



Sage grouse, lagomorph, and pronghorn use of a sagebrush grassland burn site on the Idaho National Engineering Laboratory  
by Robert John Gates

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:**

From May 1980 through July 1983, a study was conducted on the Idaho National Engineering Laboratory (INEL) in southeast Idaho to collect data on sage grouse (*Centrocercus urophasianus*), pygmy rabbit (*Brachylagus idahoensis*), black-tailed jack rabbit (*Lepus californicus*), and pronghorn (*Antilocapra americana*) use of a 405 ha sagebrush (*Artemisia tridentata*) grassland prescribed burn site.

Relative use of the burn site and an adjacent control area by the 4 species was determined for 2 years before and 1 year after treatment, in August 1981. Seasonal food habits of the 4 species in unburned habitat were determined. Radiotelemetry was used to determine the seasonal distribution of grouse in relation to the burn site and post-fire mortality and dispersal of pygmy rabbits.

Pellet-counts indicated no difference in use of the burn and control sites ( $P > 0.05$ ) by the 4 species prior to treatment. One year after the initial burn, relative use of the burn site by sage grouse and jack rabbits was greater ( $P < 0.05$ ) than use of the control site while pronghorn use was lower ( $P = 0.04$ ). Pygmy rabbit use did not differ ( $P = 0.59$ ) between the burn and control sites 1 year after treatment; however, there was a decreased use of burned plots.

Fecal analyses showed that sagebrush comprised  $> 70\%$  of grouse, pygmy rabbit, and pronghorn diets over the seasonal periods sampled. Grouse and pronghorn consumed increasing proportions of forbs through spring and summer, Pygmy rabbits consumed larger proportions of grasses and rabbitbrush (*Chrysothamnus* spp.) in the summer. Winterfat (*Ceratoides lanata*) was the predominant forage in the jack rabbit diet.

Grouse and pronghorn used the burn area during the fall, winter, and spring. The burn site was not critical grouse winter habitat. Desiccation of forbs in sagebrush habitats concentrated both species near irrigated cropland and lawns of INEL facilities during the summer.

The post-burn weekly mortality rate of radio-collared rabbits increased 66% after burning. Predation on dispersing and non-dispersing rabbits was the major cause of death. Sixteen unmarked rabbits were found which died during the fire. Pygmy rabbits were eliminated from a partially burned area 20 months after burning.

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MONTANA STATE UNIVERSITY  
Bozeman, Montana

December 1983

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## ACKNOWLEDGMENTS

This research was funded by the Office of Health and Environmental Research, United States Department of Energy. Assistance was provided by the Montana Agricultural Experiment Station. I wish to thank the following individuals for their advice and assistance: O. D. Markham, W. J. Arthur, B. W. Mortensen, and D. K. Halford of the Department of Energy; D. Wright and F. D. Deshon of the Idaho Department of Fish and Game; and A. E. Anderson of the Colorado Division of Wildlife. Field assistance was volunteered by H. W. Browsers, J. W. Connelly, S. T. Knick, O. D. Markham, W. J. Arthur, M. P. Stafford, L. D. Flake, J. Ensign, and R. Crete. Field assistance was also provided by the following students from the Associated Western Universities summer program: K. Grover, J. Grant, J. Bronaugh, T. Day, J. Canfield, J. Gingerich, M. Ogle, E. Hellgren, D. Koehler, B. Buls, H. Blair, and S. Kraft.

Special appreciation is due my major professor, Dr. R. L. Eng, for his assistance and support; and to J. E. Toepfer for his timely assistance and advice. I also thank my committee members, Drs. R. E. Lund and R. J. Mackie for advice; and Drs. O. D. Markham, R. L. Eng, and L. R. Irby for their critical reviews of this thesis.

I will be forever grateful to my wife, Robin, for her love, sacrifice, support, and assistance throughout this project.

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## ABSTRACT

From May 1980 through July 1983, a study was conducted on the Idaho National Engineering Laboratory (INEL) in southeast Idaho to collect data on sage grouse (Centrocercus urophasianus), pygmy rabbit (Brachylagus idahoensis), black-tailed jack rabbit (Lepus californicus), and pronghorn (Antilocapra americana) use of a 405-ha sagebrush (Artemisia tridentata) grassland prescribed burn site.

Relative use of the burn site and an adjacent control area by the 4 species was determined for 2 years before and 1 year after treatment in August 1981. Seasonal food habits of the 4 species in unburned habitat were determined. Radiotelemetry was used to determine the seasonal distribution of grouse in relation to the burn site and post-fire mortality and dispersal of pygmy rabbits.

Pellet-counts indicated no difference in use of the burn and control sites ( $P > 0.05$ ) by the 4 species prior to treatment. One year after the initial burn, relative use of the burn site by sage grouse and jack rabbits was greater ( $P < 0.05$ ) than use of the control site while pronghorn use was lower ( $P = 0.04$ ). Pygmy rabbit use did not differ ( $P = 0.59$ ) between the burn and control sites 1 year after treatment; however, there was a decreased use of burned plots.

Fecal analyses showed that sagebrush comprised  $> 70\%$  of grouse, pygmy rabbit, and pronghorn diets over the seasonal periods sampled. Grouse and pronghorn consumed increasing proportions of forbs through spring and summer. Pygmy rabbits consumed larger proportions of grasses and rabbitbrush (Chrysothamnus spp.) in the summer. Winterfat (Ceratoides lanata) was the predominant forage in the jack rabbit diet.

Grouse and pronghorn used the burn area during the fall, winter, and spring. The burn site was not critical grouse winter habitat. Desiccation of forbs in sagebrush habitats concentrated both species near irrigated cropland and lawns of INEL facilities during the summer.

The post-burn weekly mortality rate of radio-collared rabbits increased 66% after burning. Predation on dispersing and non-dispersing rabbits was the major cause of death. Sixteen unmarked rabbits were found which died during the fire. Pygmy rabbits were eliminated from a partially burned area 20 months after burning.

## INTRODUCTION

Fire has historically been an important source of disturbance in sagebrush-grass communities (Wright et al. 1979, Shinn 1980), and prescribed burning is a commonly used technique for altering rangeland vegetation (Vale 1974). In spite of the importance of fire, burning is often conducted without proper evaluation of the effects of fire on animal populations. Many post-fire studies of vertebrate populations have been conducted without prior knowledge of the abundance, distribution, and ecology of the species present on areas impacted by unplanned fires (Renwald 1977, Riggs and Peek 1980, Bock and Bock 1981, Halford 1981). Such studies necessarily rely on comparisons of burned and unburned areas. A prescribed burn provides an opportunity to make comparisons before and after fire as well as of burned and unburned areas.

The effects of fire on birds and mammals vary with the intensity, size, shape, season of the burn, and on the type of habitat burned (Bendell 1974). Late summer or fall, fires in sagebrush grasslands usually do not severely damage perennial grasses and forbs; however, sagebrush is easily killed by fire. The initial release of nutrients after fire and the elimination of sagebrush competition for moisture and nutrients enhance the growth of perennial grasses, forbs, and shrubs which are able to resprout after burning (Blaisdell 1953). Sagebrush must reinvade burned areas entirely by seed; consequently,

\*  
↓  
↑  
\*

30 years may be required for sagebrush cover to regain pre-burn levels (Harniss and Murray 1973).

Changes in the vegetal community after fire should have a long-term effect on the quality and quantity of forage and cover available to sage grouse (Centrocercus urophasianus), pronghorn (Antilocapra americana), pygmy rabbits (Brachylagus idahoensis), and black-tailed jack rabbits (Lepus californicus) which use the burn site. Quantity and quality of food are important factors which affect the population dynamics and distribution of birds and mammals (Watson and Moss 1970; Wolff 1980, Klein 1970, Keith 1974). This study addressed primarily the distribution aspect of these species' response to fire based upon the relative use of a portion of the burn site and an adjacent control area.

In May 1980, the Bureau of Land Management (BLM) and the Department of Energy (DOE) designated an area of sagebrush (Artemisia tridentata) grassland in southeast Idaho for a prescribed burn. The burn site included land withdrawn by DOE for nuclear energy research and was managed for livestock grazing by the BLM. Objectives of the burn were to increase the density of herbaceous vegetation on the burn site and to allow research to be conducted on the effects of fire on the flora and fauna of a sagebrush grassland type. This study was part of an overall research program funded by the DOE to determine the response of vegetation, insects, birds, and mammals to a prescribed burn.

Field work for the study was begun in May 1980 and was concluded in July 1983. Data were collected to provide information on seasonal use of the burn site prior to treatment and to document initial

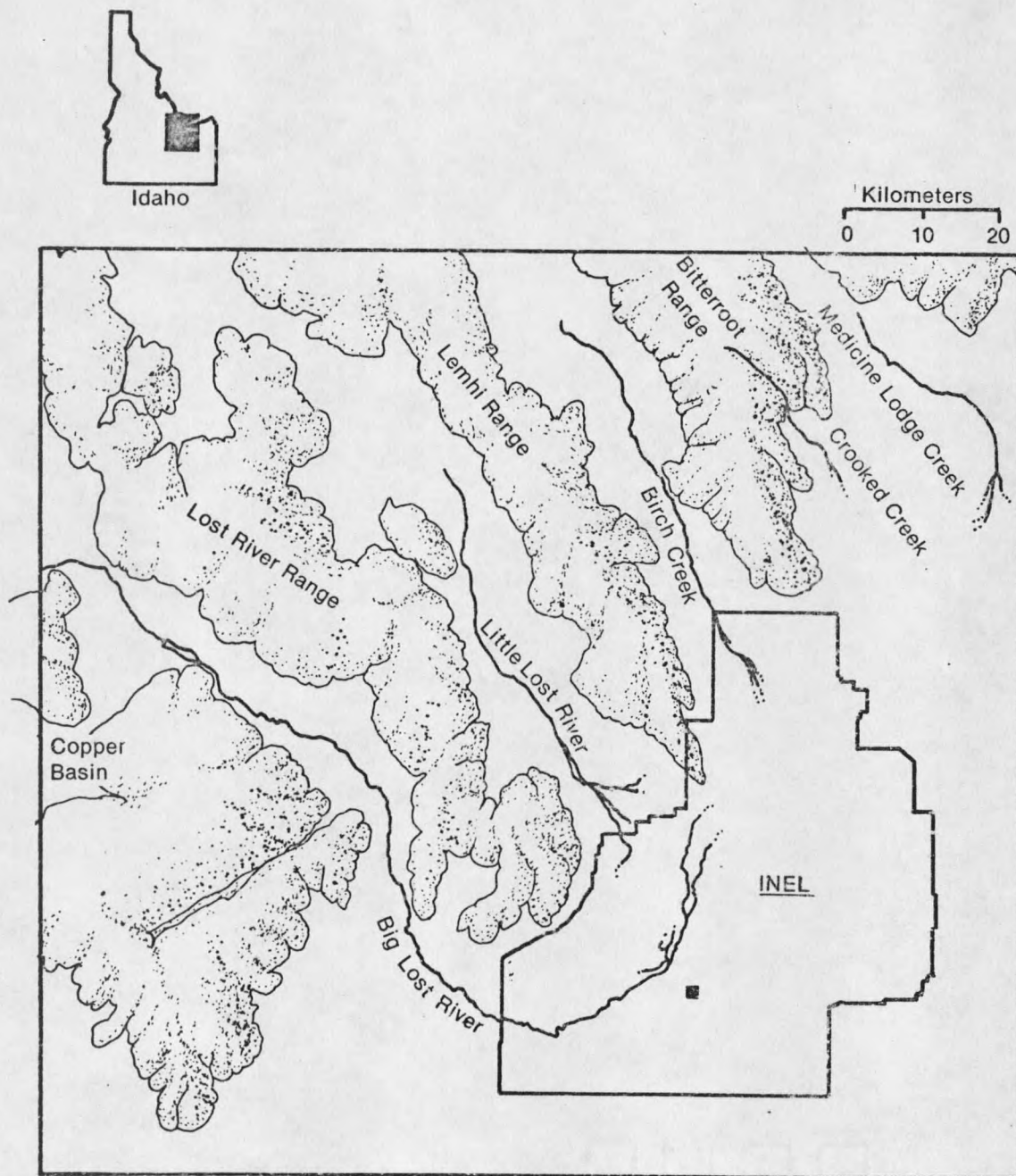


responses of sage grouse and pygmy rabbits to burning. The specific objectives of this study were: 1) to determine relative use of the burn site and a control area by sage grouse, pygmy rabbits, black-tailed jack rabbits, and pronghorn prior to and 1 year after treatment; 2) to determine the seasonal food habits of the above species in unburned habitat; 3) to document seasonal distribution and movements of sage grouse in relation to the burn site; 4) to investigate post-fire mortality and dispersal of pygmy rabbits on the burn site.

## STUDY AREA

This study was conducted on the DOE administered 2315 square kilometer ( $\text{km}^2$ ) Idaho National Engineering Laboratory (INEL). The INEL, designated a National Environmental Research Park in 1975, is located along the western edge of the upper Snake River Plain at the foothills of the Lost River, Lemhi, and Bitterroot mountain ranges (Fig. 1). Climate and vegetation are characteristic of the northern cold desert shrub biome. Winters are cold, summers are hot, and precipitation is low. Temperatures at the Central Facilities Area (CFA) range from  $-41$  Celsius (C) to  $38$ C with a mean annual temperature of  $6$ C. January is the coldest month and July is the hottest. The frost-free period averages 91 days. Annual precipitation at CFA averages 21 centimeters (cm) with 40% of the precipitation falling in April, May, and June (Fig. 2; Yanskey et al. 1966). Snowcover is variable but may persist from December through February (Fig. 3).

The burn site was a 405 hectare (ha) area located on the west-central boundary of the INEL, 10 km south of Howe, Butte County, Idaho. Most of the burn site occurred on an alluvial fan that extended east from the foothills of the Lost River Range (Fig. 4). Elevation of the burn site ranged from 1543 meters (m) at the top of the fan to 1487 m at the bottom. Floyd (1982) described the vegetal characteristics of the burn area prior to treatment. The dominant shrubs on the burn site were Wyoming big sagebrush (Artemisia tridentata



INEL-A-14 705

Fig. 1. Location of the INEL in relation to major mountain ranges and drainages in southeast Idaho.

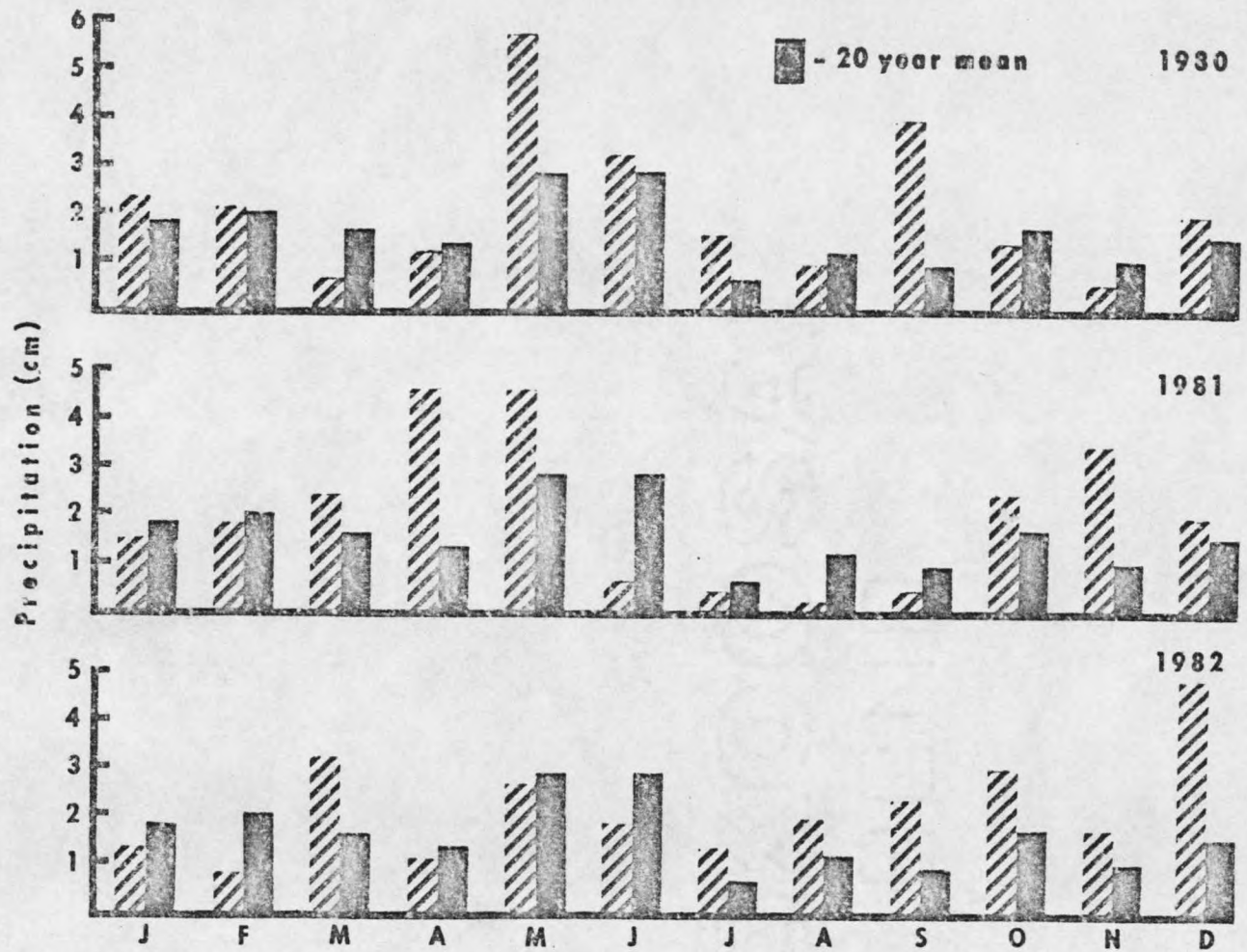


Fig. 2. Monthly precipitation at the Central Facilities Area (CFA) during 1980-82.

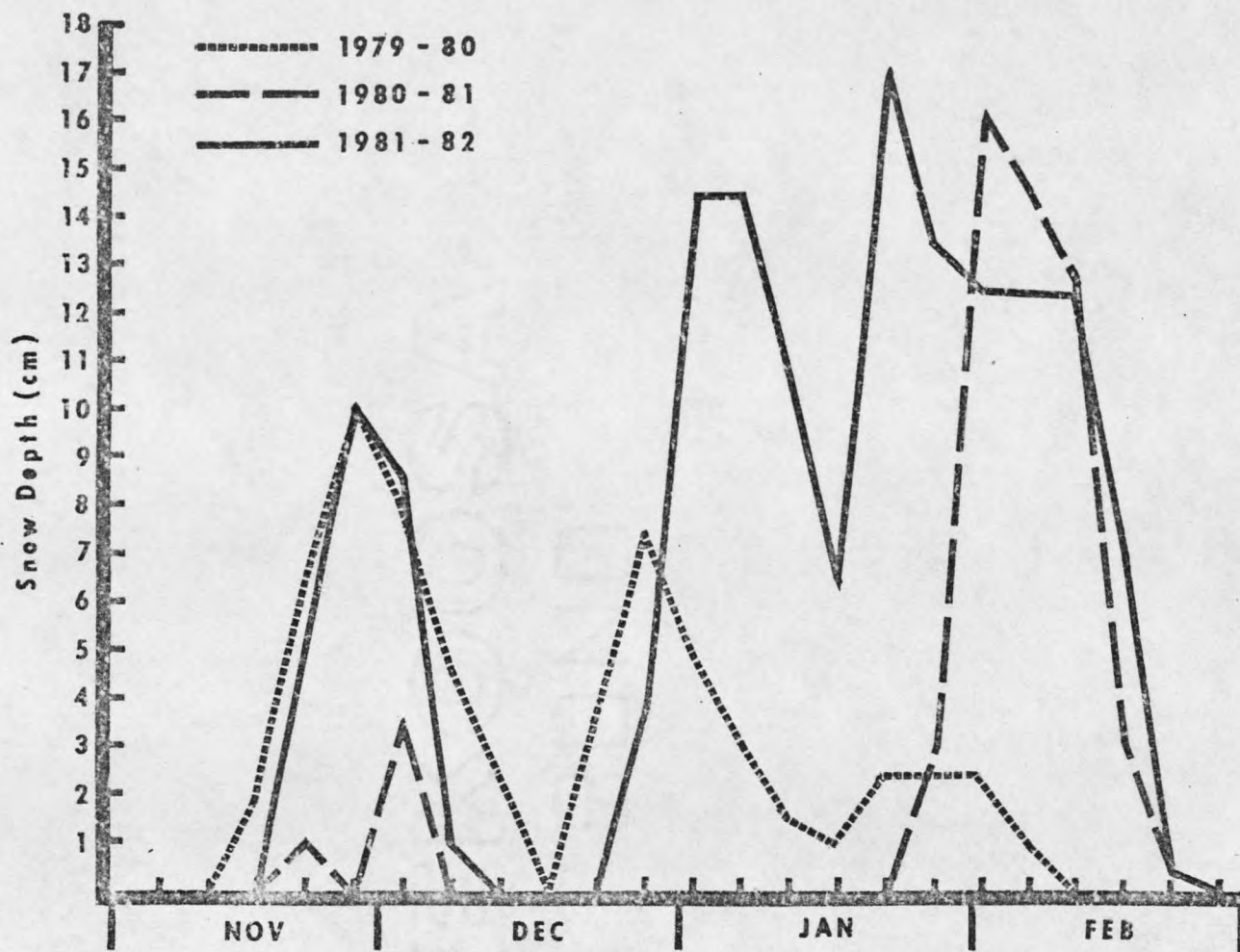


Fig. 3. Mean snowcover at CFA for 5 day intervals during November-February 1979-80, 1980-81, and 1981-82.

































































































































































































































































































