Mule deer habitat use in the Owyhee Mountains, Idaho
by Gregory Bryan Milner

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fish and Wildlife Management
Montana State University

Abstract:
Ten mule deer (Odocoifeus hemionus) were selected from 50 deer captured and radiocollared during winter 1992-93. These deer were relocated 196 times from the ground and 296 times from the air during the summer (June - August) - fall (September -November) 1993 study period. Home ranges were computed for the 10 deer (4 males and 6 females) based on ground and aerial locations. In summer - fall 1994, 11 radiocollared deer were located 248 times from the ground and 59 times from the air. Home ranges were calculated for 9 of them (2 males and 7 females). Two males and 2 females were tracked in both years. Detailed information on vegetation and site characteristics was recorded at each ground location. Ninety-nine percent of ground locations were visual. Characteristics at ground locations were contrasted with characteristics at 346 random points measured during 1993 and 1994 using univariate and multivariate analysis techniques. The 2-year study allowed a contrast of deer habitat use in a wet year (1993) with that in a dry year (1994). During 1994, deer were tied more closely to wet areas and traveled less. In both years, females tended to use more heavily vegetated, moister habitats than males. Males tended to use areas with more bare ground and less complex site structure. In a dry year, males used lower elevation, moister habitats more than in a wet year. Females used the same home ranges and habitats in wet and dry years but concentrated activities on more mesic aspects in a dry year. The potential for cattle/deer competitive interactions increased during a dry year.

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APPROVAL

of a thesis submitted by

Gregory Bryan Milner

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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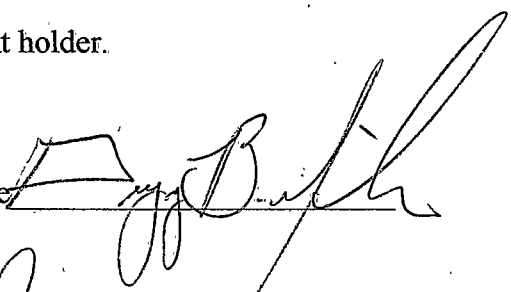
Signature 

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ABSTRACT

Ten mule deer (Odocoileus hemionus) were selected from 50 deer captured and radiocollared during winter 1992-93. These deer were relocated 196 times from the ground and 296 times from the air during the summer (June - August) - fall (September - November) 1993 study period. Home ranges were computed for the 10 deer (4 males and 6 females) based on ground and aerial locations. In summer - fall 1994, 11 radiocollared deer were located 248 times from the ground and 59 times from the air. Home ranges were calculated for 9 of them (2 males and 7 females). Two males and 2 females were tracked in both years. Detailed information on vegetation and site characteristics was recorded at each ground location. Ninety-nine percent of ground locations were visual. Characteristics at ground locations were contrasted with characteristics at 346 random points measured during 1993 and 1994 using univariate and multivariate analysis techniques. The 2-year study allowed a contrast of deer habitat use in a wet year (1993) with that in a dry year (1994). During 1994, deer were tied more closely to wet areas and traveled less. In both years, females tended to use more heavily vegetated, moister habitats than males. Males tended to use areas with more bare ground and less complex site structure. In a dry year, males used lower elevation, moister habitats more than in a wet year. Females used the same home ranges and habitats in wet and dry years but concentrated activities on more mesic aspects in a dry year. The potential for cattle/deer competitive interactions increased during a dry year.

INTRODUCTION

Although mule deer are one of the most studied animals in North America, much remains to be learned in order to accomplish desired management goals. Much of the missing information can be attributed to the difficulty in measuring interactions between an animal and its environment. Add to this the relatively recent widespread impacts of intensive human land use and the different habitat use strategies utilized by mule deer in different areas, and it becomes evident why many questions remain unanswered.

The relationships of mule deer in the Owyhee study area (Idaho Fish and Game Region 3) to the primary land use in this area, livestock grazing, are not well understood. Although numerous studies have been conducted on the impacts of livestock grazing on mule deer (Mackie 1981), the results are usually site-specific and cannot be broadly applied to other areas (Kie et al. 1991, Ragotzkie and Bailey 1991).

Effects of cattle on mule deer noted in the literature vary from detrimental to neutral to beneficial. In years of average and above average precipitation, mule deer and cattle diets have little overlap in many regions (Mackie 1970, Currie et al. 1977). This overlap probably increases during years of drought (Short 1977) or when overgrazing limits forage. In spite of this, mule deer have been shown to prefer ungrazed pastures even in years of adequate forage production (Loft et al. 1991, Ragotzkie and Bailey 1991).

Moderate grazing by cattle on mule deer summer range in the Sierra Nevadas was shown to decrease the availability of hiding cover for deer in meadow-riparian and aspen habitats (Loft et al. 1991), to reduce use of preferred habitats by deer (Loft et al. 1991), to increase home range size of deer (Loft 1988), and to increase the time deer spent feeding

compared to areas with no grazing (Kie et al. 1991). These factors could adversely affect mule deer through increased exposure to predators and increased costs of foraging.

Although negative or neutral effects are frequently noted in the literature, cattle grazing may be an effective tool for enhancing forage availability for mule deer. Willms et al. (1979) found increased spring mule deer use of a pasture grazed the previous fall. On 2 adjacent ungrazed pastures in central Arizona, Wallace and Krausman (1987) reported higher deer densities in the pasture that was grazed the previous year. A rest-rotation grazing system is used on several elk winter ranges managed by the Montana Department of Fish, Wildlife, and Parks to enhance forage (Frisina pers. comm. 1992). Livestock grazing may also promote diversity in habitat (Mackie 1978).

Despite the potential detrimental effects of cattle grazing on mule deer, cattle grazing will likely continue to be a dominant aspect of public land use in the West, and mule deer will likely continue to justify their presence on public land. Mule deer are Idaho's most important big game animal, providing over 1,000,000 days of recreation in 1991 (Unsworth 1992). In a bioeconomic analysis, Loomis et al. (1991) found that the incremental benefits of deer hunting gained under a 2-years-off, 1-year-on grazing system are greater than the lost net economic value of the forage to the rancher. Managers need to develop methods for management of both deer and cattle on the same lands.

In addition to the need for better understanding of the effects of cattle grazing on mule deer, more information is needed concerning general habitat use and selection by mule deer in the Owyhee area. Based on findings from other areas, male and female mule deer probably use their habitat differently (Geist 1981, Bowyer 1984, Hamlin and Mackie

1989), but little is known about habitat segregation in the Owyhee study area. An evolutionary advantage may be gained with resource partitioning by reducing intersexual competition and ultimately enhancing reproductive success and survival (Bowyer 1984). Hamlin and Mackie (1989) described buck habitat in the Missouri Breaks as being characterized by the more rugged Pinus-Juniperus-shale habitats, and doe habitat as being characterized by open and moderate density Douglas fir (Pseudotsuga menziesii)-juniper, scattered density pine-juniper-grass, moderate density pine-juniper, and river riparian types.

Information collected in this study on mule deer/livestock interactions as well as general habitat use by mule deer will provide managers with necessary information to insure that healthy mule deer populations can be maintained in the Owyhee study area. The applicability and validity of this study will be increased via comparisons with a parallel study to be conducted in the Bennett Mountain area by J. Unsworth, Principal Wildlife Research Biologist, and C. Gray, Graduate Research Assistant.

Specific objectives addressed in this study were:

1. Determination of physical and biological characteristics of preferred habitat for male and female mule deer in the Owyhee Mountains.

2. Assessment of changes in habitat selection in relatively wet vs dry years.

3. Determination of impacts of habitat availability and variation in rainfall on home range size.

4. To provide useful information for the management of mule deer habitat.

STUDY AREA

The Owyhee study area is located in southwest Idaho, approximately 40 miles southwest of the city of Nampa. It lies within Big Game Management Unit 40 of Idaho Fish and Game Region 3. It is entirely within Owyhee County. The north boundary is the Salmon Creek drainage, and the south boundary is the Babbington/Little Cottonwood divide. Reynold's Creek makes up the eastern boundary and Cottonwood Creek is on the west side (Fig. 1). The majority of summer deer relocations were found on the east front of the main divide between Reynold's Creek and Cottonwood Creek. Elevations range from 1,060m in the east side to 1,830m on the main divide.

Nine cover types were identified based upon the vegetation composition and structure present. These types were: grass, low sage (Artemesia arbuscula) (<1m), high sage (Artemesia tridentata) (>1m), sage/bitterbrush (Artemesia spp. and Purshia tridentata), mahogany (Cercocarpus ledifolius), mountain brush, riparian, aspen (Populus tremuloides), and rock/cliff.

The grass type was found on medium elevation south exposure slopes and low elevation flats in association with streams and springs. This type included a diverse set of grasses and forbs in several plant communities, but covered <6% of the study area.

The low sage type consisted of Artemesia arbuscula and associated shrubs and forbs. Shrubs commonly encountered in this type were bitterbrush (Purshia tridentata), rabbitbrush (Chrysothamnus spp.), and serviceberry (Amelanchier alnifolia). Common forbs associated with this type included lupine (Lupinus spp.), arrowleaf balsamroot (Balsamorhiza sagittata), fireweed (Epilobium spp.), and tansymustard (Descurainia

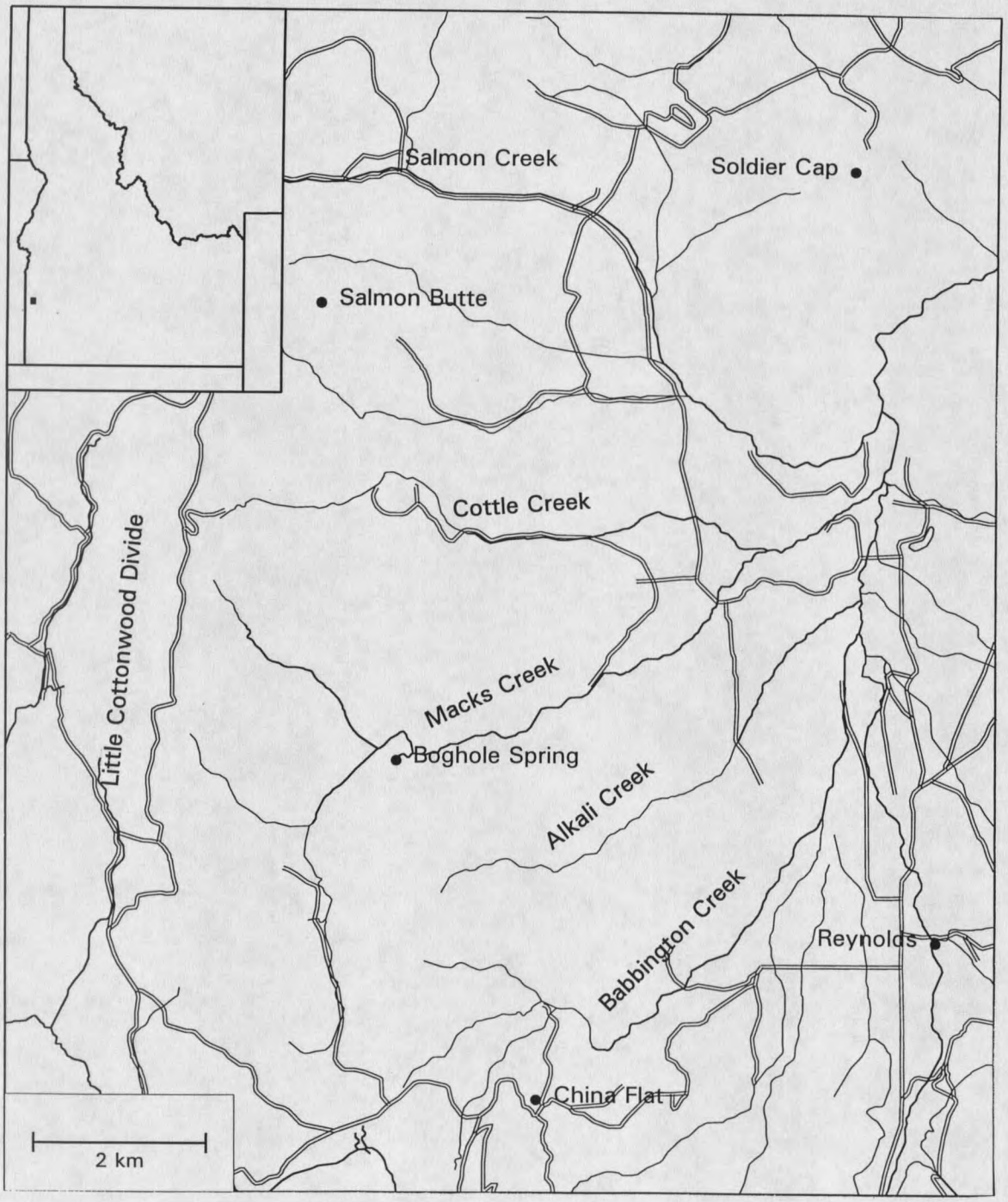

Figure 1. Map of Owyhee Study Area. Double lines are roads; single lines are streams.

sophia). The grass understory was usually composed of Idaho fescue (Festuca idahoensis), cheatgrass (Bromus spp.), and squirreltail (Sitanion hystrix).

The high sage type was dominated by big sagebrush (Artemesia tridentata vaseyana). Other shrubs include bitterbrush, rabbitbrush, serviceberry, snowberry (Symphoricarpos oreophilus), and basin big sagebrush (A. t. tridentata). Among the associated forbs were wild onion (Allium spp.), goatsbeard (Tragopogon dubius), sego lily (Calochortus macrocarpus), buckwheat (Eriogonum spp.), yarrow (Achillea millefolium), collomia (Collomia spp.), gromwell (Lithospermum ruderale), and hawksbeard (Crepis spp.). The grass understory was composed of cheatgrass, squirreltail, wheatgrass (Agropyron spp.), bluegrass (Poa spp.), and occasionally giant wildrye (Elymus cinereus) in the wetter areas.

The sage/bitterbrush type was dominated by big sagebrush and bitterbrush. In addition, rabbitbrush, serviceberry, cheatgrass, wheatgrass, and squirreltail were common. The mahogany type consisted of mahogany (Cercocarpus ledifolius) dominated areas with sparse understories because of the thick mahogany canopy.

The mountain brush type was the most diverse type on the study area. These areas were composed of an association of big sagebrush, bitterbrush, rabbitbrush, serviceberry, snowberry, wild rose (Rosa woodsii), and currant (Ribes spp.). The forbs within this type included wild onion, goatsbeard, yarrow, lupine, buckwheat, collomia, toadflax (Comandra pallida), and horsemint (Agastache spp.). Wheatgrass, bluegrass, sqirreltail, and cheatgrass were the most common grasses.

The riparian type was found in a narrow band along streambeds. Due to the dry

nature of the area, these areas were sometimes constrained to the actual streambed. Hawthorn (Crataegus douglasii) and willow (Salix spp.) were the dominant shrubs. Because of the relative moisture associated with the streambed, the forb and grass components were very diverse. Some of the more common species were non-woody sage (Artemesia ludoviciana), wild onion, yarrow, curly dock (Rumex crispus), geranium (Geranium spp.), dandelion (Taraxacum officinale), mullein (Verbascum thapsus), bedstraw (Galium spp.), wild licorice (Osmorrhiza spp.), bluegrass, wheatgrass, and wildrye.

Stands of aspen (Populus tremuloides) occurred in areas with surface or near-surface springs. The shrub component was dominated by snowberry, but the forb/grass component was similar to that of the riparian type.

The rock/cliff type was predominantly a high elevation type. These areas consisted of at least 50% rock. Vegetation was sparse and scattered and consisted of small patches of xeric forb and grass combinations and occasional clumps of more mesic vegetation types in microsites that trapped moisture. The majority of the sites occurred along ridgelines or steep, sparsely vegetated slopes.

The primary land use on the study area was livestock grazing. The only livestock type present was cattle. A large portion of the study area was within Bureau of Land Management Reynold's Creek Grazing Allotment Number 0508. This allotment was made up of 7 separate pastures; however, the northern 2 were beyond the study area boundary (Fig. 2, pastures 1 and 2). In the 1993 grazing season, Pasture 3 was grazed from 1 May to 15 June. Pasture 4 was grazed from 16-30 June and, with a reduced