



Range ecology and relations of mule deer, elk, and cattle in the Missouri River Breaks, Montana
by Richard John Mackie

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY in Fish and Wildlife Management

Montana State University

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Abstract:

A study was conducted during the four-year period 1960-64 to obtain quantitative data on food habits, range use, and relations of mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), and cattle on ponderosa pine-juniper (*Pinus ponderosa/Juniperus scopulorum*) and related vegetation types in the Missouri River "Breaks" in northcentral Montana. Eight vegetation types comprising 12 distinct communities were analyzed and described. Totals of 11,581 mule deer observations, 3,489 elk observations, and 25,125 cattle observations were recorded during morning and evening periods. Distributions, movements, and population trends during seasons and years were related to range use and forage conditions. Seasonal and yearly distributions of observations and animal activities were related to sunrise and sunset and environmental conditions, Group sizes during seasons and years were discussed in relation to social behavior and range use.

Seasonal, yearlong, and year-to-year trends in relative use and importance of vegetation types were evaluated with respect to animal activity, forage utilization, plant growth, and weather conditions. Relative frequencies of occurrence of each of the three animals on slopes of various degrees of steepness and exposure were discussed. Relations between distributions of mule deer, elk, and cattle use on the area and distributions of water sources were described. Instances of plant use at 263 mule deer, 178 elk, and 184 cattle feeding sites were related to animal use of the various vegetation types to ascertain seasonal food habits. Analyses of rumen samples from 37 mule deer, 12 elk, and 18 cattle supplemented feeding site data. Yearlong trends in relative use and importance of forage classes and individual plant taxa were described. Year-to-year trends in food habits were related to precipitation and its influence on plant growth. Relations between elk and mule deer, elk and cattle, and mule deer and cattle were evaluated with respect to degrees of overlap in distribution of use on the area in time and space in relation to food habits, range use, animal behavior, and condition of "key" forage plants. Conclusions and recommendations relating to mule deer, elk, and "multiple-use" management programs on the area were presented.

RANGE ECOLOGY AND RELATIONS OF MULE DEER, ELK, AND
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194

by

RICHARD JOHN MACKIE

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of

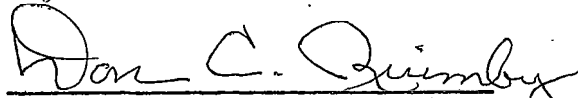
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ABSTRACT

A study was conducted during the four-year period 1960-64 to obtain quantitative data on food habits, range use, and relations of mule deer (Odocoileus hemionus), elk (Cervus canadensis), and cattle on ponderosa pine-juniper (Pinus ponderosa/Juniperus scopulorum) and related vegetation types in the Missouri River "Breaks" in northcentral Montana. Eight vegetation types comprising 12 distinct communities were analyzed and described. Totals of 11,581 mule deer observations, 3,489 elk observations, and 25,125 cattle observations were recorded during morning and evening periods. Distributions, movements, and population trends during seasons and years were related to range use and forage conditions. Seasonal and yearly distributions of observations and animal activities were related to sunrise and sunset and environmental conditions. Group sizes during seasons and years were discussed in relation to social behavior and range use. Seasonal, yearlong, and year-to-year trends in relative use and importance of vegetation types were evaluated with respect to animal activity, forage utilization, plant growth, and weather conditions. Relative frequencies of occurrence of each of the three animals on slopes of various degrees of steepness and exposure were discussed. Relations between distributions of mule deer, elk, and cattle use on the area and distributions of water sources were described. Instances of plant use at 263 mule deer, 178 elk, and 184 cattle feeding sites were related to animal use of the various vegetation types to ascertain seasonal food habits. Analyses of rumen samples from 37 mule deer, 12 elk, and 18 cattle supplemented feeding site data. Yearlong trends in relative use and importance of forage classes and individual plant taxa were described. Year-to-year trends in food habits were related to precipitation and its influence on plant growth. Relations between elk and mule deer, elk and cattle, and mule deer and cattle were evaluated with respect to degrees of overlap in distribution of use on the area in time and space in relation to food habits, range use, animal behavior, and condition of "key" forage plants. Conclusions and recommendations relating to mule deer, elk, and "multiple-use" management programs on the area were presented.

INTRODUCTION

Vegetation characterized by ponderosa pine (Pinus ponderosa) and rocky mountain juniper (Juniperus scopulorum) occurs extensively on rough uplands along the Missouri and Yellowstone River drainages and throughout central and eastern Montana. It represents the most important habitat type of mule deer (Odocoileus hemionus), is locally a superior habitat of elk (Cervus canadensis), and is heavily utilized in grazing by livestock. Much of this important game habitat type is publicly owned, mostly by the Federal Government, and administered by the Bureau of Land Management.

Paucity of quantitative data on big game and livestock food habits, range-use habits, and relations has hindered the establishment of sound effective management programs. A clarification of relationships is essential for development of cooperative multiple-use management programs. To aid in the formation of these, an intensive investigation was conducted on a representative 75,000 acre area in the Missouri River Breaks approximately 25 miles northeast of Roy, Montana. Full-time field work was conducted from June 1960 through September 1963. Additional data were obtained during several one-day to two-week periods from October 1963 to June 1964. The primary objectives were to obtain quantitative data on range-use and food habits of mule deer, elk, and cattle on the ponderosa pine-juniper and associated vegetational types and to develop methods and criteria for management. Habitat and population studies were conducted concomitantly to evaluate the effects of range condition, intraspecific and interspecific conflicts, and current game management practices on mule

deer and elk populations. These data also aided in interpretation of food and range-use relationships.

Seasonal and year-long food and/or range-use habits of mule deer and elk have been studied intensively on many parts of their ranges. Available data on range food and use habits of cattle on western rangelands appear largely observational or derived from forage utilization and condition studies. Some quantitative, seasonal and year-long data for cattle are available for a few areas where big game-livestock relations have been studied.

Few detailed studies of mule deer-cattle, elk-cattle, or mule deer-elk relationships have been made. Julander (1955) possibly presented the most comprehensive data on mule deer-cattle relationships in his report on the Oak Creek Unit of Fishlake National Forest, Utah. Detailed studies involving mule deer-cattle forage relations have been reported by Julander (1937) and Kimball and Watkins (1951) for the Kaibab deer range, Arizona and Dasmann (1949) for the interstate deer winter range, California. Elk-mule deer relationships have been considered previously in comparative winter food habit studies in northern Idaho and Montana (DeNio 1938), the Blue Mountains of Oregon (Cliff 1939), and Jasper Park, Alberta (Cowan 1947). Morris and Schwartz (1957) made a year-long study on food habits of these two species on the National Bison Range, Montana. Elk-cattle relationships were studied by Stevens (1964) in the Elkhorn Mountains, Montana. The only study of mule deer, elk, and cattle relationships known to the writer was reported by Julander and Jeffery (1964) on summer range relations in Utah.

