



Food habits, range use and relationships between elk and livestock in the Gravelly Mountains, Montana
by Charles Dean Eustace

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 of food habits, range use and relationships between elk and livestock was made in 1965-66 on a 130 square mile area of the Gravelly Mountains, Southwestern Montana. The past history of usage of the area by elk, cattle and sheep was discussed. The physiography and vegetation of the area was described. The vegetation was divided into three zones Fescue-Wheatgrass, Douglas-fir and Spruce-Fir. Each zone was divided into several types. Quantitative measurements of canopy coverage and plant density were made for many of the types. Use of each vegetation zone by elk and livestock was evaluated. Food habits were determined from the examination of feeding sites; 79 for elk, 60 for cattle, and 18 for sheep.

The diet in winter for elk consisted of 97% grasses and 2% forbs while in summer it consisted of 67% forbs and 33% grasses. The spring diet for cattle consisted of 70% grasses and 30% forbs whereas the summer diet consisted of 79% grasses and 21% forbs. The sheep diet consisted of 72% forbs and 28% grasses in summer. The canopy coverage of individual plant species was recorded at each feeding site. This provided a measure of abundance. A statistical analysis was conducted to determine the relationship between abundance of individual plant species and their significance in the diets of the animals. Negative, neutral, and positive food preferences were indicated. The summer range data for each of the three animal classes indicated that the average canopy coverage was highest for those plants' for which the animals showed a negative' preference. This may imply that the abundance of some or all of these plants was so great that it more than satisfied the needs of the animals, and was not an actual indication of a negative preference. Species composition of the vegetation was determined on the winter and summer ranges by the use of 1,000 feet of basal intercept line transect. Forage utilization was determined by the use of 14 exclosures on the winter range and five on the summer range.

Circular 0.96 square foot plots were clipped inside and outside the exclosures. Percent utilization was indicated by the difference in the inside and outside total vegetation weights, air dried. Clipping results indicated an almost equal percent utilization of total vegetation by elk and cattle on the winter range. There appeared to be very little competition between cattle and elk on the winter range and none on the summer range. Similarities of the elk and sheep diets suggested the possibility of competition on summer range.

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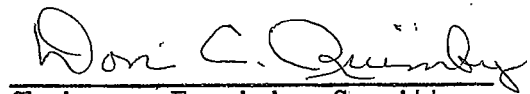
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ABSTRACT

A study of food habits, range use and relationships between elk and livestock was made in 1965-66 on a 130 square mile area of the Gravelly Mountains, Southwestern Montana. The past history of usage of the area by elk, cattle and sheep was discussed. The physiography and vegetation of the area was described. The vegetation was divided into three zones; Fescue-Wheatgrass, Douglas-fir and Spruce-Fir. Each zone was divided into several types. Quantitative measurements of canopy coverage and plant density were made for many of the types. Use of each vegetation zone by elk and livestock was evaluated. Food habits were determined from the examination of feeding sites; 79 for elk, 60 for cattle, and 18 for sheep. The diet in winter for elk consisted of 97% grasses and 2% forbs while in summer it consisted of 67% forbs and 33% grasses. The spring diet for cattle consisted of 70% grasses and 30% forbs whereas the summer diet consisted of 79% grasses and 21% forbs. The sheep diet consisted of 72% forbs and 28% grasses in summer. The canopy coverage of individual plant species was recorded at each feeding site. This provided a measure of abundance. A statistical analysis was conducted to determine the relationship between abundance of individual plant species and their significance in the diets of the animals. Negative, neutral, and positive food preferences were indicated. The summer range data for each of the three animal classes indicated that the average canopy coverage was highest for those plants for which the animals showed a negative preference. This may imply that the abundance of some or all of these plants was so great that it more than satisfied the needs of the animals, and was not an actual indication of a negative preference. Species composition of the vegetation was determined on the winter and summer ranges by the use of 1,000 feet of basal intercept line transect. Forage utilization was determined by the use of 14 exclosures on the winter range and five on the summer range. Circular 0.96 square foot plots were clipped inside and outside the exclosures. Percent utilization was indicated by the difference in the inside and outside total vegetation weights, air dried. Clipping results indicated an almost equal percent utilization of total vegetation by elk and cattle on the winter range. There appeared to be very little competition between cattle and elk on the winter range and none on the summer range. Similarities of the elk and sheep diets suggested the possibility of competition on summer range.

INTRODUCTION

According to records of the Montana Fish and Game Department, numbers of elk (Cervus canadensis nelsoni) have increased greatly in recent years on the Beaverhead National Forest in the vicinity of Wall Creek, Madison County, Southwestern Montana (Fig. 1). Local ranchers reported about 6, 30, and 158 elk wintering on the Wall Creek area in 1935, 1942, and 1950 respectively. Present numbers total nearly 300.

Depredations by elk and mule deer (Odocoileus hemionus) on private lands adjacent to public lands also increased by the early 1950's. To help alleviate the depredation problem and to increase the amount of winter range available to elk and mule deer, 6,467 acres of land adjacent to the public lands were purchased or leased by the Montana Fish and Game Department during 1960-61. This land, known as the Wall Creek Game Range, was reserved exclusively for use by game animals. Forest lands immediately adjacent to the game range are used by cattle in spring as well as by elk and mule deer in winter. There appeared to be localized grazing conflicts between elk and cattle on the forest lands.

An elk range and food habits study was conducted on the Beaverhead National Forest in the southern portion of the Gravelly Mountain Range by Rouse (1956), but observations of competition between elk and livestock were limited. Studies in Montana which included elk-livestock relations were made by Stevens (1965) in the Elkhorn Mountains, and Mackie (1965) in the Missouri River Breaks. Findings were not entirely applicable to the Wall Creek area. The objectives of my study, during the summer of 1965 and the spring and summer of 1966, were to determine seasonal

distributions, movements, food habits, range use and relations to livestock of the elk which winter on the Wall Creek Game Range.

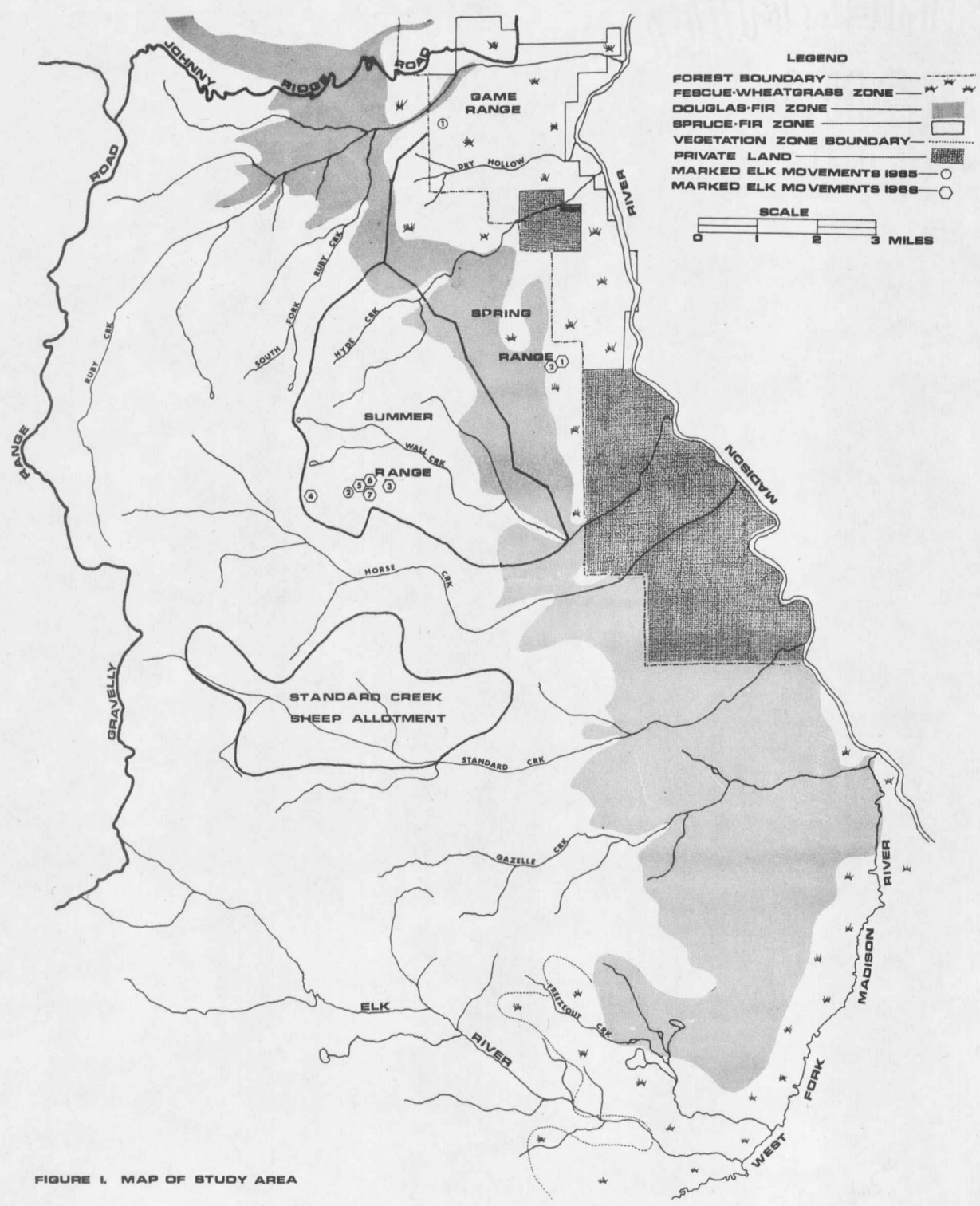


FIGURE 1. MAP OF STUDY AREA

PHYSIOGRAPHY OF STUDY AREA

The Gravelly Mountain Range is a north-south range approximately 32 miles long by 8-20 miles wide lying south of Virginia City. The east slope of the Gravelly Range is characterized by an initial abrupt rise in elevation of 800 to 1,000 feet followed by gradual elevation increases culminating in moderately rounded mountain tops. The west slope is characterized by long gradual slopes without abrupt elevation changes. Some major drainages have cut deep V-shaped gorges but most drainages are relatively broad. Elevations range from 5,600 feet on the Madison River to 10,545 feet on Black Butte Mountain.

The study area which consisted of approximately 130 square miles on the east slope of the Gravelly Range, including Wall Creek Game Range, was bounded on the west by the Gravelly Range Road, by Ruby Creek Drainage on the north, Elk River on the south, and the Madison River on the east (Fig. 1).

VEGETATION OF STUDY AREA

Plants were collected from the study area. Identification of species was verified by W. E. Booth. This plant collection aided in identifying plant species in the field. Scientific and common names are from Booth (1950) and Booth and Wright (1962).

Classification of vegetation was influenced by the works of Daubenmire (1943), and Kirsch (1966). The study area was divided into three major zones; the Fescue (Festuca spp.) - Wheatgrass (Agropyron spp.) Zone, the Douglas-fir (Pseudotsuga menziesii) Zone, and the Engelmann spruce (Picea engelmanni) - Subalpine fir (Abies lasiocarpa) Zone. Each zone was subdivided into several types.

Canopy coverage and frequency of occurrence of grasses, forbs, and shrubs on many of these types was measured along 193 transects by the canopy coverage method of Daubenmire (1959)(Table I). Twenty 2x5 decimeter plots with five paces between plots were measured along 74 transects and ten plots with two paces between plots were measured along the others.

On 14 unprotected sites basal intercept of plant species was measured along 50 foot line transects (Canfield, 1941). Measurements were made along a 100 foot line transect in each of four sites protected by enclosure fences to exclude various types of hoofed mammals (see later section). The combined data for all transects are included in Table II.

Vegetation of timber types was studied mainly by direct observation.

Fescue-Wheatgrass Zone

The fescue-wheatgrass zone dominated from 5,800 to 7,000 feet. It was divided into three types.

