



Baseline data on vegetation, breeding bird populations, and small mammals in relation to proposed contour furrowing in southeastern Montana  
by David Scott Goldan

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:**

This study, conducted during the summers of 1980 and 1981 in southeastern Montana, represents the pre-treatment phase of a study designed to determine the effects of contour furrowing on wildlife populations. Experimental and control plots were established on similar sagebrush-grassland habitat. Quantitative data were obtained on canopy cover of vegetation, breeding bird population densities, small mammal populations, and comparative use of the plots by sage grouse. Visual similarity of the study plots was substantiated by vegetational analysis. A general consistency was found in the species composition and relative abundance of birds and mammals between plots. A small increase in the cover of big sagebrush in 1981 was thought to be responsible for an increase in the number of Brewer's sparrow breeding pairs, but did not affect the number of vesper sparrow pairs. Changes between years in the trapping success of deer mice and 13-lined ground squirrels were inversely related to precipitation levels. The preponderance of male deer mice captured during both years may have been due to low population levels.

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Date March 26, 1982

BASELINE DATA ON VEGETATION, BREEDING BIRD POPULATIONS,  
AND SMALL MAMMALS IN RELATION TO PROPOSED CONTOUR  
FURROWING IN SOUTHEASTERN MONTANA

by

DAVID SCOTT GOLDAN

A thesis submitted in partial fulfillment  
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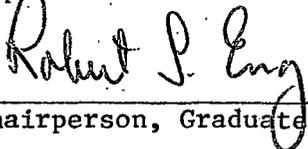
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MASTER OF SCIENCE

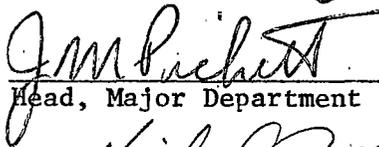
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Chairperson, Graduate Committee



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## ABSTRACT

This study, conducted during the summers of 1980 and 1981 in southeastern Montana, represents the pre-treatment phase of a study designed to determine the effects of contour furrowing on wildlife populations. Experimental and control plots were established on similar sagebrush-grassland habitat. Quantitative data were obtained on canopy cover of vegetation, breeding bird population densities, small mammal populations, and comparative use of the plots by sage grouse. Visual similarity of the study plots was substantiated by vegetational analysis. A general consistency was found in the species composition and relative abundance of birds and mammals between plots. A small increase in the cover of big sagebrush in 1981 was thought to be responsible for an increase in the number of Brewer's sparrow breeding pairs, but did not affect the number of vesper sparrow pairs. Changes between years in the trapping success of deer mice and 13-lined ground squirrels were inversely related to precipitation levels. The preponderance of male deer mice captured during both years may have been due to low population levels.

## INTRODUCTION

Mechanical treatment of relatively unproductive rangelands has been widely used in the northern Great Plains to rehabilitate these lands (Wight 1976, Wight et al. 1978, Lacey et al. 1981). One common method of mechanically altering rangelands is contour furrowing. The U. S. Bureau of Land Management (BLM) and the Soil and Water Conservation Research Division of the Agricultural Research Service began conducting research on contour furrowed lands near Ekalaka in southeastern Montana in 1967.

Casual observation by range and soil scientists suggested that changes in wildlife accompanied changes in soil characteristics and vegetation on these contour furrowed areas. Little has been published on the effects of mechanical treatment of rangeland on wildlife.

The purpose of this study was to provide baseline data on vegetation, small birds, and mammals on experimental and control plots. Alteration of the experimental plot is tentatively scheduled for 1982, after which a comparison of native and contour furrowed range will be possible. Field research was conducted from mid-June to mid-August 1980, and from early April to mid-August in 1981.

## DESCRIPTION OF STUDY AREA

The study area was located in southeastern Montana about 30 kilometers (km) south of Ekalaka. The study plots are in Section 28 of T2S, R58E, MPM, one being situated on either side of Dead Boy Creek (Figure 1). This area, administered by the BLM, consists of grazing lands and is managed under a deferred rotation grazing system.

Soils in the area are generally deep and moderately to well drained, with a thin loam surface layer and a clay or silty clay subsoil. Recent sampling by BLM soil scientists has identified soils immediately south of Dead Boy Creek as belonging to the Absher series, while those immediately north of the drainage belong to the closely allied Gerdrum series. Both soils are in the family of fine, montmorillonitic Borollic Natrargids.

The climate is arid to semiarid continental, characterized by cold, relatively dry winters and warm summers (Neff 1980). The mean annual temperature for Ekalaka, Montana is about 9 Celsius (C) with means for January and July being about -11 C and 21 C, respectively. The long term average annual precipitation is 31 centimeters (cm), however, individual year amounts may be extremely variable with 13 cm and 64 cm being the recorded minimum and maximum in this area (Neff and Wight 1981). More than half of this precipitation occurs during the months of May, June, and July. Recording gauges installed at the ARS-BLM range study site near Ekalaka in 1967 indicate that

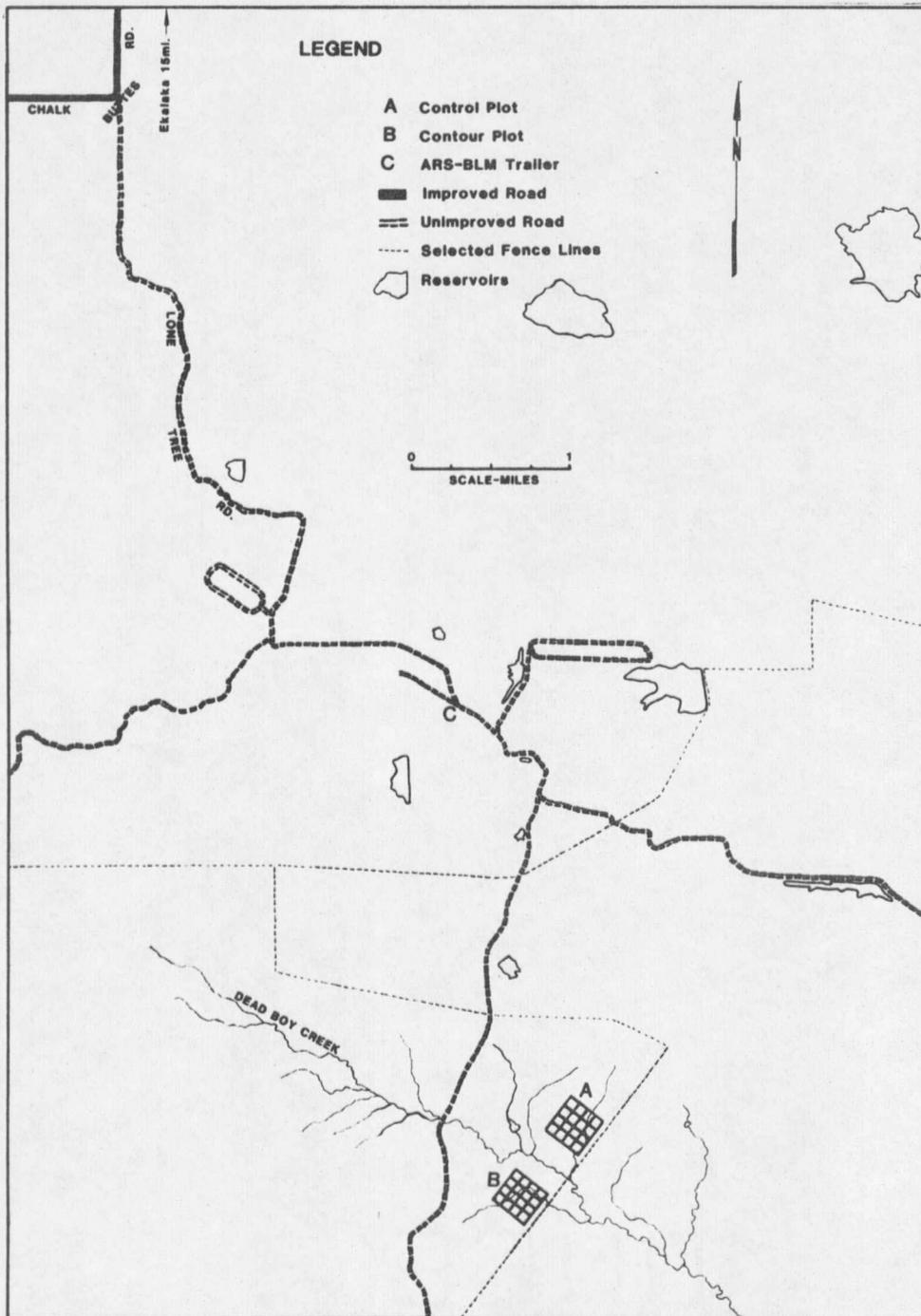


Figure 1. Map of study area.

precipitation has been somewhat lower at this site than at Ekalaka. During the period 1969-1980, average annual precipitation at Ekalaka was 44.6 cm compared to 36.8 cm at the study site.

The summer of 1980 was extremely dry. Precipitation for the period April-July was 42% of normal and the total annual precipitation was only 18.8 cm. Total precipitation in 1981 was near average levels, although July rainfall was 55% above normal.

Research conducted from 1968-1981 under the ARS-BLM cooperative agreement has provided information on flora and fauna of the area.

The ARS-BLM cooperative studies final report (Neff and Wight 1981) provides a description of vegetation and a list of plant species on the range study site near Ekalaka. A similar list of plant species was compiled by the BLM for the Ralph L. Curry allotment on which the present study plots are located.

The vegetation of the study plots is dominated by a blue grama (*Bouteloua gracilis*)-dense clubmoss (*Selaginella densa*) community interspersed with a western wheatgrass (*Agropyron smithii*)-thickspike wheatgrass (*Agropyron dasystachyum*) complex. Western and thickspike wheatgrass are almost indistinguishable in the absence of an inflorescence and are often found in close association (Hughes et al. 1973 and Yaeger et al. 1977). These grasses are considered hereafter as a single species complex. Other common grasses include prairie junegrass (*Koeleria cristata*), Sandberg bluegrass (*Poa sandbergii*), sand

dropseed (*Sporobolus cryptandrus*), and buffalograss (*Buchloe dactyloides*). The predominant shrub is big sagebrush (*Artemisia tridentata*), with Nuttall saltbush (*Atriplex nuttallii*), and broom snakeweed (*Xanthocephalum sarothrae*) also being present. Hood's phlox (*Phlox hoodii*), pricklypear cactus (*Opuntia polyacantha*), and pincushion cactus (*Mammillaria vivipara*) are the prevalent forbs. Other abundant plant species included lichens and yellow stonecrop (*Sedum stenopetalum*).

Crowston et al. (1973) described the wildlife of the Little Missouri Grasslands in southwestern North Dakota. Skaar (1975 and supplements) lists the latilong containing Carter County as containing 151 bird species. Annotated bird lists of the region have been made by Cameron (1907), Visher (1911, 1912, 1913), and Saunders (1916). Lampe et al. (1974) have described the mammals of Carter County.

## METHODS

Two 16 hectare (ha) plots were established during the spring of 1980. The plot south of Dead Boy Creek (hereafter referred to as the contour plot) was predetermined to lie within a 64 ha area to be contour furrowed by the BLM. The plot north of Dead Boy Creek (the control plot) was established in an area deemed most similar to the contour plot by visual inspection. Each plot was 400 meters (m) on a side; plots were gridded and staked at 100 m intervals.

A modification of the method described by Daubenmire (1959) was used to measure canopy cover of vegetation. A 20 x 50 cm frame was placed at 20 foot (ft) intervals along a 100 ft tape. The tape was extended in four directions at 45 degrees to each of the grid lines at the nine interior points of both plots (Figure 2). Thus, vegetation cover was estimated on each plot with 180 frames. The percent canopy cover of each plant species was recorded into one of six classes: 1 = 0-5%, 2 = 5-25%, 3 = 25-50%, 4 = 50-75%, 5 = 75-95%, and 6 = 95-100%. The midpoint of each class was used in computations.

Breeding bird pairs censuses were conducted from 18 June-4 July, 1980 and during the periods 10 May-21 May and 21 June-1 July, 1981. Censusing began about one half hour before sunrise and generally took about two hours. Only one plot was censused each day due to the distance between plots. Censuses were not conducted on days when inclement weather (rain, snow, high wind, etc.) inhibited the















































