



Range relationships of mule deer, elk and cattle in a rest rotation grazing system during summer and fall

by Craig James Knowles

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:

A study was conducted in the timbered breaks adjacent to the Missouri River, northcentral Montana, during the summers of 1973 and 1974 and the fall of 1974 to obtain quantitative data on populations, range use and food habits of mule deer, elk and cattle within an area managed by rest rotation grazing. Seven major habitat types consisting of eleven plant communities were recognized. Canopy coverages and frequencies of occurrence were determined for low growing plant taxa in each of the plant communities. Numbers, productivity, distribution, and range use of mule deer and elk were determined from two early winter helicopter surveys and regular ground observations. Fawn:doe ratios were 50.0 and 54.8 for mule deer and calf:cow ratios were 65 and 70 for elk, respectively, during the two years of the study. Numbers and distribution of mule deer within and between years showed no consistent trends in relation to grazing by cattle and pasture treatments. Numbers and distribution of elk using the study area within and between years were greatly influenced by grazing of cattle and previous pasture treatments. Elk avoided areas of heavy use by cattle. Home ranges of three radio marked mule deer were largest for the two males and smallest for the female. Home ranges of four radio marked elk were substantially larger than those of mule deer, with home ranges of males larger than females. Observations of marked elk indicated that previous and current grazing treatments of a pasture were influential in determining use of a home range within a pasture by elk. The Pinus-Juniperus habitat type was the most important for use by mule deer and elk during both summer and fall, while the Artemisia-Agropyron habitat type the most important for use by cattle during both summer and fall. Mule deer and elk made intensive use of steeper slopes and side ridges while cattle used main ridgetops and major coulee bottoms most intensively. Food habits were determined from feeding site examination and supplemented by rumen analysis. Forbs, browse, grass and browse, forbs, grass was the order of importance of forage classes used by mule deer in summer and fall, respectively. Forbs, grass, browse was the order of importance of forage classes used by elk in both summer and fall. Grass, forbs, browse was the order of importance of forage classes used by cattle in both summer and fall. Yellow sweetclover was the most important forb in the diet of each of the three ungulates. Use by mule deer was shifted to browse and use by elk was shifted to grass as forbs were desiccated. Differences in use of forage classes by mule deer between pastures in July 1974 was a result of previous grazing treatments affecting reproductive success and subsequent abundance of yellow sweetclover. Interspecific relationships, effect of rest rotation grazing and management implications of mule deer, elk and cattle on a rest rotation grazing system were discussed.

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ABSTRACT

A study was conducted in the timbered breaks adjacent to the Missouri River, northcentral Montana, during the summers of 1973 and 1974 and the fall of 1974 to obtain quantitative data on populations, range use and food habits of mule deer, elk and cattle within an area managed by rest rotation grazing. Seven major habitat types consisting of eleven plant communities were recognized. Canopy coverages and frequencies of occurrence were determined for low growing plant taxa in each of the plant communities. Numbers, productivity, distribution, and range use of mule deer and elk were determined from two early winter helicopter surveys and regular ground observations. Fawn:doe ratios were 50.0 and 54.8 for mule deer and calf:cow ratios were 65 and 70 for elk, respectively, during the two years of the study. Numbers and distribution of mule deer within and between years showed no consistent trends in relation to grazing by cattle and pasture treatments. Numbers and distribution of elk using the study area within and between years were greatly influenced by grazing of cattle and previous pasture treatments. Elk avoided areas of heavy use by cattle. Home ranges of three radio marked mule deer were largest for the two males and smallest for the female. Home ranges of four radio marked elk were substantially larger than those of mule deer, with home ranges of males larger than females. Observations of marked elk indicated that previous and current grazing treatments of a pasture were influential in determining use of a home range within a pasture by elk. The Pinus-Juniperus habitat type was the most important for use by mule deer and elk during both summer and fall, while the Artemisia-Agropyron habitat type the most important for use by cattle during both summer and fall. Mule deer and elk made intensive use of steeper slopes and side ridges while cattle used main ridgetops and major coulee bottoms most intensively. Food habits were determined from feeding site examination and supplemented by rumen analysis. Forbs, browse, grass and browse, forbs, grass was the order of importance of forage classes used by mule deer in summer and fall, respectively. Forbs, grass, browse was the order of importance of forage classes used by elk in both summer and fall. Grass, forbs, browse was the order of importance of forage classes used by cattle in both summer and fall. Yellow sweetclover was the most important forb in the diet of each of the three ungulates. Use by mule deer was shifted to browse and use by elk was shifted to grass as forbs were desiccated. Differences in use of forage classes by mule deer between pastures in July 1974 was a result of previous grazing treatments affecting reproductive success and subsequent abundance of yellow sweetclover. Interspecific relationships, effect of rest rotation grazing and management implications of mule deer, elk and cattle on a rest rotation grazing system were discussed.

INTRODUCTION

Rest-rotation grazing systems (Hormay and Talbot, 1961) have become increasingly popular in recent years as a means of managing rangelands grazed by livestock. These systems, by incorporating periods of rest into the grazing formula, provide conditions which favor the development of desirable plant composition and abundance in spite of intensive grazing during certain periods within or between years. Personnel of the Bureau of Land Management, in 1965, initiated a rest-rotation grazing system for cattle (*Bos taurus*) in the Nichols Coulee Resource Area (RCA) located on and adjacent to the Charles M. Russell Game Range in North-Central Montana. Both mule deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) also use parts of this area during at least some seasons. Mackie (1970), reported on mule deer, elk and cattle range relationships for the Missouri River Breaks; the area that includes part of the RCA. At the time of his study no rest-rotation grazing systems were in operation. Consequently he was unable to observe the effects of rest-rotation systems for cattle on the range ecology of mule deer and elk.

This study, conducted on a full time basis during the summer of 1973 and the summer and fall of 1974, considered the range ecology of mule deer, elk and cattle within the pastures included in the system.

DESCRIPTION OF THE STUDY AREA

The study area of approximately 88,810 acres is located in South Phillips County 55 miles southwest of Malta, Montana. Boundaries are shown in Figure 1. The area is part of a highly dissected plateau which slopes gradually to the southeast. Elevations range from 3,000 feet along the north boundary to 2,246 feet at the Missouri River. Breaks topography extends from the river, north, to the Charles M. Russell Game Range boundary which roughly delineates the end of the timbered breaks. From here, rolling plains develop.

Soils, mostly heavy clay loams of the Lismas, Pierre and Phillips series, are derived from the underlying Bear Paw Shale Formation (Gieseke, 1926). Shale outcrops are common, especially in the breaks portion of the study area. Alluvium from the Little Rocky Mountains to the north occurs in isolated areas. Higher, level ridgetops show evidence of feeble glaciation. Runoff from such ridges is high.

Major coulees, characterized by much meandering in a well developed flood plain, cut through shale outcrops and alluvial benches. These coulees contain intermittent streams and are subject to flash floods during periods of heavy rains. In addition to natural springs and seepages, nine wells and 83 stockponds have been developed on the study area.

Nichols Coulee RCA is a four pasture system. Grazing is administered by personnel of the Bureau of Land Management. Land ownership,

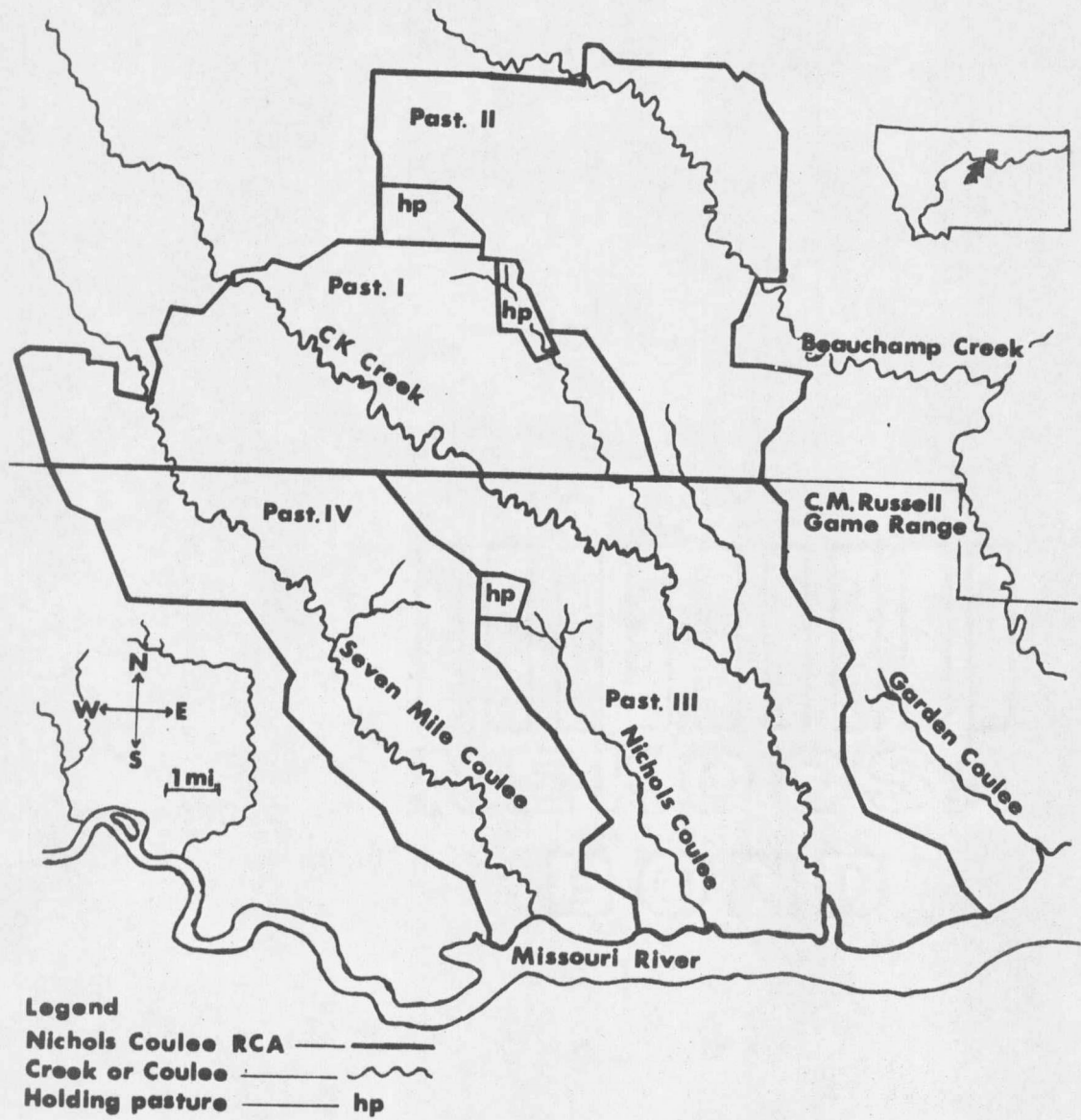


Figure 1. Map of the study area showing boundaries and drainages.

acreages and AUMs for the study area are shown in Table 1. The grazing formula is shown in Figure 2. Order of treatments within a year is counter-clockwise (Fig. 3). Rotation of treatments between years is clockwise (Fig. 3). Pasture II lacks adequate natural shelter for calving; therefore the years pasture II is grazed early, cows heavy-with-calf are often turned into pasture I April 1.

Pastures I and II are mostly rolling uplands dissected by a dendritic pattern of side coulees which flow into a few major drainages. For the most part, relief is low. Pastures III and IV are strikingly different from pastures I and II. Relief increases to as much as 400 feet immediately north of the river; ridges become narrower and break sharply into deeply entrenched drainages.

Climatological data were obtained from the United States Department of Commerce Weather Station Roy 24 NE (Mobridge), located 17 miles southwest of the study area center. Mean monthly and yearly temperatures and precipitation for the two years of the study, as well as the eleven year means, are shown in Table 2. Climate of this area is considered semi-arid with short hot summers and long cold winters (Gieseke, 1926). Eighty percent of the precipitation comes in the half year period of April through September. Despite above average precipitation in 1973, little rain fell between mid-June and late August. Mean number of frost free days is 118. For 1973 and 1974 this figure was 117 and 102 days respectively.

