



Sharp-tailed grouse habitat use during fall and winter on the Charles M. Russell National Wildlife Refuge, Montana
by Rick Dean Northrup

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:

Sharp-tailed grouse (*Tympanuchus phasianellus*) habitat use and movements were studied during 1 autumn and 2 winter seasons on a 9,196 ha site on the Charles M. Russell National Wildlife Refuge in northeast Montana. Grouse occupied the juniper cover type exclusively during a winter of heavy snow and below normal air temperatures. The juniper, grass-shale, and shale cover types were used extensively during autumn and a winter of sparse snow cover and above normal air temperatures. Shoregrass habitat along Ft. Peck Reservoir was used for feeding during early autumn. Day roosts were confined to juniper (*Juniperus* sp.) cover. Based on shrub cover characteristics, grouse selected distinct sites during morning, midday, evening, and night. Major food items identified from fecal analysis included juniper berries and buds and composite seeds. Individual grouse movements commonly ranged beyond 1.6 km of respective dancing grounds. Shrub cover, which provides food and shelter during winter, and habitat interspersions are important components of sharptail habitat which should be protected.

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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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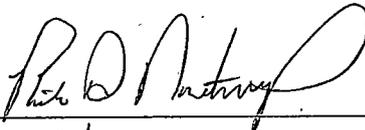
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In memory of
my father, Galen M. Northrup,
Wildlife Biologist.

VITA

Rick Dean Northrup was born June 21, 1966 in Rawlins, Wyoming, to Joann and Galen Northrup. He graduated from Brookings High School, Brookings, SD in 1984 and enrolled at South Dakota State University, Brookings, in Fisheries and Wildlife Sciences and Environmental Management. He married the former Lori M. Meidinger of Aberdeen, SD, in May 1988. He began studies toward a Masters of Science degree in Fish and Wildlife Management in August, 1988.

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ABSTRACT

Sharp-tailed grouse (*Tympanuchus phasianellus*) habitat use and movements were studied during 1 autumn and 2 winter seasons on a 9,196 ha site on the Charles M. Russell National Wildlife Refuge in northeast Montana. Grouse occupied the juniper cover type exclusively during a winter of heavy snow and below normal air temperatures. The juniper, grass-shale, and shale cover types were used extensively during autumn and a winter of sparse snow cover and above normal air temperatures. Shoregrass habitat along Ft. Peck Reservoir was used for feeding during early autumn. Day roosts were confined to juniper (*Juniperus* sp.) cover. Based on shrub cover characteristics, grouse selected distinct sites during morning, midday, evening, and night. Major food items identified from fecal analysis included juniper berries and buds and composite seeds. Individual grouse movements commonly ranged beyond 1.6 km of respective dancing grounds. Shrub cover, which provides food and shelter during winter, and habitat interspersion are important components of sharptail habitat which should be protected.

INTRODUCTION

In 1936, approximately 450,000 ha of land along the Missouri River in northeast Montana was set aside by Executive Order 7509 for "... the conservation and development of natural wildlife resources and for the protection and improvement of public grazing lands and natural forage resources..." The primary species of interest in the Executive Order were plains sharp-tailed grouse (*Tympanuchus phasianellus jamesi*) and pronghorn antelope (*Antilocapra americana*). The land eventually became the Charles M. Russell National Wildlife Refuge (CMRNWR) and was transferred to the U.S. Fish and Wildlife Service management in 1976.

This project was designed to research autumn and winter habitat use of sharp-tailed grouse on a single grazing allotment within the CMRNWR. Plains sharptails have been studied in other parts of their range. Aldrich (1963) described plains sharptail habitat as subclimax brush in grassland areas and Rocky Mountain parks. Moyles (1981) reported use of a grassland - low shrub transition zone during fall with a shift to trees and marsh during winter. Similarly, Nielsen and Yde (1981) and Swenson (1985) reported use of upland grass habitat during summer and autumn with a gradual shift to wooded draws during autumn and winter.

The primary objective of this study was to determine autumn and winter sharptail habitat by evaluating use of cover types and characterizing vegetation at grouse use sites. Secondary objectives included determining home range characteristics and feeding habits.

DESCRIPTION OF STUDY AREA

The study was conducted in northeastern Montana on the Charles M. Russell National Wildlife Refuge on Skunk Coulee grazing allotment (SCGA) approximately 13 km southwest of Fort Peck (Figure 1). The 9,196 ha SCGA generally comprised an *Agropyron-Stipa* grassland association. The southeast two-thirds of the area was dissected by 4 major coulees, and the northwest one-third comprised rolling range and numerous smaller drainages. The waterways remained dry during most of the year and water was supplied to cattle by small stock dams and the Fort Peck Reservoir which bordered the east side of the area. Cattle were grazed on SCGA in a spring and summer, 2 pasture system. The only other agricultural activity in the immediate area was limited haying; the nearest grain fields were more than 8 km distant.

Climate and Geology

The climate is continental with a wide annual temperature range. Mean monthly temperatures in January and July are -12 C and 22 C respectively. Annual precipitation averages 25-30 cm with over 50% occurring between April and July (Caprio 1980).

Two major geologic events formed the parent soil on SCGA. First, a series of "oscillating inland seas" formed the Bearpaw Shale during the Late Cretaceous Period (Veseth and Montagne 1980). This formation is characterized by easily eroding gray and black shales resulting in a

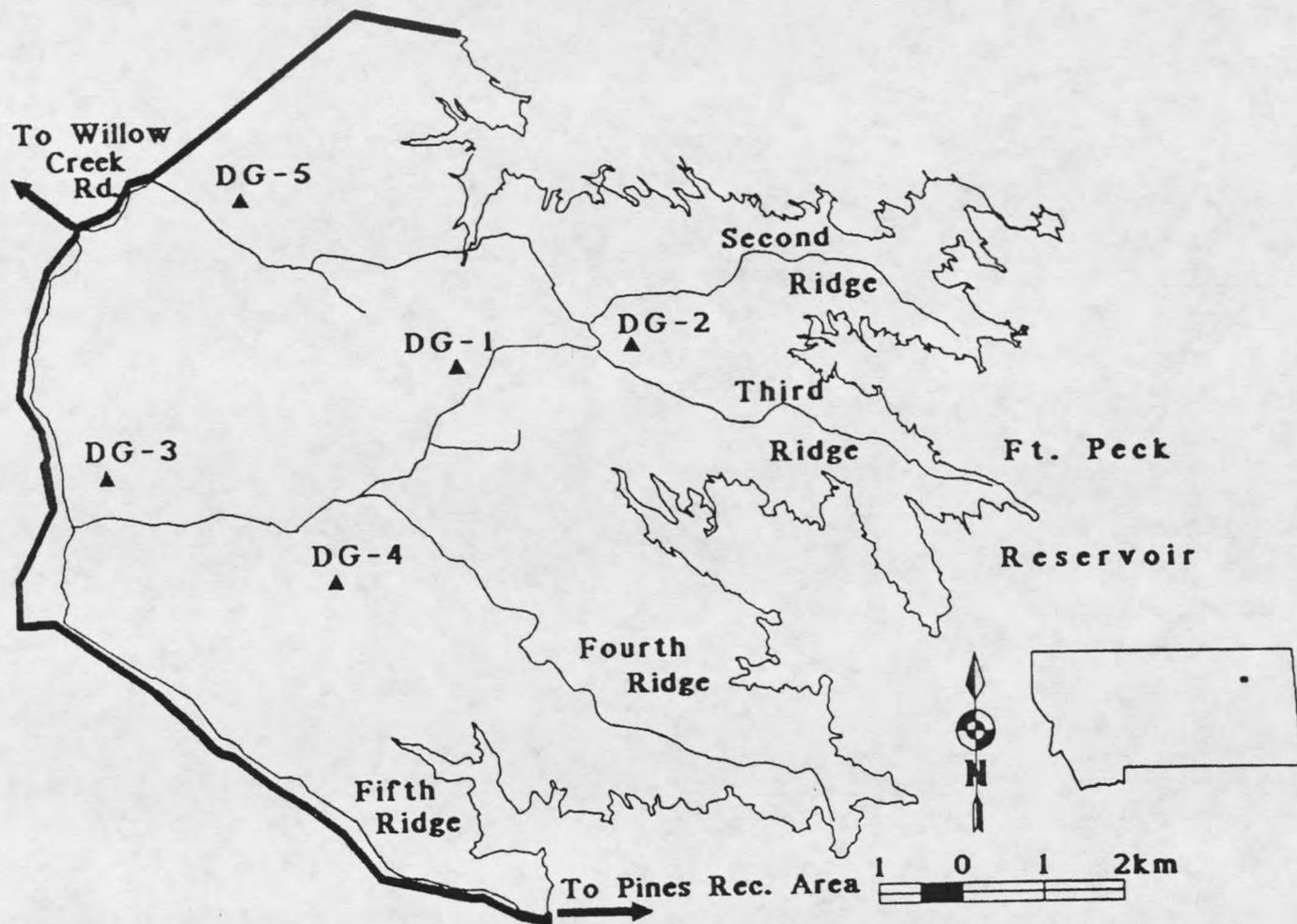


Figure 1. Skunk Coulee Grazing Allotment, Charles M. Russell National Wildlife Refuge, Valley County, MT with roads (light internal lines), land boundary (heavy line), and sharptail dancing grounds (solid triangles).

fine dendritic drainage system over most of the study area. Second, continental glaciation during the Wisconsin stage produced a till mixture at the soil surface. The soils are well drained, shallow, and clayey with a high montmorillonite content (Bingham et al. 1984).

Habitat

Eleven separate cover types were recognized on SCGA based on vegetation and topographic characteristics (Figure 2). Borders between types were often characterized by gradual changes. Vegetation cover measurements of each type are presented in Appendix Tables 13, 14, and 15. Plant scientific nomenclature follows Hitcock and Cronquist (1973).

Juniper cover type

Heavy juniper cover, mostly Rocky Mountain juniper (*J. scopulorum*), was limited to sloped sides of the 4 major coulees. A scattering of big sagebrush (*Artemisia tridentata*) and skunkbush sumac (*Rhus trilobata*) occurred among large junipers and in grassy openings. Dominant grasses and grasslike species in this type included western wheatgrass (*Agropyron smithii*), green needlegrass (*Stipa viridula*), little bluestem (*Andropogon scoparius*), and sedge (*Carex* spp.). Bluebunch wheatgrass (*Agropyron spicatum*) occurred on boundaries with grass-sage habitat.

Juniper-grass cover type

A scattering of junipers occurred in a wide draw northwest of Fourth Ridge. Although similar to the juniper type, juniper was less abundant. Big sagebrush and skunkbush sumac were also common.

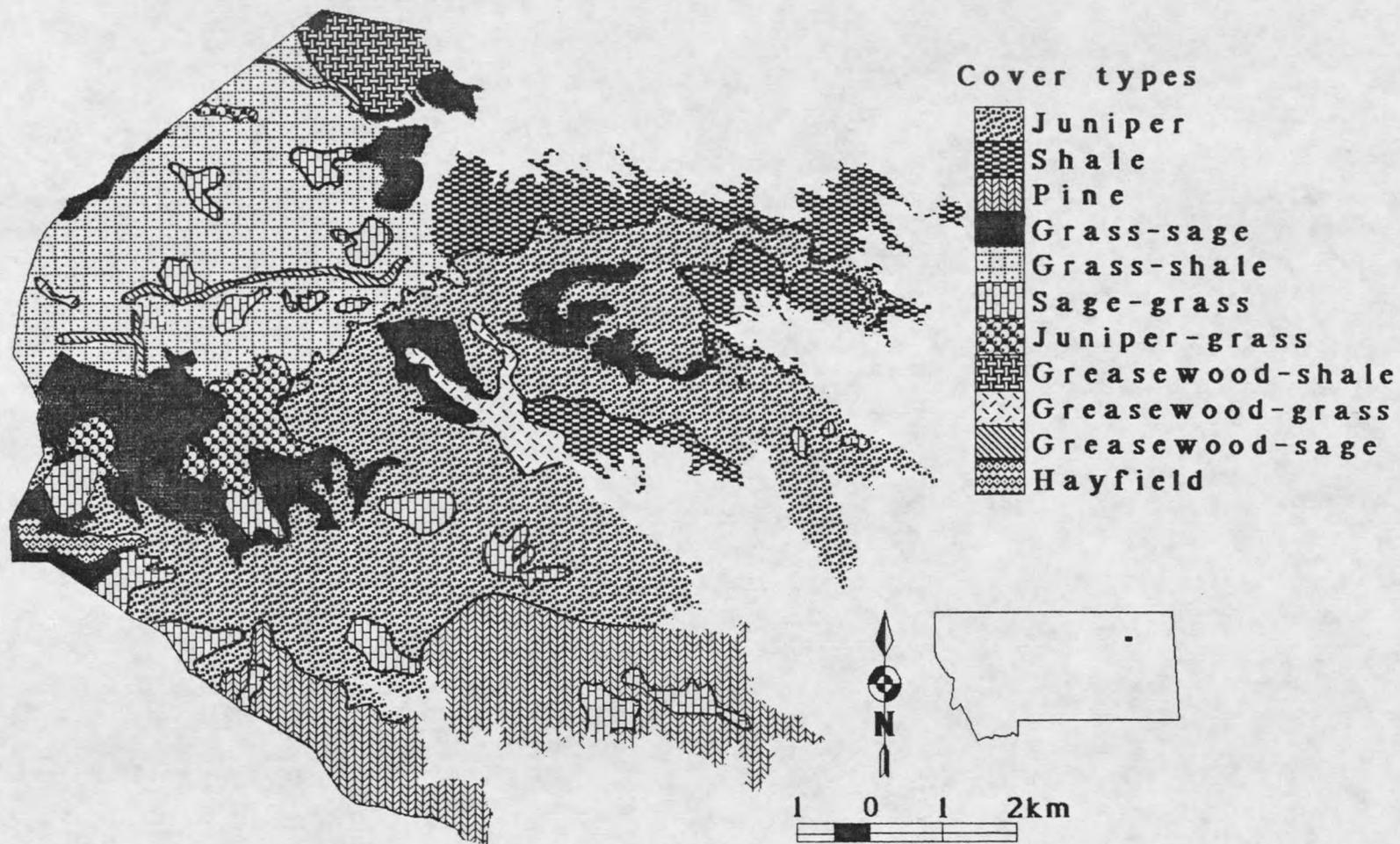


Figure 2. Distribution of 11 cover types on the Skunk Coulee Grazing Allotment, Charles M. Russell National Wildlife Refuge, Valley County, MT.

Dominant grasses included western wheatgrass, little bluestem, and green needlegrass.

Grass-sage cover type

The major ridges and a large flat separating Fifth Coulee from the northwest portion of SCGA were dominated by big sagebrush. The half-shrubs, broom snakeweed (*Gutierrezia sarothrae*) and fringed sagewort (*Artemisia frigida*) were also common. Dominant grasses were western wheatgrass and green needlegrass, followed by junegrass (*Koeleria cristata*) and blue grama (*Bouteloua gracilis*). Big sagebrush canopy coverage was moderate compared to the sage-grass type.

Sage-grass cover type

Plateaus in the northwest one-third of SCGA and slopes extending from large buttes on Fourth and Fifth Ridges were dominated almost exclusively by big sagebrush. Grasses were primarily western wheatgrass, green needlegrass, and blue grama. Narrow draws composed of the grass-shale type separated the plateaus.

Grass-shale and shale cover types

Alternating shale ridges and shallow drainages resulted in a mosaic of habitats. The grass-shale type was found in portions of the northwest one-third of SCGA. The shale type, which comprised more bare shale ridges, occurred directly above the Ft. Peck Reservoir shoreline in many parts of SCGA (Figure 2). Shrub dominance on these types correlated with topographical location. Ridges were either bare or covered with big sagebrush and grass; flats and hill sides were

dominated by a mix of big sagebrush, skunkbush sumac, and rose (*Rosa* sp.). North facing slopes were often occupied with junipers and dead buffaloberry (*Shepherdia argentea*) which apparently was killed several years earlier during a winter of extreme temperature fluctuations. Dominant grasses in both types were western wheatgrass and green needlegrass. The periphery of bare shale ridges and drainage bottoms often contained greasewood (*Sarcobatus vermiculatus*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and Sandberg's bluegrass (*Poa sandbergii*).

Shore cover type

The band of exposed land between the high and low water level of Fort Peck Reservoir varied considerably in width. Bays, with their inherent low slopes, formed broad shorelines. Shrubs were absent due to periodic flooding. Dense stands of foxtail barley (*Hordeum jubatum*) and slender wheatgrass (*Agropyron caninum*) with Canada thistle (*Cirsium arvense*), cocklebur (*Xanthium strumarium*), and yellow sweet clover (*Melilotus officianalis*) were distributed in scattered patches with greatest abundances occurring where drainages opened to the reservoir. Other areas consisted of sparse cover and bare ground.

Greasewood-grass cover type

The saline flats between Third and Fourth Ridge were dominated by greasewood, big sagebrush, and broom snakeweed. Characteristic grasses included western wheatgrass, Sandberg's bluegrass, inland saltgrass (*Distichlis stricta*), and alkali-grass (*Puccinellia nuttalliana*). Narrow drainages inhabited with junipers were included in this type.

Pine cover type

The ends of Fourth and Fifth Ridges contained ponderosa pine (*Pinus ponderosa*) forest with an understory of scattered junipers. Grass and grasslike plant cover was sparse relative to other types and consisted mainly of carex.

Greasewood-shale cover type

The rolling hill topography along the extreme northern border of SCGA supported nearly pure greasewood shrub stands inter-spaced with bare ground. Combined grass and forb cover in this type was sparse (Appendix Table 13).

Greasewood-sage cover type

Flood plains of major drainages on SCGA were dominated with dense big sagebrush and greasewood. Although this type covered only a small portion of the study area, it was distinctly different from surrounding types. Dominant grasses were western wheatgrass, Sandberg's bluegrass, and alkali grass.

METHODS

Cover Type Vegetation Analysis

The study area was mapped into 11 cover types by reconnaissance and use of 1:8000 black and white aerial photographs. Vegetation characteristics were analyzed using 3 different methods on 10 representative locations within each cover type. In the first method, a 100 m line intercept transect was used to estimate shrub canopy coverage (Canfield 1941). In the second method, grass, forb, and shrub coverage were measured using a 0.2 by 0.6 m frame (Daubenmire 1959) at 10 m intervals along the line intercept transect.

The third method measured height and visual obstruction of vegetation by use of a pole similar to that utilized by Robel et al. (1970). The height density pole (HDP), which was 2.54 cm square in cross section and 91.44 cm long, was marked and numbered at 2.54 cm intervals on each side. A 3.40 m cord with a 0.90 m sighting rod attached was tied at the top of the HDP for sighting from a standard distance and height. The highest completely obstructed increment was recorded from each side of the HDP and was qualified as either grass-forb- or shrub-obstructed. These 4 readings, which ranged from 0 (no obstruction) to 36, were also taken at 10 m intervals along the line intercept transect. Any vegetation obstruction exceeding 0 was considered 1 "hit."

