Summer movements and habitat use by sage grouse broods in central Montana
by Richard Orville Wallestad

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

Abstract:
The habitat requirements and movements of sage grouse (Centrocercus urophasianus) broods were studied with the aid of radio-telemetry in central Montana during the summers of 1968 and 1969. Five hundred and eighty locations were obtained on 18 radio-marked sage grouse. The vegetation at brood sites was analyzed periodically throughout both summers. Visual estimates of sagebrush (Artemisia tridentata) density were obtained for all locations of radio-equipped broods. Throughout both summers sagebrush in scattered (1-10 percent) and common (10-25 percent) densities received the greatest utilization by broods. Sagebrush heights of 6 to 18 inches were the most prevalent heights at brood sites. For the 2 years combined, sagebrush canopy coverage averaged 14 percent for June, 12 percent for July, 10 percent for August and 21 percent for September. Broods utilized sagebrush-grassland benches early in the summer (June and July) and shifted to greasewood (Sarcobatus vernriculatus) bottoms and/or alfalfa (Medicago sativa) fields as the forbs on the higher elevations became desiccated. They remained in these bottom types until late August and early September at which time they shifted back into sagebrush types. Sizes of areas used by broods averaged 213 acres for sagebrush types in early summer (June and July), 144 acres for alfalfa fields, 91 acres for greasewood bottoms and 128 acres for sagebrush types in late summer (August and September). Brood ranges can be quite small, occurring within one vegetational type or quite extensive covering movements through Several vegetational types. In this area it appeared that the availability of food was the factor which determined the vegetational types utilized by broods during different periods of the summer.

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Date March 2, 1970

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by 1141

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ABSTRACT

The habitat requirements and movements of sage grouse (*Centrocercus urophasianus*) broods were studied with the aid of radio-telemetry in central Montana during the summers of 1968 and 1969. Five hundred and eighty locations were obtained on 18 radio-marked sage grouse. The vegetation at brood sites was analyzed periodically throughout both summers. Visual estimates of sagebrush (*Artemisia tridentata*) density were obtained for all locations of radio-equipped broods. Throughout both summers sagebrush in scattered (1-10 percent) and common (10-25 percent) densities received the greatest utilization by broods. Sagebrush heights of 6 to 18 inches were the most prevalent heights at brood sites. For the 2 years combined, sagebrush canopy coverage averaged 14 percent for June, 12 percent for July, 10 percent for August and 21 percent for September. Broods utilized sagebrush-grassland benches early in the summer (June and July) and shifted to greasewood (*Sarcobatus vermiculatus*) bottoms and/or alfalfa (*Medicago sativa*) fields as the forbs on the higher elevations became desiccated. They remained in these bottom types until late August and early September at which time they shifted back into sagebrush types. Sizes of areas used by broods averaged 213 acres for sagebrush types in early summer (June and July), 144 acres for alfalfa fields, 91 acres for greasewood bottoms and 128 acres for sagebrush types in late summer (August and September). Brood ranges can be quite small, occurring within one vegetational type or quite extensive covering movements through several vegetational types. In this area it appeared that the availability of food was the factor which determined the vegetational types utilized by broods during different periods of the summer.

INTRODUCTION

Manipulation of sagebrush (*Artemisia* spp.) stands in many areas of the west, for the purpose of increasing the volume of grasses for livestock, has been the goal of many range managers for the past 30 years. In 1965 the Montana Fish and Game Department in cooperation with the United States Department of the Interior, Bureau of Land Management, initiated a 10-year study to determine the ecological effects of sagebrush removal on certain game species.

As part of this project, I studied the habitat requirements and movements of sage grouse (*Centrocercus urophasianus*) broods with the aid of radio-telemetry during the summers of 1968 and 1969. The study was conducted in central Montana on a non-migratory population of sage grouse.

Previous studies of sage grouse brood habitat have indicated a heavy use of sagebrush types early in the summer with mid-summer movements to more mesic sites, such as creek bottoms and mountain meadows (Batterson and Morse 1948, Patterson 1952, Dalke *et al.* 1963, Klebenow 1969, and Peterson 1970). Despite the amount of work that has been done on sage grouse brood movements and habitat requirements, quantitative data are lacking.

DESCRIPTION OF AREA

This study was conducted in the Yellow Water Triangle Area in Petroleum County, Montana (Figure 1). Gieseker (1938) describes the physiography of the area as consisting chiefly of high, broken, shaly ridges sloping east and grading into rolling clay hills with some gravel on the surface. The stream valleys are chiefly alkali flats, locally bordered by barren, shaly slopes.

The climate was described by Gieseker (1938) as being semi-arid, characterized by low rainfall, great temperature extremes, a large number of sunny days and a relatively low humidity. The average summer precipitation at Flatwillow (U. S. Department of Commerce Weather Station), located on the eastern edge of the study area, is 6.74 inches. Average summer temperature for the area is 65.4 degrees F. The summers of 1968 and 1969 were characterized by above average rainfall (3.21 inches and .12 inches, respectively) and below average temperatures.

The vegetation on the higher elevations is dominated by a sagebrush-grassland community. Predominant shrubs include big sagebrush (*Artemisia tridentata*) and broom snakeweed (*Gutierrezia sarothrae*). Common grasses include several species of wheatgrass (*Agropyron* spp.), green needlegrass (*Stipa viridula*), needle-and-thread (*Stipa comata*), blue grama (*Bouteloua gracilis*) and Junegrass (*Koleria cristata*). The major forbs include fringed sagewort (*Artemisia frigida*), common dandelion (*Taraxicum officinale*), yarrow (*Achillea millefolium*), American vetch (*Vicia americana*) and plains pricklypear (*Opuntia polycantha*).

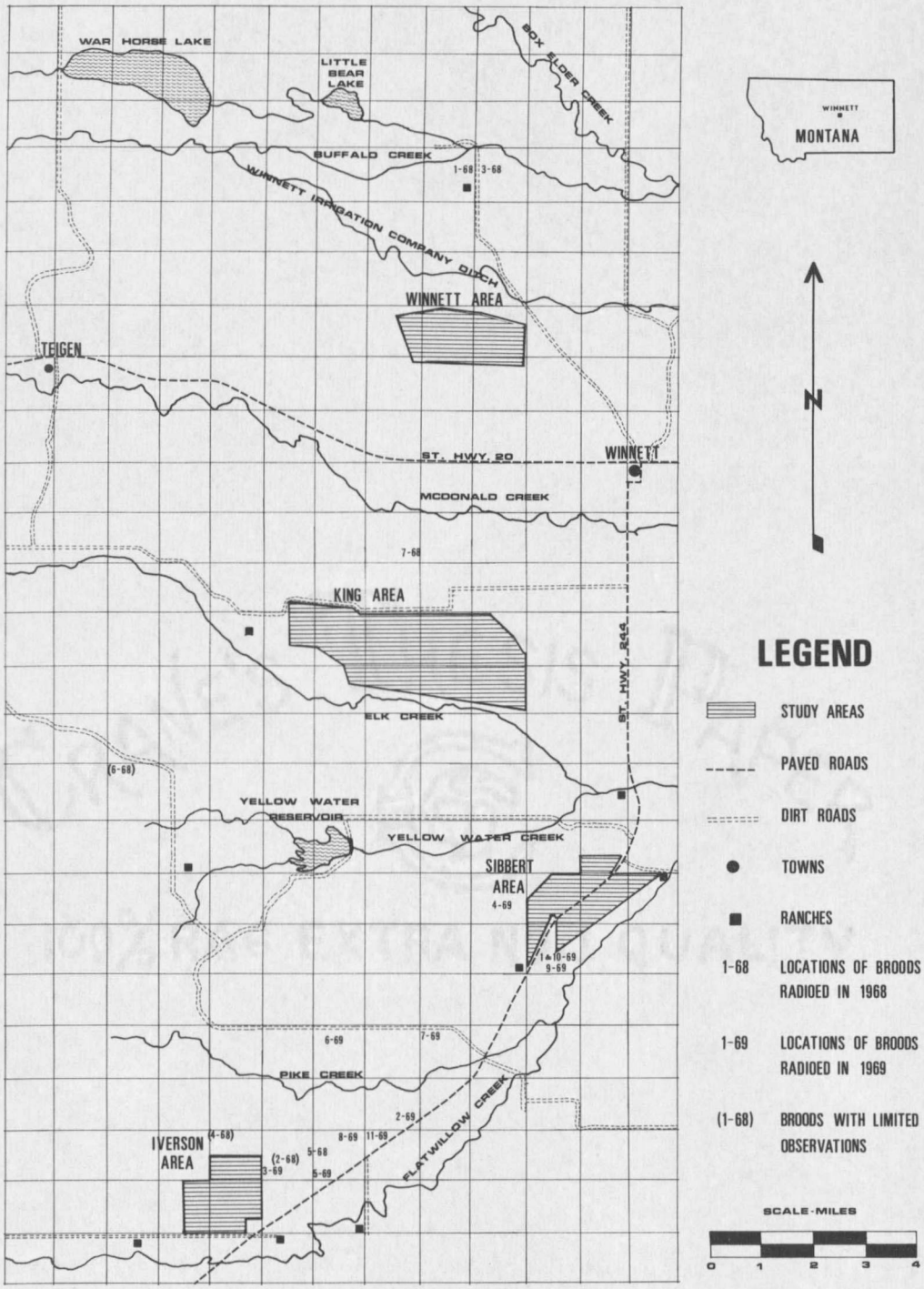

Figure 1. Area of study showing the general locations of radioed sage grouse broods in the summers of 1968 and 1969.

The vegetation on bottomlands and creek bottoms is dominated by shrubs such as big sagebrush, silver sagebrush (*Artemisia cana*) and greasewood (*Sarcobatus vermiculatus*). Major forbs include common dandelion, common salsify (*Tragopogon dubius*) and curlcup gumweed (*Grindelia squarrosa*). Dominant grasses are the wheatgrasses, brome (*Bromus* spp.) and desert saltgrass (*Distichlis stricta*).

Alfalfa (*Medicago sativa*) and to a lesser extent barley (*Hordeum distichum*) are the two major agricultural crops produced in the area. The basic economy in the area is livestock grazing.

METHODS

In early summer, female sage grouse with broods were captured with a long-handled net similar to the one used by Mussehl (1960). Hens were lured within effective range of the net by imitating the distress call of a chick. Later in the summer, when the hen would no longer respond to chick calls, broods were herded with a vehicle into a drive net consisting of a 4' x 6' x 4' wire mesh cage and two, 100-foot, net wings.

Captured birds were leg-banded with numbered aluminum bands, neck-tagged for visual observation (Pyrah 1963), and equipped with radio transmitters (Figure 2). The stage of molt of the outer primaries was used as the criterion in separating adult (2+) hens from yearling hens (Petrides 1942, Patterson 1952). Chicks were assigned to a weekly age class (Eng 1955, Pyrah 1963) and wing-tagged with numbered metal clips. Radio equipment and harnessing techniques used were similar to those described by Marshall and Kupa (1963). Transmitters and portable receivers were designed and constructed by Sidney Markusen, Cloquet, Minnesota. Portable receivers were used both with a hand-held directional antenna or a vehicle-mounted directional antenna. The receiver was equipped with 12 channels which operate at discrete frequencies in the range of 150-151 megacycles.

Broods were located twice each day when practicable. Locations in 1969 were made using a vehicle-mounted antenna to minimize disturbance of birds. In locating a radio-equipped hen the receiver was set on the proper channel and tuned. The antenna was then swung in an arc and the