 occurred in the Silver Sage Type compared to 31 percent in the Grassland Type. Both mule deer and cattle used the Silver Sage Type during late summer. Food habits of mule deer were determined from the examination of 29 rumens and 79 feeding sites. Volume of browse averaged 43, 81, 60 and 59 percent of the rumen contents for summer, fall, winter and spring, respectively. Forbs constituted 54 percent of the rumen contents for samples taken in summer. Yellow sweetclover, snowberry, rubber rabbitbrush and creeping juniper were the most important items in the diet during summer, fall, winter and spring, respectively. Grass constituted 17 percent of the diet during spring but was insignificant during other seasons. Grass accounted for 67 and 85 percent respectively, of the summer and early fall diets of cattle as determined from the examination of 52 feeding sites. Forbs, including yellow sweetclover, were important in early summer. Greasewood, snowberry, and chokecherry were shrubs used by cattle. Hog-dressed weights averaged 70 percent of whole weights of 18 mule deer. Kidney fat indices for mule deer collected between January and June averaged 108, 36, 20 and 11 percent, respectively, for yearling females, older females, male fawns and yearling males. An average ovulation incidence of 2.0 and a conception rate of 90 percent were determined for females collected from January to April. Fawn:female ratios for winter were 106:100 and 104:100 as determined by ground and aerial observations, respectively. There appeared to be some land use but no significant forage competition between mule deer and cattle.

INTRODUCTION

Range relationships of mule deer (*Odocoileus hemionus*) have been intensively studied in various localities of Montana. Included are the studies of Morris and Schwartz (1957), South (1957), Wilkins (1957), Lovaas (1958), Firebaugh (1969), Kamps (1969), Nellis and Ross (1969), and Mackie (1970). Habitat types represented by these studies have included at least some plant communities dominated by coniferous forests. Quantitative data are generally lacking for areas where the short-grass prairie is the dominant habitat type. This type predominates throughout much of the Milk River breaks in the northcentral part of the State. This area, administered largely by the Bureau of Land Management and used primarily for grazing by cattle, supports a significant population of mule deer. Dual use by cattle and deer has suggested the possibility of interspecific range competition particularly on heads of coulees and in drainage bottoms which receive heavy use by cattle. Overuse of range by mule deer has also been considered a likely possibility but quantitative data are lacking. Since both deer and cattle are given consideration in the 1969 management plan for the Cottonwood Creek Grazing Association, it was desirable to secure data on both classes of animals.

The main objectives of this study, conducted during the summers of 1969 and 1970 and the winter of 1971, were: to obtain quantitative data on seasonal distribution, range use and food habits of mule deer and cattle in the Cottonwood Creek area; to evaluate interspecific re-

relationships; and to utilize the information in developing criteria for proper management of mule deer on prairie habitat types.

DESCRIPTION OF THE STUDY AREA

The study area, with boundaries as shown in Figure 1, includes approximately 85,900 acres located about 7 miles north of Malta, Montana. Approximately 41,000 acres are used by members of the Cottonwood Creek Grazing Association (Appendix, Figure 10). Approximately 54 percent of the 41,000 acres is privately owned. Thirty-nine percent is Federal land administered by the Department of the Interior. The remaining 7 percent is owned by the State.

Major drainages, including Big Cottonwood, Little Cottonwood, Garland and Assiniboine Creeks, flow in a southeasterly direction emptying into the Milk River. These drainages form a dendritic pattern characterized by long side coulees, many of which extend more than a mile from the stream bottoms. Long side coulees appear to be more common on the north sides of the Cottonwood drainages than on the south sides. These drain relatively smooth, gently sloped glacial till plains. Elevations on the area range from 2,250 to 2,750 feet. Mesozoic sedimentary rock (Southard 1969) lies underneath the glacial till and is exposed in some areas.

Soils of the area are dominated by Brown and Solidized-Solonetz soils of the northern till plain (Southard 1969). Very shallow, light colored calcareous clay loam soils occur on steep and very steep edges of till plains. Deep dark colored soils with loamy surface layers and clay loam subsoils occur on nearly level to undulating glacial uplands (Soil Conservation Service 1969).

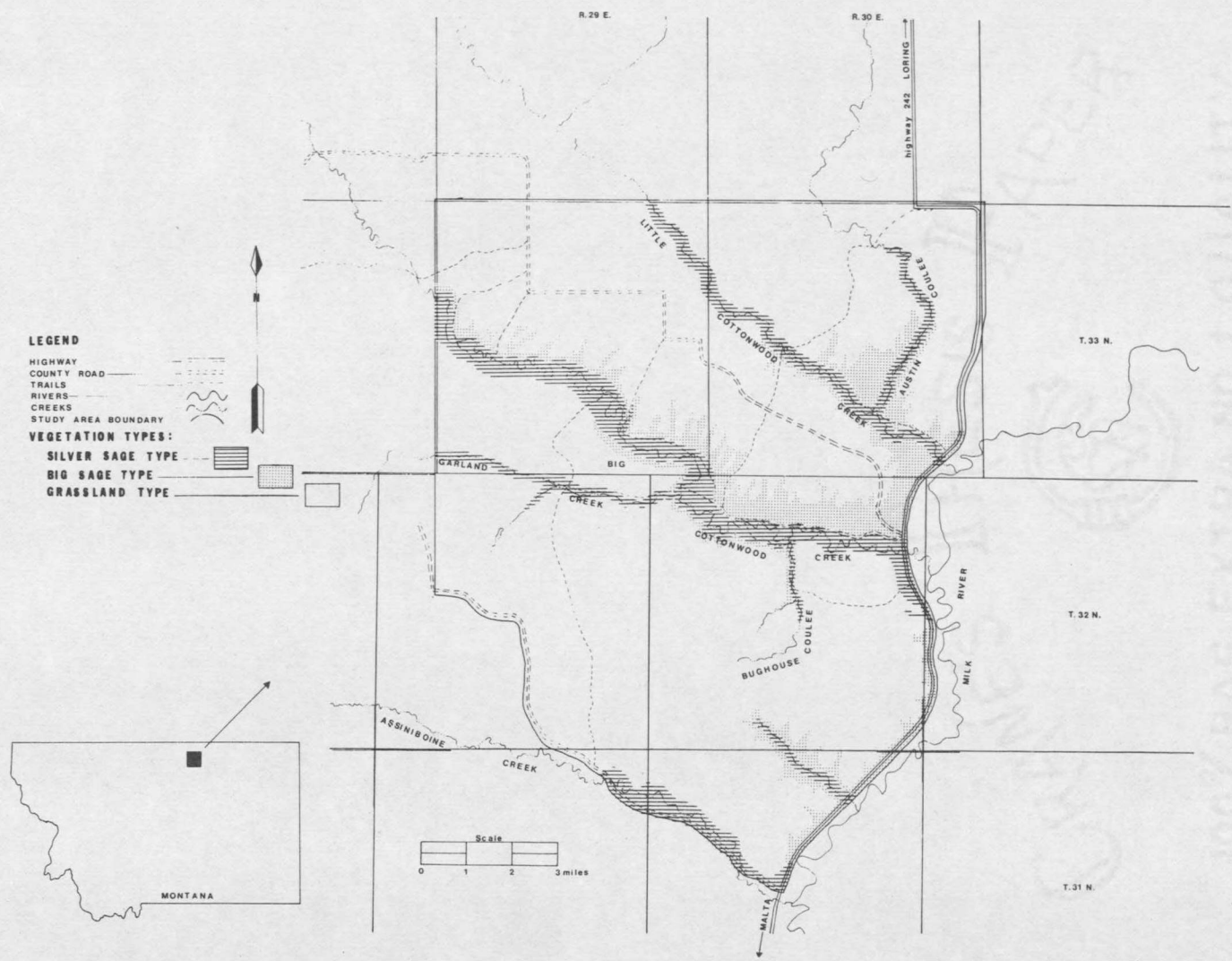


Figure 1. Map of the study area showing vegetation types.

Climatological data were taken from that recorded by the Bureau of Reclamation at Malta (Appendix, Table 16). Mean temperatures for June-September were 66.1° and 66.9° F for 1969 and 1970, respectively. These were a little above the normal of 65.3° F. The number of frost-free days was 117 and 122 in 1969 and 1970, respectively. The mean temperature for the period of December, 1970 through February, 1971 was 11.3° F. Mean temperatures for December and January were below normal. Average temperatures for February were not available for comparison.

Annual precipitation for 1969 and 1970 was 11.36 inches and 13.48 inches, respectively. Monthly variations can be found in Appendix, Table 16. Total precipitation for the period of December, 1970 through March, 1971 was 2.10 inches.

METHODS

Vegetation

The vegetation of the study area was grouped into three types based on major vegetation characteristics. Each of the types was further divided into subtypes based on minor differences. A reference collection of plants from the area was assembled to aid in the identification of various species comprising the vegetation types and subtypes. Common and scientific names were from Booth (1950) and Booth and Wright (1959). Plant composition of the subtypes characterized by low-growing vegetation was quantitatively sampled by a method similar to that described by Daubenmire (1959). Several sites were selected in each subtype, and the vegetation within each of twenty, 2x5 decimeter plots spaced at 10-foot intervals along four, 50-foot lines was analyzed. Canopy coverage and frequency for each low-growing taxon were estimated for each plot. A further measure of ground cover was provided by recording whether each leg of the 2x5 decimeter frame rested on bare ground, rock, litter or living vegetation.

On subtypes where deciduous shrubs were the dominant life form, canopy coverage was determined by crown intercept of the various shrubs measured along 100-foot transect lines. Heights of shrubs intercepted were determined also.

Distribution and Range Use

Most observations of mule deer were made while I was in a vehicle or on foot with the aid of a 7x35 binocular and a 15-60X spotting scope

during observation trips to areas where the animals were concentrated during a given season as determined by general surveys of the area. As opposed to systematic coverage of definitely established routes, this method is justified according to Russo (1964). Obviously most of the observer's time is in areas where opportunities for observations of deer are greatest. During winter inaccessibility limited ground observations in some areas. Distribution of deer was evaluated for the entire study area once a month as determined by observations from a fixed-wing airplane.

Deer observed were classified as to sex, whether adult or fawn, and activity such as feeding, bedding, etc. Both deer and cattle were recorded according to occurrence by vegetation type and subtype, and for deer, slope and exposure. The approximate location of each observation of deer and cattle was plotted on a grid map.

Food Habits

Year-long trends in food habits of mule deer were determined by the examination of rumen samples from deer which I collected, from hunter-killed animals, and from deer accidentally killed on roads. A quart rumen sample from each of 29 deer was analyzed using a technique similar to that used by Wilkins (1957) and others.

Summer and winter food habits of mule deer and summer food habits of cattle were determined by the use of feeding site examinations. Sites

were examined shortly after being vacated by feeding animals. When practicable, availability of various taxa on feeding sites was determined by the use of twenty, 2x5 decimeter frames as previously described. This provided a basis for determining preference when compared with the data on usage of various taxa. One bite on a plant constituted one instance of use. The aggregate percentage method (Martin *et al.* 1946) was used to tabulate by month, season, or vegetation type, the results of both feeding sites and rumen samples.

Weights, Productivity and Population Characteristics

Sex, age, whole weights and hog-dressed weights were determined for deer collected in the field. The age of deer was estimated by tooth replacement or wear on the mandibular dentition (Robinette *et al.* 1957). Kidneys and kidney fat were weighed to evaluate physical condition (Ransom 1965). Reproductive tracts were taken from all females collected from January to April. Fetuses were sexed and measured. Corpora lutea in ovaries were counted using the gross technique described by Cheatum (1949) to determine ovulation incidence. Productivity and population characteristics were determined from observed fawn:doe, fawn:adult and male:female ratios.

RESULTS

Vegetation

The three vegetation types, Silver Sage, Big Sage, and Grassland, (Figure 1) are included in the Temperate Grassland Biome (Odum 1959). The Silver Sage and Grassland Types, in another section of the Milk River breaks, have been generally described by Martinka (1967). The species composition of types and subtypes for which quantitative measurements were taken are in Table 1 and Appendix, Table 17. Ground cover characteristics are in Table 2. Subtypes not quantitatively studied but described from general observations include the Abandoned Meadow and Deciduous Shrub Subtypes in the Silver Sage Type, the Deciduous Shrub and Juniperus Subtypes in the Big Sage Type, and the Cropland Subtype in the Grassland Type.

SILVER SAGE TYPE

This type occurs on the floodplains of major drainages. It extends into the bottoms of some side coulees for short distances. Included are four subtypes.

Silver Sage-Agropyron Subtype. - Silver sagebrush (*Artemisia cana*) and western wheatgrass (*Agropyron smithii*) represent the dominant shrub and grass, respectively (Table 1 and Figure 2). Other grasses and grasslike plants commonly occurring are Richardson needlegrass (*Stipa richardsonii*), crested wheatgrass (*Agropyron cristatum*), needle-and-thread (*Stipa comata*), junegrass (*Koeleria cristata*), and sedges (*Carex* spp.). Shrubs, occurring in trace amounts are rose (*Rosa* spp.) and

