



Ecology of white-tailed deer and mule deer in agricultural lands in the Gallatin Valley, Montana
by Kathryn Susan OConner

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:

Home range patterns, habitat use and social organization of Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) and white-tailed deer (*O. virginianus*) in the Gallatin Valley, Montana, were studied during 1983-1984 via aerial surveys and telemetry relocation sessions on radio-collared and color-collared does. Relocations of deer made during an earlier, 1981-1982 study were also used in home range and association analyses. Six radio-collared white-tailed does were followed for 3-1/2 years and six radio-collared white-tailed does and four radio-collared mule deer does were followed for 2-1/2 years during the two studies. With one exception, all color-collared does seen in the second and third years after trapping were related to radio-collared does. Related adult does were seen together in fall, winter, and spring, but not in summer.

One doe, 1 doe-1 fawn, 1 doe-2 fawns, and 2 does were the most common social groups seen in all seasons for both species. Buck-doe groups were seen only in late summer and fall. Mean group size increased from summer to late -winter. Agricultural practices appeared to affect habitat use of mule deer and white-tailed deer. Fields not rotated/plowed yearly (alfalfa and pasture) were used most frequently in summer. Grainfields were used more often in fall and winter. Fields not plowed in spring (alfalfa, pasture and winter wheat) were used most frequently in spring. Summer fallow was avoided in all seasons.

Mule deer preferred mixed brush in summer and fall, but used it and tree cover with brush equally in winter and spring. White-tailed deer habitat selection varied with location in the valley, but tree cover with brush was preferred over mixed brush overall. Deer bedded in brush patches near preferred crops and not near crops they avoided. Mule deer summer ranges were significantly smaller than other seasonal ranges. White-tailed deer spring and fall ranges were significantly larger. All individuals showed high fidelity to a general area, but many moved short distances (0.8 - 1.6 km) to new seasonal ranges between years. Thirty percent of the summer home ranges were altered, while changes of other seasonal ranges were < 10%. Deer may have established new summer ranges in response to changing habitat availability, caused by rotation of fields.

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APPROVAL

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Kathryn Susan O'Connor

This thesis has been read by each member of the thesis committee and has been found to be satisfactory regarding content, English usage, citations, bibliographic style, and consistency and is ready for submission to the College of Graduate Studies.

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ABSTRACT

Home range patterns, habitat use and social organization of Rocky Mountain mule deer (Odocoileus hemionus hemionus) and white-tailed deer (O. virginianus) in the Gallatin Valley, Montana, were studied during 1983-1984 via aerial surveys and telemetry relocation sessions on radio-collared and color-collared does. Relocations of deer made during an earlier, 1981-1982 study were also used in home range and association analyses. Six radio-collared white-tailed does were followed for 3-1/2 years and six radio-collared white-tailed does and four radio-collared mule deer does were followed for 2-1/2 years during the two studies. With one exception, all color-collared does seen in the second and third years after trapping were related to radio-collared does. Related adult does were seen together in fall, winter, and spring, but not in summer. One doe, 1 doe-1 fawn, 1 doe-2 fawns, and 2 does were the most common social groups seen in all seasons for both species. Buck-doe groups were seen only in late summer and fall. Mean group size increased from summer to late winter. Agricultural practices appeared to affect habitat use of mule deer and white-tailed deer. Fields not rotated/plowed yearly (alfalfa and pasture) were used most frequently in summer. Grainfields were used more often in fall and winter. Fields not plowed in spring (alfalfa, pasture and winter wheat) were used most frequently in spring. Summer fallow was avoided in all seasons. Mule deer preferred mixed brush in summer and fall, but used it and tree cover with brush equally in winter and spring. White-tailed deer habitat selection varied with location in the valley, but tree cover with brush was preferred over mixed brush overall. Deer bedded in brush patches near preferred crops and not near crops they avoided. Mule deer summer ranges were significantly smaller than other seasonal ranges. White-tailed deer spring and fall ranges were significantly larger. All individuals showed high fidelity to a general area, but many moved short distances (0.8 - 1.6 km) to new seasonal ranges between years. Thirty percent of the summer home ranges were altered, while changes of other seasonal ranges were < 10%. Deer may have established new summer ranges in response to changing habitat availability, caused by rotation of fields.

INTRODUCTION

Sympatry between Rocky Mountain mule deer (Odocoileus hemionus hemionus) and white-tailed deer (O. virginianus) has been reported in prairie (Dusek 1975, Severson and Carter 1978, Swenson et. al. 1983, and Wood 1987) and forest (Allen 1968, Kamps 1969, Kramer 1973, and Hudson et. al. 1976) habitats. Most studies found white-tailed deer distributions to be concentrated on floodplain agricultural lands within these habitats, which received only limited use by mule deer. Actual range overlap was limited as a result of differing habitat preferences (Swenson et. al. 1983). Few observers have documented year-round use by mule deer of agricultural lands and developed areas (Happe 1983, Ball, pers. comm.), while use of these areas by white-tailed deer is common (Martinka 1968).

A study in the Gallatin Valley, Montana, during 1981-1982 (Vogel 1983) located a small mule deer herd resident to agricultural land. This herd was surrounded by a white-tailed deer population, and separated from other mule deer populations in adjacent mountain-foothill habitat. Observations were made on distribution, population dynamics, activity and food habits of valley white-tailed deer and mule deer.

My study continued observations on these two species

in the Gallatin Valley during 1983-1984. Objectives were to assess possible differences between mule deer and white-tailed deer in seasonal and yearly home range patterns, habitat use, and social organization, to complement the previous study. The analysis incorporated applicable data from the 1981-1982 study.

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DESCRIPTION OF STUDY AREA

Geography

The Gallatin Valley (Fig. 1) is an intermontane basin covering over 1,000 square kilometers in southwest Montana (DeYoung and Smith 1931, Hackett et. al. 1960, Vogel 1983). It is bounded on the south by the Gallatin Range and its foothills, on the northeast by the Bridger Range and foothills, and on the north and west by the Horseshoe Hills and Camp Creek Hills, respectively. The valley slopes from an elevation of 2,000 m in the southern and eastern foothills to under 1,300 m near the northwest outlet for the Gallatin River, the major drainage stream. The western branch of the river flows north from its canyon outlet along the western portion of the valley, while the eastern branch and its tributaries drain the central and eastern majority. Soils are mostly brown and light-brown sandy loams, of alluvial and eolian nature.

Five portions of the valley were selected for the study:

Reese Creek: rolling benchlands between the Bridger Range and Horseshoe Hills, which are drained by North Cottonwood, Bear and Reese Creeks.

Pine Butte: the Camp Creek Hills in the vicinity of Pine Butte, west of Bozeman.

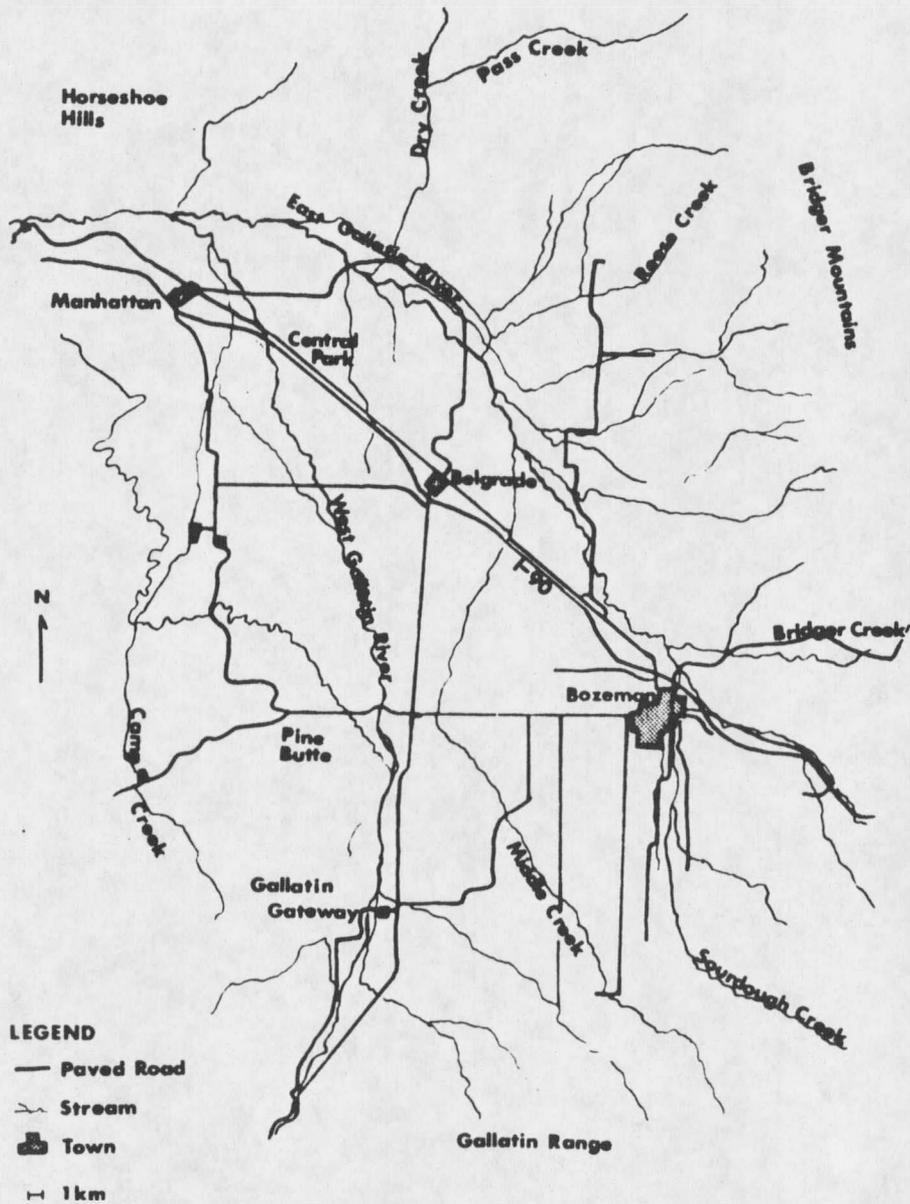


Figure 1. A map of the Gallatin Valley, Montana (Vogel 1983).

Sourdough: agricultural lands and foothills adjacent to Sourdough Creek, south of Bozeman.

Valley Center: flat agricultural lands around Hyalite Creek southeast of Belgrade.

Penwell Bridge: flat agricultural lands surrounding the East Gallatin River northeast of Belgrade.

Climate

The Gallatin Valley climate is montane-continental; temperatures during the short summers rarely reach 32 C, while winter temperatures commonly drop below -18 C. Killing frosts occur in any month. The average frost-free period in Bozeman is 114 days. Pacific fronts bring warm "chinook" winds, with resulting snowmelt, during all winter months, but typically in January and February. Proximity of the mountains results in greater precipitation in the eastern and southern portions of the valley than elsewhere. The average annual precipitation at Bozeman is 46.6 cm; the 11 year (1971-1982) mean winter snowfall was 223 cm (Pac et. al. 1982).

Winter 1980-1981 was characterized by low snowfall and above average temperatures; only one winter since 1971-1972 was milder (Pac et. al. 1984). Winter 1981-1982 had normal temperatures and above average snowfall, while the converse was true of winter 1982-1983. Winter 1983-1984 was the third most severe since 1971-1972, due to a 3-week period in December of -40 C temperatures. This was followed by

mild temperatures in late January through late February, and above average snowfall in March through May. However, only winter 1980-1981 fell outside the biometeorological normal.

Vegetation and Agricultural Practices

Vegetation in the valley is an interspersion of agricultural fields and pasture, with woody vegetation along stream courses. Ranches, farms and dairies are common. Roughly half of the fields are irrigated. Plant nomenclature is according to Hitchcock and Cronquist (1981). Habitat classes were adapted from Vogel (1983).

Lands undisturbed by agricultural practices were placed in the following habitat classes:

Cottonwood: A canopy of cottonwood (Populus trichocarpa) with little or no brushy understory occurred along banks of major rivers and streams.

Mixed brush: A layer of brush without overstory trees, bordering streams and ditches, contained shrubs such as willow (Salix spp.), serviceberry (Amelanchier sp.), dogwood (Cornus sp.), hawthorn (Crataegus sp.), chokecherry (Prunus sp.), current (Ribes spp.), and snowberry (Symphoricarpos sp.). It sometimes had grasses such as basin wildrye (Elymus cinereus) and reed canary grass (Phalaris arundinacea) associated with it.

Deciduous forest: A structural and vegetative combination of the Cottonwood, Aspen, and Mixed brush types occurred along rivers and larger streams, and on slopes immediately below the Conifer forest type.

Willow: Pure stands of willow (Salix spp.) grew in low-lying wet areas, and along rivers and streams.

Marsh: Plants such as cattails (Typha spp.), rushes (Juncus spp.) and sedges (Carex spp.) occupied low-lying wet areas.

Aspen: Aspen (Populus tremuloides) was found along some smaller streams and wet areas, and in the mountains.

Linear herbaceous: The uncut herbaceous vegetation along fences, irrigation ditches and railroad rights-of-way had a variable composition of species from the Pasture, Grass hay, Alfalfa and Small grain types.

Riparian: Riparian areas were bodies of water and adjacent areas such as gravel bars.

Most of the valley acreage was devoted to agricultural uses. Farmers and ranchers' activities were nearly synchronous over 2- to 3-week periods. The following agricultural habitat classes were identified:

Small grain: Winter wheat and spring wheat (Triticum aestivum) and barley (Hordeum vulgare) were common; oats (Avena sativa) and rye (Secale cereale) were uncommon. Spring planting occurred in late April to early May, spring wheat preceding barley. Winter wheat was planted in September. Grains were cut in September; a field might be plowed at this time rather than the spring, but winter fallow was the common practice. Occasionally winter wheat was cut for hay. Cattle were observed grazing in harvested fields in the fall.

Alfalfa: Alfalfa (Medicago sativa or M. falcata) with orchard grass (Dactylis glomerata) and brome grass (Bromus spp.) was usually irrigated or subirrigated. Hay was cut in June and August; a third cutting might be made in the fall. The first cutting contained a mixture of alfalfa and grasses, but the second crop was exclusively alfalfa.

Grass hay: Orchard grass and brome grass, without an accompanying legume, was often used as cattle pasture for part of the season and cut only once.

