



Antelope range use, food habits, and behavior in relation to sagebrush eradication
by David Alan Roberts

A thesis submitted to the Graduate Faculty 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 a 130 square mile area, including four sagebrush control study plots, in central Montana during the summers of 1968 and 1969, to determine the influence of various sagebrush control treatments on the range use habits of antelope. Sagebrush control operations included treatment with 2,4-D as well as mechanical treatments to accomplish various degrees of sagebrush eradication. Antelope within an enclosure and free-ranging antelope were observed. This study followed a similar study in 1966 and 1967, prior to sagebrush control operations.

Vegetation measurements, which were restricted to one sagebrush control study plot, gave predictable results for vegetation changes following treatment as reported by various authors.

A total of 3,634 sightings of free-ranging antelope indicated female: male ratios of 129 and 135 females per 100 males for 1968 and 1969, respectively. The highest fawn:female ratios were 133 and 86 fawns per 100 females for these years and densities were 2.7 and 3.2 antelope per square mile.

A total of 188 sightings of 25 neck-banded antelope indicated that territorial males, bachelor herd males and females had relatively large, small, and intermediate sized home ranges, respectively.

A chi-square statistical analysis of use of vegetation types by free-ranging antelope indicated use of the grassland-abandoned meadow-timber, greasewood, and greasewood-sagebrush vegetation types was significantly less than expected, both summers, and use of shale-slope and cropland types was significantly greater. In 1968, use of sagebrush-grassland was as expected, but in 1969, it was significantly less. The sagebrush-grassland vegetation type averaged over 50 percent of the total antelope use both years. Over 75 percent of the antelope sighted on sagebrush-grassland were in common or dense sagebrush aspects.

On one sagebrush control study plot, there was an apparent increased use of the contour furrow, and a decreased use of the defer control, open control, and interseed treatment sites, when compared to pre-treatment data.

A chi-square statistical analysis of 966 observations of antelope within the enclosure indicated greater use than expected of the strip spray treatment site, and a lesser use of the partial kill and defer control treatment sites in 1968. In 1969, the strip spray site was used to a lesser extent than expected, and the defer control to a greater extent. The partial kill received approximately the expected use.

A total of 15,074 instances of plant use was recorded from the examination of 58 feeding sites on the sagebrush treatment study plots.

Big sagebrush was the most utilized plant in spring, followed by various forbs and grasses, respectively. By early summer, forbs were the most utilized, followed by browse and grasses. As the summer progressed, there was a declining use of forbs and an increasing use of browse. Within the

enclosure, the relative proportion of browse use was greater on the spray treatment sites in 1968 than in 1969.

Analysis of 13 antelope rumen samples indicated an increasing use of browse as the fall and winter progressed, until a peak was reached in early January. The major browse plant was big sagebrush. A comparison between the contents of rumen samples of free-ranging antelope and samples from antelope collected from the enclosure revealed a higher relative content of browse in the latter samples.

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Signature David Alan Roberts
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IN RELATION TO SAGEBRUSH ERADICATION

by

DAVID ALAN ROBERTS

A thesis submitted to the Graduate Faculty in partial
fulfillment of the requirements for the degree

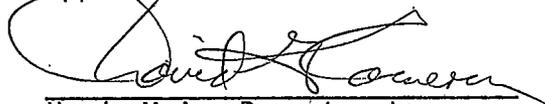
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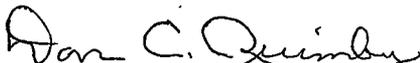
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ABSTRACT

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INTRODUCTION

Sagebrush (*Artemisia* spp.) removal or manipulation on range lands to affect better grass production for domestic use, has been a popular practice in many areas of western United States in recent years. This practice on public and private lands has often been undertaken with little or no consideration of the effects on wildlife, resulting from the changes in floral composition. To determine these effects, the Montana Fish and Game Department, in cooperation with the Bureau of Land Management initiated a 10-year project in 1965, in Petroleum County, central Montana. The ecology of pronghorn antelope (*Antilocapra americana*) was included in the overall objectives. The importance of sagebrush in the diet and range use habits of antelope in Montana, was reported by Cole (1956) and Cole and Wilkins (1958). Studies in other states and provinces showing similar relations include those of Einarsen (1948), Ferrel and Leach (1952), and Dirschl (1963). The effects of sagebrush eradication programs on sagebrush and associated vegetation was reported by several authors (Hurd 1955; Alley 1956; Blaisdell and Mueggler 1956; Hyder and Sneva 1956; Mueggler and Blaisdell 1958; and Hedrick *et al.* 1966). Results of the above studies tended to indicate that sagebrush eradication would be detrimental to the food and range use habits of pronghorn antelope. Quantitative data documenting these effects were lacking.

Results of the pre-treatment phase of the current study have been reported by Wentland (1968). The study reported herein is the initial

post-treatment phase. It was conducted on a full time basis from June 17, through September 13, 1968 and from June 11, through September 17, 1969 to quantitatively determine the influence of various sagebrush control treatments on antelope summer range use, food habits, and behavior. To facilitate comparison of data, the procedures of this study were quite similar to those of the pre-treatment phase.

DESCRIPTION OF THE STUDY AREA

The study area (Figure 1) is located roughly 50 miles east of Lewistown in central Montana. It is composed of nearly 83,597 acres (130.6 square miles) including sagebrush control study plots. Privately-owned lands comprise 57.9 percent and public lands administered by the State of Montana or the Bureau of Land Management, 42.1 percent (Wentland 1968).

The physiography of the study area has been described by Gieseke (1938) and Cole (1956). The soils have been described by Andrews *et al.* (1944) and personnel of the Soil Conservation Service (1968). Gieseke (1938), describes the climate of the area as semiarid, "... characterized by a comparatively low rainfall, great temperature extremes, a large number of sunny days, and a relatively low humidity." The mean average annual temperature at Flatwillow (U. S. Department of Commerce Weather Station), 1 mile east of the study area, is 45.4 degrees Fahrenheit. The highest temperature recorded during the field period of this study was 101 degrees in August, 1969 and the lowest was 30 degrees in September, 1969. The average annual precipitation is 12.57 inches. The summer (June-September) precipitation average is 6.74 inches. For the summers of 1968 and 1969, respectively, the precipitation was 47.6 percent and 1.8 percent above normal. The monthly climatological data for both summers are shown in Appendix, Table 15.

Cole (1956), Bayless (1969), and Wentland (1968) described the vegetation. For this study, the vegetation classification of the latter

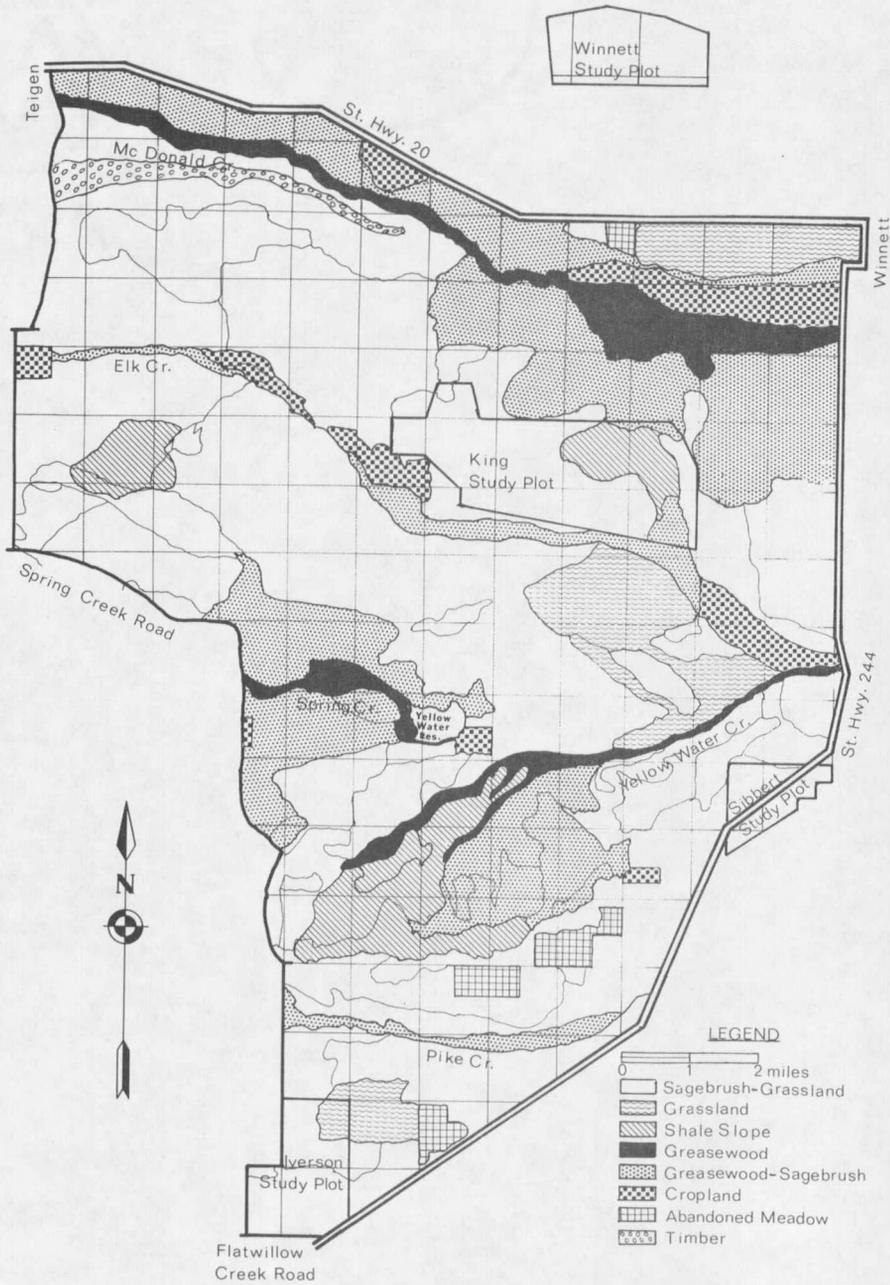


Figure 1. The study area, showing the sagebrush control study plots and the vegetation types (from Wentland).

was followed. Sagebrush-grassland comprised 59 percent of the area; greasewood-sagebrush, 22 percent; grassland, 7 percent; greasewood, 6 percent; shale-slope, 2 percent; cropland, 2 percent; abandoned meadow, 1 percent; and timber, 1 percent (Figure 1). Plant nomenclature follows that of Booth (1950), Booth and Wright (1966), and personnel of the Montana Fish and Game Department (1969).

The Winnett Study Plot is composed of approximately 1,220 acres of sagebrush-grassland including a site for total kill of sagebrush by chemical agents (Figure 2) and a site for kill of sagebrush on alternate strips. The King Study Plot is comprised of approximately 4,240 acres of sagebrush-grassland, shale-slopes, and greasewood bottoms including sites for mechanically manipulated sagebrush treatment (Figure 3) and for total kill of sagebrush by use of chemicals (Figure 4). The Sibbert Study Plot comprising nearly 910 acres of sagebrush-grassland, included a site for partial kill of sagebrush by chemicals. A portion of this study plot was burned in the 1950's. The Iverson Study Plot consisted of roughly 1,520 acres of sagebrush-grassland including a site for partial kill (Figure 5) and a site for kill of sagebrush on alternate strips by use of chemicals. Only 1,200 acres of this study plot were inclosed by a fence. The location of all study plots and treatment sites is shown in Appendix, Figure 9.

