Ecology of mule deer on a sagebrush-grassland habitat in northeastern Montana
by Scott Donald Jackson

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University

Abstract:
The ecology of a mule deer (Odocoileus hemionus) population inhabiting native big sagebrush (Artemisia tridentata) - grass rangeland in northeastern Montana was studied during 1985-1987 using aerial surveys and radioed and neckbanded deer. Habitat use, including distribution, movements, use and selection of cover types, and food habits, was described and related to topography, physiography, weather, vegetation, and land use. Deer appeared to be yearlong residents of traditional home ranges, except under severe winter conditions when most moved to areas of rougher terrain. Mule deer used topographic relief for shelter, security, and foraging opportunity during all seasons. Small, deeply eroded cuts were extremely important in this role, especially during summer, in this otherwise open environment. Polygon seasonal home range size for adult females during summer varied from 0.35 km^2 to 12.93 km^2 (mean = 4.66 km^2). Home range sizes ranged from 2.76 km^2 to 321.37 km^2 (mean = 66.53 km^2) during the extremely harsh winter in 1985-86, while during the relatively mild winter of 1986-87 home ranges varied only from 0.90 km^2 to 4.60 km^2 (mean = 2.74 km^2). Nocturnal movements determined by triangulation during, summer 1986 also increased home range size. Use of cover types by marked deer during daytime generally corresponded to availability. Shale hills and deeply cut drainageways were used significantly more than expected. Deer occurred more often than expected in rested cattle pastures during autumn and winter and less often than expected in pastures grazed early or late in the season. Population characteristics, including size and trends, structure, group size, productivity and recruitment, adult mortality, dispersal, and condition were described. In 1986, preharvest density was estimated as 2.0/km^2, down from 4.25/km^2 in autumn 1984, but similar to estimates of 2.0/km^2 and 1.5/km2 in 1981 and 1982, respectively. Fawn:doe ratios in autumn ranged from 47:100 for October 1985 to 71:100 in October 1986.

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APPROVAL

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Scott Donald Jackson

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

July 23, 1990
Date

Linda J. Mackie
Chairperson, Graduate Committee

Approved for the Major Department

8 August 1990
Date

Robert S. Moore
Head, Major Department

Approved for the College of Graduate Studies

August 9, 1990
Date

Nancy L. Parsons
Graduate Dean

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Date 2 July 1990

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ABSTRACT

The ecology of a mule deer (Odocoileus hemionus) population inhabiting native big sagebrush (Artemisia tridentata) - grass rangeland in northeastern Montana was studied during 1985-1987 using aerial surveys and radioed and neckbanded deer. Habitat use, including distribution, movements, use and selection of cover types, and food habits, was described and related to topography, physiography, weather, vegetation, and land use. Deer appeared to be yearlong residents of traditional home ranges, except under severe winter conditions when most moved to areas of rougher terrain. Mule deer used topographic relief for shelter, security, and foraging opportunity during all seasons. Small, deeply eroded cuts were extremely important in this role, especially during summer, in this otherwise open environment. Polygon seasonal home range size for adult females during summer varied from 0.35 km^2 to 12.93 km^2 (mean = 4.66 km^2). Home range sizes ranged from 2.76 km^2 to 321.37 km^2 (mean = 66.53 km^2) during the extremely harsh winter in 1985-86, while during the relatively mild winter of 1986-87 home ranges varied only from 0.90 km^2 to 4.60 km^2 (mean = 2.74 km^2). Nocturnal movements determined by triangulation during summer 1986 also increased home range size. Use of cover types by marked deer during daytime generally corresponded to availability. Shale hills and deeply cut drainageways were used significantly more than expected. Deer occurred more often than expected in rested cattle pastures during autumn and winter and less often than expected in pastures grazed early or late in the season. Population characteristics, including size and trends, structure, group size, productivity and recruitment, adult mortality, dispersal, and condition were described. In 1986, pre-harvest density was estimated as 2.0/km^2, down from 4.25/km^2 in autumn 1984, but similar to estimates of 2.0/km^2 and 1.5/km^2 in 1981 and 1982, respectively. Fawn:doe ratios in autumn ranged from 47:100 for October 1985 to 71:100 in October 1986.

INTRODUCTION

Rocky Mountain mule deer (Odocoileus hemionus hemionus) occupy a diversity of habitats in Montana (Egan 1971). Comparative studies across the state (Mackie et al. 1980, 1985) indicate that patterns of habitat use, biological characteristics, and population dynamics of deer vary widely in relation to attributes of individual habitats occupied. Thus, knowledge obtained through the description of various populations and their respective habitats provides the best framework for determining broad-based management opportunities and practices.

Intensive studies of mule deer have been conducted in mountains and mountain-foothills, river breaks, mixed-prairie/forest, upland prairie/ponderosa pine (Pinus ponderosa), prairie-agriculture, mixed-grass prairie, and short-grass prairie. However, little or no research has been conducted in non-timbered sagebrush-grass rangelands.

Native rangeland dominated by big sagebrush (Artemisia tridentata) and various grasses occurs extensively in eastern Montana (Ross and Hunter 1976) and, at least locally, supports significant populations of mule deer. My study was established to provide data on range use and

population characteristics for management of one of these populations in northeastern Montana. Specific objectives were to determine seasonal distribution and movements, habitat use, and population characteristics. Special emphasis was also directed toward developing guidelines for conducting and interpreting results of aerial population trend surveys and evaluating relationships between mule deer and domestic livestock operations on the area.

The study was conducted full time during the summers of 1985 and 1986 and the winter of 1985-86. Biologists with the Montana Department of Fish, Wildlife and Parks (MDFWP) cooperated in trapping and marking deer during December 1984 and 1985, and in collecting data during other periods from January 1985 through June 1987.

DESCRIPTION OF STUDY AREA

Location and General Description

The 261 km^2 Dog Creek study area was located 30 km southwest of Glasgow in southern Valley County, Montana (Fig. 1). Boundaries were defined to include all areas used by marked deer during all seasons except the winter of 1985-86 when most deer moved off the primary study area. Land ownership was primarily federal, administered by the U.S. Department of the Interior (USDI) Bureau of Land Management (BLM) (95%), with small sections of state (4%) and private (1%) lands included (USDI 1985). The area was adjacent to the Charles M. Russell National Wildlife Refuge (CMR) (Fig. 2).

Major drainages included Lone Tree and Little Beaver Creeks which flowed southeasterly into Willow Creek, a northeasterly flowing tributary of the Milk River. Several minor drainages also emptied to the southeast into Willow Creek. This pattern formed a landscape of gently rolling uplands interspersed with wide flat drainages deeply incised by meandering creek bottoms. Areas of relatively rough