



Ecology of reintroduced Rocky Mountain bighorn sheep following two transplants in the southern Madison Range, Montana
by Johnna Lynn Roy

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:

Rocky Mountain bighorn sheep were monitored from January 1988 through July 1990 during the first 2.5 years following their release into the Southern Madison Range of southwestern Montana. Specific objectives were to document survival, productivity, movements, habitat use and range establishment, and possible limiting factors of transplanted sheep. Data on remnant native sheep herds were also collected.

Two groups of sheep were transplanted from Thompson Falls and Anaconda, Montana during the winters of 1988 (19 sheep) and 1989 (23 sheep), respectively. Twenty-six sheep were radio-collared and released on 2 different historic winter ranges 16 km apart in the Hilgard Peaks. Remnant native herds were present at both release sites.

Two native ewes were darted and radio-collared in 1989.

Blood samples were within normal ranges of cell counts and serum composition for Montana bighorns, and fecal samples indicated presence of lungworm (*Protostrongylus* sp.) infection in 1988 transplants and Hilgard native sheep ($x = 327$ and 8 larvae per gram, respectively). Survival through June 1990 for the original transplanted sheep was 100% and 69% for the 1988 and 1989 release groups, respectively. The transplant population increased to 65 (55% increase) in 2.5 years. Lamb production was moderately high and mortality was low. Lamb:ewe ratios were 23:100 (1988), 67:100 (1989), and 39:100 (1990) for the 1988 transplant group and 61:100 (1989) and 47:100 (1990) for the 1989 group. Native sheep bands had slightly higher ratios over the same interval.

Both transplant groups exhibited a gradual range expansion. Seasonal migrations were characterized by an elevational drift from winter range release sites to adjacent alpine ridges. Movements from summer to winter ranges were common during the summer. Cliffs adjacent to winter ranges (within 2 km) were used for lambing. Exploratory movements up to 7 km were made mainly by rams. One 1989 transplant ewe moved 12 km after release and permanently joined the 1988 transplant band. Transplant rams remained with ewe groups throughout the year. Five distinct native sheep bands were recognized. Bands utilized the 2 common historic winter ranges, but migration and selection of high elevation summer ranges was independent.

Limiting factors identified were interspecific competition with other sympatric ungulates, and intraspecific competition for limited winter range resources.

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This thesis has been read by each member of the graduate 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

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INTRODUCTION

Rocky Mountain bighorn sheep (Ovis canadensis canadensis Shaw) are indigenous to the Madison Mountains of southwestern Montana. The Hilgard Peaks and Henrys Lake Mountains of the southern Madison Range have historically supported a small, huntable population of sheep. Buechner (1960) summarized the scant data available and reported that approximately 25 sheep were observed near Hebgen Dam in spring 1943 and 18 were counted near Moose Creek in February 1955 by the Montana Fish and Game Department. He noted the Hilgard population remained small in years prior to 1960 and suggested that summer cattle grazing of bighorn winter range could have been limiting sheep numbers.

Annual surveys conducted by the Montana Department of Fish, Wildlife and Parks (MDFWP) during 1966-1981 indicated a stable population with minimum estimates of 51-61 sheep. A December 1982 census of traditional winter ranges produced 23 bighorns, whereas 59 were counted in December 1981. By 1987, only 5 sheep were observed where more than 50 had wintered less than a decade before. Reasons for the decline are unknown, but possible contributing factors include competition with other native ungulate species and/or domestic livestock, habitat deterioration, excessive

mortality due to disease, hunting or predation, and catastrophic accident due to extreme weather (Graham Taylor, pers. comm., January 1988).

MDFWP initiated a program to restore Hilgard bighorn population levels in 1984. Agreements with landowners were obtained to increase access for hunters near traditional sheep range so that harvest of 2 potential competitors, elk (Cervus elaphus nelsoni) and mountain goats (Oreamnos americanus), could be increased. This hunting district was closed to sheep harvest in 1987.

Transplanting of bighorn sheep is a useful management tool to maintain habitat and population quality for expanding herds and to repopulate historical ranges or extend existing bighorn ranges. Introduced herds have exhibited a range of responses from failure to successful establishment (Couey and Schallenberger 1971). Wishart (1975) concluded that the weakest aspect of trapping and transplanting programs has been the monitoring and evaluation of success. A better understanding of the ecology of introduced herds should improve the ability of wildlife managers to effect successful transplants.

MDFWP transplanted 42 sheep into the southern Madison Range in January 1988 (19 sheep) and January-February 1989 (23 sheep) to augment the existing remnant native population. This project was initiated to monitor the status of the transplanted sheep during the first 2 years

following release and to investigate factors which could have caused the decline of the native Hilgard bighorns (and thus jeopardize the success of the transplants). The objectives were to (1) document survival, productivity, movements, and habitat use of transplanted sheep, (2) monitor the influence of actions implemented by MDFWP to reduce hypothesized limiting factors to Hilgard sheep, and (3) recommend management actions to insure a huntable population of bighorn sheep in the southern Madison Range. Field work was conducted January 1988 through July 1990.

STUDY AREA

Location and Physiography

The study area was located in the southern Madison Range and northern Henrys Lake Mountains of Madison and Gallatin counties in southwestern Montana. The 407 square kilometer area is approximately 30 km northwest of West Yellowstone, Montana (Figure 1). The area is bordered to the north by the Wolf Creek and Taylor Fork drainages, to the south by the Continental Divide, on the west by the Madison Valley, and by the Beaver Creek drainage to the east (Figure 2).

The Hilgard Peaks portion (290 km²) of the study area has mixed ownership. Approximately 88% is in the Taylor-Hilgard Unit of the Lee Metcalf Wilderness, administered by the Gallatin and Beaverhead National Forests. The remaining 12% is located in foothills on private (10%), state (1%), and Bureau of Land Management (1%) land. The southern portion of the study area in the Henrys Lake Mountains (117 km²) is administered by the Gallatin National Forest (Figure 2).

Lowest elevations (1890 meters above sea level) occur along the Madison River. Highest elevations occur along

