



Population ecology of mule deer with emphasis on potential impacts of gas and oil development along the east front of the Rocky Mountains, northcentral Montana  
by Helga Beate Ihsle

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 on the East Front of the Rocky Mountains in northcentral Montana from June 1980 to September 1981. It was the second phase of a 2-part investigation designed to collect quantitative baseline information on mule deer seasonal distribution, movements, population characteristics, and habitat use on a representative portion of the East Front subject to gas and oil exploration and development. Six, and possibly 7, population units were delineated by winter range origin. A total of 6,000 to 7,000 mule deer were included in these units. Monitored deer showed a high degree of fidelity to seasonal ranges. Three out of 78 marked deer were known to have dispersed from one winter range to another. Mean winter home range size for females was larger in 1980-1981 ( $6.0 \text{ km}^2$ ) than 1979-1980 ( $4.6 \text{ km}^2$ ). Three summer range segments were confirmed from previous work. Of 22 radio-collared deer, 14% were residents, 59% summered east of the Continental Divide, and 27% summered west of the Continental Divide. Mean summer home range was  $6.4 \text{ km}^2$  in 1979,  $3.5 \text{ km}^2$  in 1980, and  $1.4 \text{ km}^2$  in 1981 for female deer. Population estimates indicated that the population wintering on the study area increased by 6% from 1980 to 1981. Ratios of fawns per 100 adults were lower (49.8 in early winter, 49.8 in late winter) in 1981 than in 1980 (69.3 in early winter, 61.7 in late winter). This decrease was attributed to a higher proportion of non-productive yearlings in the population. The age structure and high proportion of males (19 antlered per 100 non-antlered) indicated a healthy population that could withstand greater harvest than occurred during the study. At least 90% of deer summering north of the Sun River and west to the South Fork of the Flathead River winter on the study area. Winter ranges were separated by low deer use zones. Low deer use zones had a lower percentage of moderate to steep slope categories and a lower proportion of southerly aspects than core winter ranges. Mule deer apparently preferred moderate slopes, higher elevations, south and east aspects, and limber pine timber types within core winter ranges. Impacts of gas and oil exploration were difficult to assess due to the low intensity of activity, the mild winter conditions, arid low density of deer in the vicinity of the only active well sites during this study. Implications of more intense development were discussed.

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POPULATION ECOLOGY OF MULE DEER WITH EMPHASIS ON POTENTIAL  
IMPACTS OF GAS AND OIL DEVELOPMENT ALONG THE EAST FRONT  
OF THE ROCKY MOUNTAINS, NORTHCENTRAL MONTANA

by

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A thesis submitted in partial fulfillment  
of the requirements for the degree

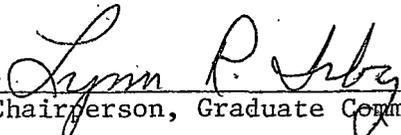
of

MASTER OF SCIENCE

in

Fish and Wildlife Management

Approved:

  
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MONTANA STATE UNIVERSITY  
Bozeman, Montana

February, 1982

## ACKNOWLEDGMENTS

I wish to express my sincere appreciation to the following people for their vital contribution to this study: Dr. Lynn Irby, Montana State University, for direction of the study, assistance, and guidance in preparation of the manuscript; Dr. Richard Mackie and Dr. Robert Eng, Montana State University, and Dr. John Weigand, Montana Department of Fish, Wildlife and Parks, for critically editing the manuscript; Mr. Gary Olson, Mr. John McCarthy, Mr. Dan Hook, and Ms. Gayle Joslin, for technical and field assistance; Mr. Wayne Kasworm, for invaluable assistance in every phase of the study; Mr. Jack Jones and Mr. Wayne Elliot for project planning and field assistance; Mr. James Mitchell, Mr. Terry Lonner, Mr. Kenneth Greer, Mr. Bert Goodman, Mr. Bill Hill, and Dr. Henry Jorgensen for providing equipment and assistance; employees of the Lewis and Clark National Forest, for assistance and use of facilities and equipment; and all those who assisted in drive-netting. I would also like to thank local landowners for their cooperation, friendship, and help; my family and friends for encouragement; and special thanks to David Pac for inspiration, encouragement, and friendship. The East Slope Rocky Mountain Front Mule Deer Study and investigation was supported by the Bureau of Land Management through a contract (YA-512-CT9-33) to the Montana Department of Fish, Wildlife and Parks.

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## ABSTRACT

A study was conducted on the East Front of the Rocky Mountains in northcentral Montana from June 1980 to September 1981. It was the second phase of a 2-part investigation designed to collect quantitative baseline information on mule deer seasonal distribution, movements, population characteristics, and habitat use on a representative portion of the East Front subject to gas and oil exploration and development. Six, and possibly 7, population units were delineated by winter range origin. A total of 6,000 to 7,000 mule deer were included in these units. Monitored deer showed a high degree of fidelity to seasonal ranges. Three out of 78 marked deer were known to have dispersed from one winter range to another. Mean winter home range size for females was larger in 1980-1981 (6.0 km<sup>2</sup>) than 1979-1980 (4.6 km<sup>2</sup>). Three summer range segments were confirmed from previous work. Of 22 radio-collared deer, 14% were residents, 59% summered east of the Continental Divide, and 27% summered west of the Continental Divide. Mean summer home range was 6.4 km<sup>2</sup> in 1979, 3.5 km<sup>2</sup> in 1980, and 1.4 km<sup>2</sup> in 1981 for female deer. Population estimates indicated that the population wintering on the study area increased by 6% from 1980 to 1981. Ratios of fawns per 100 adults were lower (49.8 in early winter, 49.8 in late winter) in 1981 than in 1980 (69.3 in early winter, 61.7 in late winter). This decrease was attributed to a higher proportion of non-productive yearlings in the population. The age structure and high proportion of males (19 antlered per 100 non-antlered) indicated a healthy population that could withstand greater harvest than occurred during the study. At least 90% of deer summering north of the Sun River and west to the South Fork of the Flathead River winter on the study area. Winter ranges were separated by low deer use zones. Low deer use zones had a lower percentage of moderate to steep slope categories and a lower proportion of southerly aspects than core winter ranges. Mule deer apparently preferred moderate slopes, higher elevations, south and east aspects, and limber pine timber types within core winter ranges. Impacts of gas and oil exploration were difficult to assess due to the low intensity of activity, the mild winter conditions, and low density of deer in the vicinity of the only active well sites during this study. Implications of more intense development were discussed.

## INTRODUCTION

The east slope of the Rocky Mountains in northcentral Montana provides winter habitat for a large mule deer (*Odocoileus hemionus*) population. This area has a high potential for gas and oil production, and commercial quantities of gas have already been discovered. By October, 1981, 4 producing gas wells had been drilled between the Muddy and Dupuyer Creek drainages. At least 3 additional wells will be completed in 1982 on this area, and seismic lines are continually being surveyed by several companies. Knowledge of mule deer wintering along the East Front is essential if impacts of gas and oil exploration on this species are to be ascertained.

This study, conducted from June 1980 through September 1981, represents the second phase of a 2-part investigation. The first phase was conducted from June 1979 through September 1980 (Kasworm 1981). These studies were designed to collect baseline information on mule deer, including seasonal distribution, movements, population dynamics, and habitat use, to evaluate potential conflicts between hydrocarbon exploration and deer, and to develop management guidelines.

Previous studies and management surveys on deer in this area by Montana Department of Fish, Wildlife and Parks (MDFWP) personnel have provided some information on range use, food habits, reproduction and population trends (Schallenberger 1966, McCarthy et al. 1978, 1979,

1980). Background information on the area is available from studies on grizzly bear (*Ursus arctos*) (Sumner and Craighead 1973, Hamlin and Frisina 1975, Schallenberger 1974, 1976, Jonkel 1976, 1977, Schallenberger and Jonkel 1978, 1979, 1980, and Aune 1981), Rocky Mountain bighorn sheep (*Ovis canadensis*) (Schallenberger 1966, Erickson 1972, Frisina 1974), Rocky Mountain elk (*Cervus elaphus*) (Picton 1960, Knight 1970, Picton and Picton 1975), and Rocky Mountain goats (*Oreamnos americanus*) (Thompson 1981).

## STUDY AREA

The 2,725 square kilometer ( $\text{km}^2$ ) study area (Fig. 1) was located in and adjacent to the Sawtooth Range along the east slope of the Rocky Mountains in western Teton, Pondera, and Flathead Counties, Montana. It was bordered on the north by the Blackfoot Indian Reservation and on the south by the Sun River. Important drainages on the study area included Birch Creek, Muddy Creek, the Teton River, Deep Creek, the Middle Fork of the Flathead River, and the Sun River. The center of the area was approximately 40 km west of Choteau.

Most (85%) of the area consisted of public lands administered by the Lewis and Clark and Flathead National Forests. Remaining lands were administered by the Bureau of Land Management (BLM) or owned by private organizations, private individuals, and the State of Montana. The BLM administered 95% of the mineral rights on the study area.

## Geology

Geological characteristics of the study area have been described by Giesecker (1937), Deiss (1943) and Johns (1970). The East Rocky Mountain Front is composed of a combination of parallel north-south extending ridges, characterized by abruptly sloped east faces and moderate west facing slopes, separated by precipitous drainage valleys. During the early Cenozoic era, the Lewis overthrust pushed late Precambrian and Paleozoic limestone and shales over more recent Mesozoic sediments, creating a situation conducive to petroleum

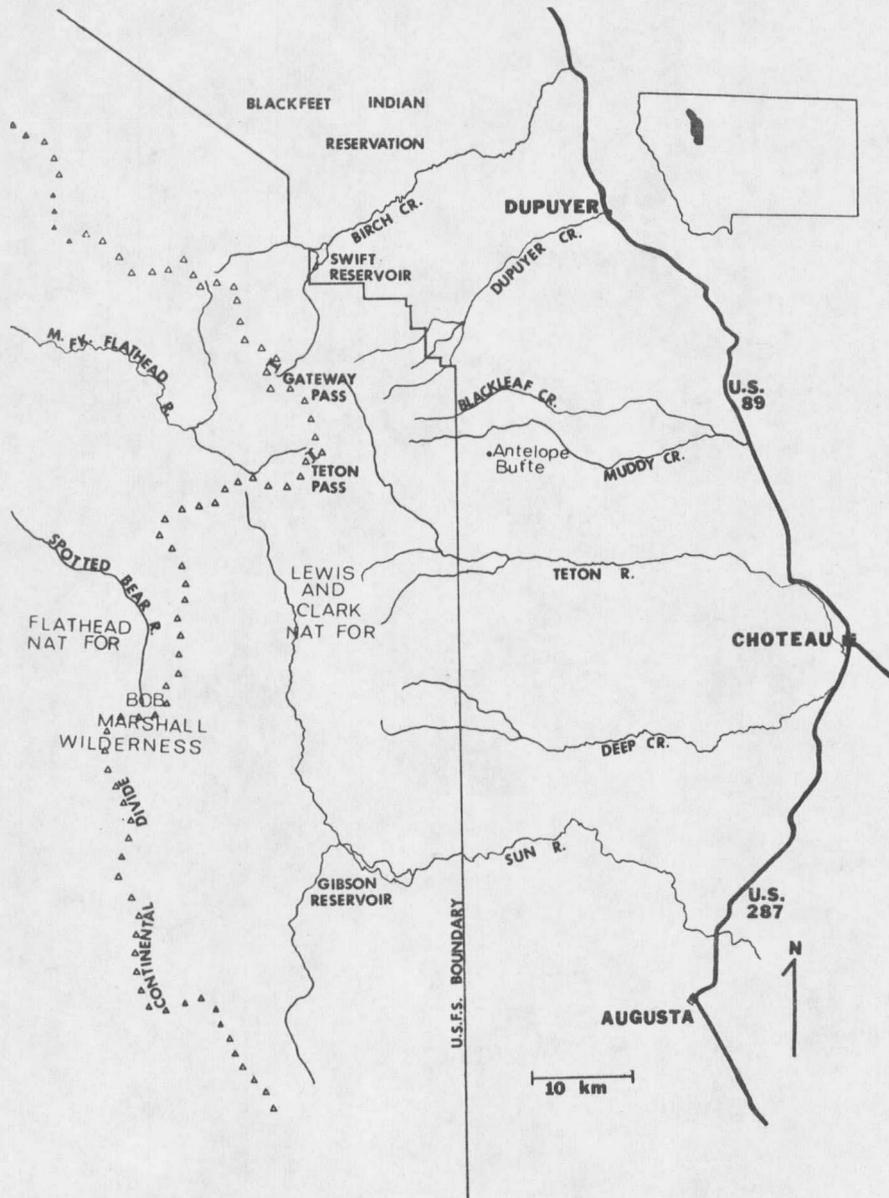


Figure 1. Map of the East Front study area showing major features.

deposition and accumulation. Glaciation and erosion have created the buttes, ridges, and foothills dissected by small drainages that characterize mule deer winter ranges along the mountain front. Elevations range from 1,311 meters (m) to 1,798 m on winter ranges and from 1,707 m to 2,863 m on summer ranges.

#### Climate

Climatological data for 3 weather stations along the East Front are presented in Table 1. Gibson Dam (GD) was located at the southern end of the study area. The Choteau (CH) and Blackleaf (BL) stations represent midway points. Blackleaf was closer to the Front, but data were incomplete for some months; therefore, Choteau was included to show trends.

Average annual precipitation at these stations ranged from 35 to 56 centimeters (cm). Winter precipitation was higher than average in 1978-1979 and 1979-1980 (Kasworm 1981) and lower than average in 1980-1981.

Average annual temperature in the area is about 5°C. The 3 winters covered during this study were climatically very different. Temperatures in 1978-1979 were much lower than average, in 1979-1980 they were approximately average (Kasworm 1981), and in 1980-1981 they were slightly above average. Very strong southwesterly chinook winds characterize this area and can influence deer behavior and distribution on the winter ranges.

































































































































































