



Summer habitat use of white-tailed deer on the Tally Lake Ranger District, Flathead National Forest  
by John Thomas Morgan

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in  
Biological Sciences

Montana State University

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Abstract:

Summer habitat relationships of white-tailed deer (*Odocoileus virginianus*) were studied on the Tally Lake Ranger District of the Flathead National Forest in northwestern Montana during 1989-1991. Macro-habitat selection patterns were analyzed using 2,009 relocations of radio-collared deer obtained through aerial surveys while deer occupied summer ranges. An additional 463 relocations provided information on migration routes and accessory areas. Micro-habitat selection was investigated in the Star Meadows and Corduroy Creek complexes through 18 diel telemetry sessions and a remote camera survey in Corduroy Creek. The geographic information system programs ERDAS and EPPL7 were used to create 8 habitat component data layers including: slope, aspect, elevation, vegetation, riparian areas, and roads (all, open, and closed).

Deer habitat selection at the macro-level appeared to be influenced by locations of second and third order streams and associated riparian meadow complexes. Deer initially selected sites close to riparian habitat, between 1,159 and 1,524 m, containing naturally occurring grass/forb and shrub/hardwood vegetation. Later in the season deer preferences shifted to slightly higher elevations containing more open and closed pole/immature timber. In general, early serai and mature vegetation were avoided. Roads appeared to play little role in whitetail habitat selection except for an avoidance of sites within 100 m of a road. Aspect and slope also had little impact on habitat selection. Deer habitat selection at the micro-level was less specific. Once deer selected their summer home range, use of individual habitat variables within this area apparently was less important.

Forest management on the Tally Lake District should aim to preserve riparian complexes, including mesic bottomlands and associated upland pole/immature timber within 750 m of riparian sites. Cutting units occurring above 1,646 m or below 1,159 m and/or on westerly to northerly aspects would have less impact on deer. Stands should be allowed to return to the pole/immature stage before adjacent cuts are made.

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John Thomas Morgan

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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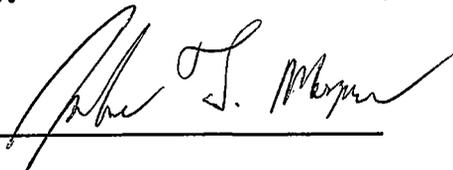
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## ABSTRACT

Summer habitat relationships of white-tailed deer (*Odocoileus virginianus*) were studied on the Tally Lake Ranger District of the Flathead National Forest in northwestern Montana during 1989-1991. Macro-habitat selection patterns were analyzed using 2,009 relocations of radio-collared deer obtained through aerial surveys while deer occupied summer ranges. An additional 463 relocations provided information on migration routes and accessory areas. Micro-habitat selection was investigated in the Star Meadows and Corduroy Creek complexes through 18 diel telemetry sessions and a remote camera survey in Corduroy Creek. The geographic information system programs ERDAS and EPPL7 were used to create 8 habitat component data layers including: slope, aspect, elevation, vegetation, riparian areas, and roads (all, open, and closed).

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Forest management on the Tally Lake District should aim to preserve riparian complexes, including mesic bottomlands and associated upland pole/immature timber within 750 m of riparian sites. Cutting units occurring above 1,646 m or below 1,159 m and/or on westerly to northerly aspects would have less impact on deer. Stands should be allowed to return to the pole/immature stage before adjacent cuts are made.

## INTRODUCTION

White-tailed deer (Odocoileus virginianus) are the most widely distributed and abundant of North American big game mammals (Smith and Coggin 1984). Their ability to exist in a diversity of habitats, under a variety of conditions, and in the presence of humans has allowed whitetail populations to expand and occupy much of North America. Whitetails also are one of the most studied wildlife species in the country as indicated by the numerous texts, monographs, and journal articles on the species (Halls 1984).

Despite this abundance of information, knowledge of whitetail ecology and requirements in specific habitats is often lacking. A widely applicable and generally acceptable framework of knowledge and understanding of habitat relationships has yet to be developed. Thus, Caughley (1980), claimed white-tailed deer were one of the most studied and least understood of all animals.

In Montana, whitetail populations are distributed throughout the mountains and plains in a variety of habitats (Allen 1971). The Dakota subspecies (Odocoileus virginianus dacotensis), found east of the Continental Divide, primarily inhabits river bottoms (Dusek et al. 1989), a few isolated mountainous areas (Martinka 1968, Kamps 1969), and to a limited extent prairie habitats (Swenson et al. 1983, Wood et al. 1989). However, whitetails reach their greatest concentrations west of the divide, particularly in the

heavily timbered northwest counties (Allen 1971) where the Northwest subspecies (*O. v. ochrourus*) has been studied in the Swan River Valley (Hildebrand 1971, Leach 1982, Mundinger 1984), the Clearwater River Valley (Janke 1977, Slott 1979), the Thompson River Valley (Hicks 1990), along the North Fork of the Flathead River (Jenkins 1985, Krahmer 1989, Tucker 1991, Rachael 1992), and in the Fisher River/Wolf Creek drainages (Zajanc 1948, Schmautz 1949, Schmautz and Zajanc 1949 and 1951, Blair 1954-55, Neils et al. 1955, Firebaugh et al. 1975). These northwest white-tailed deer populations are somewhat unique in their close yearlong association with relatively dense, often mature coniferous forest habitats.

Many whitetail studies in northwestern Montana have concentrated on winter habitat relationships. Generally, these have emphasized deer use of southerly aspects which are often clear of snow (Firebaugh et al. 1975, Janke 1977, Slott 1979), mature timber in riparian and/or upland areas which intercepts snow (Hildebrand 1971, Mundinger 1984, Hicks 1990), and timbered areas interspersed with small openings providing edge (Krahmer 1989).

However, whitetails in northwestern Montana are generally migratory and often spend up to 9 months of the year on summer ranges and/or transitional and accessory areas between summer and winter range. Summer habitat must not only meet the general food, water, and cover

requirements for adult deer throughout the season but must also provide for specific seasonal needs. For instance, adult females require quality forage throughout this season for gestation, lactation, and recovery. Fawns need hiding cover early, and quality forage later in the summer to meet their growth and survival needs. Also important is security cover from predators and during hunting season, which is ongoing while deer occupy summer ranges. And last, high quality forage in abundance is needed for maintaining physical condition and building fat reserves prior to fall migration and the onset of winter.

Summer use of coniferous forest by white-tailed deer in northwestern Montana was previously reported by Leach (1982) in the Swan River Valley, Slott (1979) along the Clearwater River, and Kraemer (1989) and Rachael (1992) along the North Fork of the Flathead River. All studies showed an apparent preference by whitetails for riparian areas and moist habitats. In managed forests small cutting units providing a diverse vegetative structure also were noted as important to deer (Leach 1982, Kraemer 1989).

The Salish Mountains, which include the Tally Lake Ranger District of the Flathead National Forest northwest of Kalispell, also provide important whitetail summer range (Mundinger and Riley 1982, 1983). Extensive timber harvesting and road building on the district could potentially disrupt traditional patterns of whitetail

activity and habitat use on summer ranges and during migration to wintering areas.

This study was initiated to investigate habitat use and selection patterns at the macro- and micro-habitat levels by whitetails on summer and transitional ranges on the Tally Lake District. Research was conducted from spring through fall 1989-1991. Specific objectives were (1) to determine use and importance of various seral stages of coniferous forest and riparian communities, (2) to determine how spatial distribution and organization of these communities to form habitat complexes influences distribution and abundance of deer, and (3) to determine the importance of other habitat features including topographic, climatic, and land use components.

## STUDY AREA

The Tally Lake Ranger District (TLRD) of the Flathead National Forest (FNF) lies in the northern portion of the Salish Mountains in northwestern Montana at  $48^{\circ} 30'$  north latitude  $114^{\circ} 30'$  west longitude (Fig. 1). The study area, as used for macro-habitat analysis, was defined as the area within the district containing all summer and transitional relocations of radio-marked deer from January 1989 through December 1991. This included approximately that portion of the district north of Ashley Mountain, east of the Flathead/Lincoln County line, south of Martin Falls, and west of Tally Lake. The district is approximately  $926 \text{ km}^2$  (USDA For. Serv. 1985). The study area consisted of approximately  $445 \text{ km}^2$  of Forest Service land and  $35 \text{ km}^2$  of private land within and adjacent to the district boundary.

Geologically, parent material throughout much of northwestern Montana consists of fine-grained metamorphic rocks from the Belt Super Group of the late Precambrian age (Johns 1970, Montagne et al. 1982). The northern Salish Mountains were created by faulting and folding during the late Cretaceous to early Tertiary ages and are characterized by north-northwest trending folds in the Belt sediments. The Cordilleran ice sheet covered much of northwestern Montana moving into the northern and western portions of the Tally Lake District. Also, 30-45 cm of volcanic ash covered northwestern Montana. The metamorphic parent material,





































































































































































































