



Ecology of bighorn sheep in relation to oil and gas development along the east slope of the Rocky Mountains, northcentral Montana
by Timothy Alan Andryk

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 bighorn sheep study was conducted on the east slope of the Rocky Mountains in northcentral Montana from June 1981 to April 1983. Objectives were to provide quantitative baseline information on bighorn sheep seasonal distribution, habitat use, population status and trend, and response to oil and gas exploration and development in an area that supported a transplanted population. Three population units and their seasonal ranges, rutting, lambing, and mineral lick areas were delineated based on the distribution and movements of 9 radio-collared and 9 neckbanded sheep and their associated groups. Lincoln index population estimates for the entire study area were 253 sheep in winter 1982-1983 and 258 in summer 1982. The January 1983 lamb:ewe ratio was 45:100 and ram:ewe ratio was 48:100. Population data indicated the sheep herd in the study area was healthy and evidently -expanding both in range and numbers. Important winter-spring habitat components were: open grassland and old burn cover types, elevations of 1526 m - 1678 m, distances less than 91 m from rocky terrain (escape cover), distances greater than 400 m from dense shrub and timber stands, south-facing slopes on a foothill winter range, and north-facing windswept slopes on a subalpine winter range. Important summer and fall habitat components were open rocky bluff and cliff sites, and elevations of 2,013 m - 2440 m. Timbered sites were used during fall. Grass-forb communities seemed less important on summer ranges than on winter-spring ranges. Grasses were the dominant food item in fecal samples during fall, winter, and spring, while forbs were dominant in summer. Sheep displacement from a lambing area was associated with seismographic activity in the area. A mean helicopter flushing distance of 364 m was recorded in 1982-1983 helicopter surveys. Mitigation guidelines for intense exploration and development activities are presented.

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APPROVAL

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Timothy Alan Andryk

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.

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ABSTRACT

A bighorn sheep study was conducted on the east slope of the Rocky Mountains in northcentral Montana from June 1981 to April 1983. Objectives were to provide quantitative baseline information on bighorn sheep seasonal distribution, habitat use, population status and trend, and response to oil and gas exploration and development in an area that supported a transplanted population. Three population units and their seasonal ranges, rutting, lambing, and mineral lick areas were delineated based on the distribution and movements of 9 radio-collared and 9 neckbanded sheep and their associated groups. Lincoln index population estimates for the entire study area were 253 sheep in winter 1982-1983 and 258 in summer 1982. The January 1983 lamb:ewe ratio was 45:100 and ram:ewe ratio was 48:100. Population data indicated the sheep herd in the study area was healthy and evidently expanding both in range and numbers. Important winter-spring habitat components were: open grassland and old burn cover types, elevations of 1526 m - 1678 m, distances less than 91 m from rocky terrain (escape cover), distances greater than 400 m from dense shrub and timber stands, south-facing slopes on a foothill winter range, and north-facing windswept slopes on a subalpine winter range. Important summer and fall habitat components were open rocky bluff and cliff sites, and elevations of 2,013 m - 2440 m. Timbered sites were used during fall. Grass-forb communities seemed less important on summer ranges than on winter-spring ranges. Grasses were the dominant food item in fecal samples during fall, winter, and spring, while forbs were dominant in summer. Sheep displacement from a lambing area was associated with seismographic activity in the area. A mean helicopter flushing distance of 364 m was recorded in 1982-1983 helicopter surveys. Mitigation guidelines for intense exploration and development activities are presented.

INTRODUCTION

The east slope of the Rocky Mountains in northcentral Montana has a high potential for oil and gas production (Mudge et al. 1978), and commercial quantities of gas have already been discovered. In response to a recent surge in oil and gas exploration, a study of Rocky Mountain bighorn sheep (Ovis canadensis canadensis Shaw) was initiated in 1981 on the East Front. Information available on bighorn sheep along the East Front prior to this study consisted largely of population ecology and range use studies in the Sun River area (Schallenberger 1966, Erickson 1972, Frisina 1974). Knowledge of mountain sheep population dynamics and habitat use along other segments of the mountain front is essential if impacts of oil and gas exploration and development are to be mitigated. This study, conducted from June 1981 through April 1983, was designed to provide information on sheep populations north of the Sun River drainage with emphasis on a population transplanted in 1976 from the Sun River area to the Walling Reef area approximately 45 kilometers (km) north of Sun River. The specific objectives were:

- 1) to provide quantitative baseline information on bighorn sheep seasonal distribution, habitat use, and population status and trend.
- 2) to investigate responses to human disturbance, particularly oil and gas exploration.

- 3) to develop management and mitigation guidelines for bighorn sheep populations in the study area.

Background information on the East Front was available from studies on mule deer (Odocoileus hemionus) (Kasworm 1981, Ihle 1982), Rocky Mountain elk (Cervus elaphus nelsoni) (Picton 1960, Knight 1970, Picton and Picton 1975, Olson 1983), Rocky Mountain goats (Oreamos americanus) (Thompson 1981, Joslin 1983), and grizzly bears (Ursus arctos) (Sumner and Craighead 1973, Hamlin and Frisina 1975, Schallenberger 1974, 1976, Jonkel 1977, Schallenberger and Jonkel 1980, Aune and Stivers 1983).

The East Front Rocky Mountain Front Bighorn Sheep Study and Investigation was supported by the U.S. Forest Service through a contract with the Montana Department of Fish, Wildlife and Parks.

STUDY AREA

The study area included a 777 square kilometer (km²) portion of the Sawtooth Range along the east slope of the Rocky Mountains in western Teton and Pondera counties (Fig. 1). It was bordered on the north by the Birch Creek drainage, on the south by the South Fork of the Teton River drainage, on the west by the Continental Divide, and on the east by the foothill/prairie ecotone of the East Front.

Approximately 90% of the area consisted of public lands administered by the Lewis and Clark National Forest. Remaining lands were administered or owned by the State of Montana, Bureau of Land Management (BLM), Nature Conservancy, or private individuals. The northern half of the study area was part of the Bob Marshall Wilderness complex.

Geology

Geological features of the study area have been described in detail by Gieseke (1937), Diess (1943), and Holdorf (1981). The East Rocky Mountain Front is composed of a series of parallel north-south extending ridges and peaks, characterized by moderate west facing slopes and abruptly sloped east faces, separated by narrow stream bottoms and canyons. Sheer limestone reefs ranging up to 250 m in height separate the foothills from the mountains. Elevations range from 1,556 meters (m) along the Teton River to 2,863 m at the summit

