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CHARACTERISTICS OF MULE DEER BEDS

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ABSTRACT.—Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) beds were studied in selected plant communities with the purpose of characterizing bedding sites. Six trends exist among the data: (1) deer appeared to prefer bedding under or near conifers, (2) most beds were found on or near game trails, (3) beds in xeric communities were located at higher altitudes and had less overhead cover than in mesic communities, (4) the percentage of uphill cover in xeric areas was greater than in mesic areas, (5) visibility was lower on the north and west sides of deer beds in both community types than on the south and east sides, and (6) the mean size of deer beds was the same in both xeric and mesic communities. These trends, as well as other tendencies in bed locations, are considered from the standpoint of deer thermoregulation and predator avoidance.

One essential requirement of wildlife habitat is the covert (King 1938), a place of hiding or concealment, which for mule deer takes the form of a "bed." The purpose of this study was to characterize mule deer beds and bedding sites. Deer beds in central Utah were examined to determine if selected bedding sites provided potential protection from environmental extremes and predators and to consider temporal patterns, types of habitat, and adaptive behavior patterns of mule deer.

Mule deer live in extremely variable environments. Within the Stewart Falls study area of Mt. Timpanogos, daily temperature extremes ranged from −4 to 26 C. According to Linsdale and Tomich (1953), deer bed whenever weather conditions exceed the range of effective thermal homeostasis (Short 1981). They also bed to ruminate. Nevertheless, deer usually tolerate extreme cold better when feeding than when at rest. Many authors report mule deer seek cover when ambient temperature exceeds 15 C, and during winter cold they show a strong preference to bed in areas sheltered from prevailing winds (Miller 1968, 1970, Dasmann and Taber 1956). Many behavioral and anatomical characteristics of mule deer show how important thermoregulatory mechanisms are to cervids. For example, vascularization of the velvet integument that covers growing antlers dissipates body heat (Stonehouse 1968). Most authors agree that deer bed for thermoregulatory or energetic benefit (Darling 1937, Linsdale and Tomich 1953, Stonehouse 1968, Miller 1968, 1970, Short 1981). Flinders and Elliott (1979) showed that, for jackrabbits (*Lepus californicus*), "forms" function as an environmental compromise to aid in regulation of body temperature. The same is true for mule deer that tend to seek cover during periods of extreme ambient temperatures (Short 1981).

Not only are beds selected to protect against environmental extremes, they are chosen to facilitate predator avoidance. The ruminant habit of deer has apparently lead to selection for behavioral responses that permit animals to choose beds where rumination can occur without increasing vulnerability to predators (Geist 1981). Bedding sites exhibit features that permit deer to sense the approach of predators by sight, olfaction, or sonification, and allow for either concealment or escape. Bedding sites are often near cliffs, rocks, or trees, apparently because the approach of predators is hampered from blind sides and the image of the bedded animal is broken up.

Mule deer seem habitually restricted to a home range that consists of a series of small feeding, bedding, watering, and escape areas (Dasmann and Taber 1956). Except during the rut, mature males are segregated from does and fawns. Partitioning of the habitat has placed bucks on more elevated sites, on more exposed south-facing slopes, and in more xeric environments. Females and young occur more frequently in topographical depres-

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sions, on densely vegetated north slopes, and in more mesic sites (Dasmann and Taber 1956, Miller 1970, McCullough 1979, King and Smith 1980, Bowyer 1984). Within these respective habitats, it would be advantageous for deer to find bedding sites that afford thermoregulatory and predator-avoidance benefits. The constituent features of various deer beds observed reflect utilization of available topographic and environmental factors and other elements that can be used for their benefit.

STUDY AREA

Two sites in central Utah were studied. One site was on Mt. Timpanogos in the area of Stewart Falls, Utah County, (3.2 km above Sundance Ski Resort). This is a fairly heterogeneous area with steep, rugged canyons and plentiful springs and streams. Several cliffs and higher elevations of the area are steep and less densely vegetated. Deer inhabitants are part of Utah Deer Herd 15. Elevation ranges from 2,600 to 3,200 m. The lower part of this study area is used extensively by cabin owners and hikers, but no roads penetrate the study area.

The other site was in Eccles Canyon drainage 8 km south of Scofield, Carbon County. The north-facing slope of this canyon is predominantly spruce-fir, with aspen in some of the less declivitous areas. The south-facing slope is mostly xeric, with sagebrush (*Artemisia tridentata*), bitterbrush (*Purshia tridentata*), snowberry (*Symphoricarpos oreophilus*), gambel's oak (*Quercus gambelii*), and other shrubs. Pockets of aspen (*Populus tremuloides*) occur in the draws and on less steep inclines. A perennial stream courses the narrow bottom of Eccles Canyon and the South Fork of Eccles Canyon. A coal mine is presently operating in Eccles Canyon and another is under construction. The gravel road in the bottom of the canyon is heavily traveled by mine personnel and recreationists. Deer inhabiting the area are part of Utah Deer Herd 32. Elevation varies from 2,100 to 2,900 m.

METHODS

Deer beds were initially located by randomly walking both study areas. Subsequently, 10 linear transects, 750 m long with 250 m cross transects every 250 m were traversed to detect deer beds. Bedding sites were distinguished as oblong depressions in the soil or as flattened areas of vegetation. Sites were confirmed to be deer beds by the size of the depression, which conforms closely with the size and shape of a deer (Linsdale and Tomich 1953), and by the presence of deer hair, fecal pellets, or deer tracks.

Data collected at each bed site were: (a) habitat type (xeric or mesic), (b) percent cover over the bed and on uphill, downhill, and lateral sides of the bed, (c) position relative to deer trails, (d) vegetation type, (e) size of the bed, (f) percent visibility on north, south, east, and west sides, and (g) slope position. Xeric habitats were defined as those with dry surfaces, primarily facing south, that were vegetated with sagebrush, bitterbrush, gambel's oak, and other shrubs. There was very little herbaceous understory. Mesic habitats were defined as those with moist soil, primarily facing north or east, that were predominantly vegetated with spruce-fir and having aspen and maple pockets. Percent cover afforded the bedded animal and visibility were estimated against a highly visible background of fluorescent painted sheet metal or a silver space blanket. The background was placed perpendicular to north, south, east, and west compass points from the center of the deer bed and observed from a 5 m distance perpendicular to the compass points. Percent cover was estimated as the percent of the background covered by projecting vegetation and visibility as the percent of the artificial background that could be seen through the vegetation. Data were pooled and examined using histograms for numbered beds observed compared to vegetation type and slope position and one-way analysis of variance, with $\alpha = .01$ for visibility compared to community type.

RESULTS AND DISCUSSION

Six trends were evidenced from data analyses. There was a preference for bedding under or near conifers. Of forty-one total beds examined, including both sites, 78% ($n = 32$) were within 2 m of coniferous trees (Fig. 1). In predominantly mesic aspen communities, deer beds were primarily found in small pock-

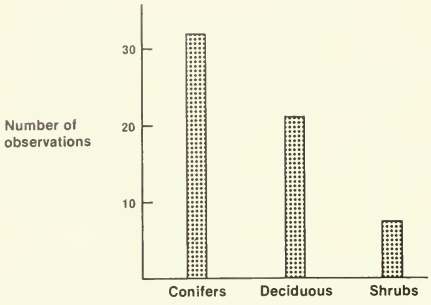

Fig. 1. Number of deer beds observed in various vegetative types. Conifers = spruce, fir, pine. Deciduous = aspen, maple, oak, chokecherry, etc. Shrubs = sagebrush, snowberry, bitterbrush, mountain mahogany, etc.

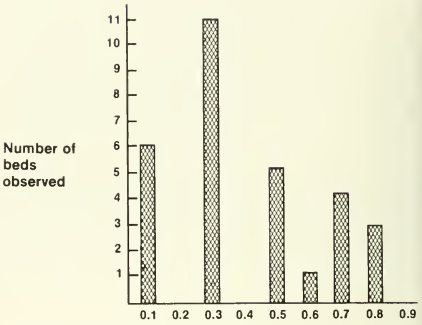

Fig. 2A. Number of deer beds found at various slope positions within mesic areas. 1.0 = top of the mountain.

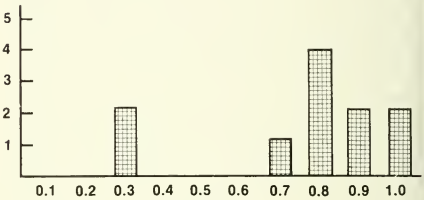

Fig. 2B. Number of deer beds found at various slope positions within xeric areas. 1.0 = top of the mountain.

ets of conifers. On the south-facing slope of Eccles Canyon, one lone fir on a xeric mountainside of predominantly oak and shrubs sheltered two well-used deer beds. Linsdale and Tomich (1953) reported that resting places suitable to some needs are likely within very limited areas that deer use repeatedly. Of special attraction is the ground beneath dense trees, where there is insulation from the weather. Moen (1973) reports that deer will remain in a bed for one to three days after a storm, usually under low-hanging conifers. He also reveals that beds of white-tailed deer in Maine were found under conifer branches that were bent down and covered with snow. In hot weather, areas under conifers are cooler than more open vegetation stands. Dark shadows also provide concealment for bedded deer. Often other types of vegetation, such as deciduous trees, forbs, or shrubs, are located proximally to the bedding community.

Aspen groves also provide choice bedding sites. They offer an abundant food supply and are often small enough to allow deer to see in all directions. Because of leaf litter and underbrush, aspen stands prohibit silent stalk or approach of predators (McRae 1980). Aspen groves were commonly used by females as evidenced by the sex of deer flushed from beds.

Eighty-seven percent (n = 36) of beds were located upon or contiguous to a deer trail. This has the advantage of allowing deer immediate access to relatively unobstructed escape routes. Energetically it is less costly to use established trails when fleeing from danger or locating a resting spot than to forge through dense brush. Trails along which deer frequently bed, therefore, are the travel lanes connecting feeding, watering, bedding, and escape areas of deer's home range (Dasmann and Taber 1956). Of the remaining beds that were not located on a trail, most were in dense cover close to trails.

Significant differences were noted in characteristics of deer beds between xeric and mesic communities with respect to elevation of beds and percentage of cover projected over the bed. Beds in xeric habitats were on the average located at higher slope positions than those in mesic communities (Fig. 2). Analysis of variance indicated that the mean percentage of projected cover over the beds in xeric areas (12.7%, n = 12) was significantly less (P = .01) than in mesic areas (38%, n = 29). This seems obvious when considering the short vegetation of xeric communities, but it may explain why xeric beds are higher altitudinally. Deer that bed in xeric habitats compensate for lack of cooling shade by selecting

bedding sites at higher elevations where updrafting occurs and temperatures are cooler. Since bucks predominate in xeric communities (King and Smith 1980), the possible thermoregulatory function of antlers may help males compensate for the lack of shade in drier environments. This would be particularly true if wind currents play a role in heat dispersal. Bedding in more open higher places, without heavy concealing vegetation, provides deer with a visual advantage over predators. Many beds were located along the top of a ridge or just below the crest, where the bedded animal had commanding views of the surrounding areas.

The percentage of cover variance on the uphill side of the bed between mesic and xeric areas indicated an important trend. There was a significant difference ($P = .01$, $F = 12.37$) between cover on the uphill side of beds located in xeric areas compared to those in more mesic areas. Mean uphill cover in xeric communities was 79.1% ($n = 12$) compared to 41.0% ($n = 29$) for mesic environments. Comparisons of percent downhill cover and on both lateral sides of the beds showed no significant differences between the two habitat types. The greater amount of protective uphill cover for more open, xeric beds not only broke up the outline of the deer but provided greater visual and physical protection from predators approaching the blind side of the deer. Predators, such as cougars, are forced to go around the obstacle provided by more dense cover instead of making a direct rushing attack on the resting deer. This gives bedded deer the advantage of a head start.

Analyzing percent visibility that can be seen of the bed from the four compass points showed a common trend that holds for xeric and mesic communities. The lowest percent visibility is from the north (Table 1). This may afford greater protection from cold north winds and heat radiation to an open, air-circulating environment. There was also decreased visibility on the west side of the bed in both habitat types. This may be advantageous by affording protection to bedded deer from the hot afternoon sun.

Analysis of variance showed that the mean bed size does not vary significantly from xeric to mesic communities ($F = 0.86$, $P = .01$). This is a little surprising since Linsdale and Tomich (1953) report that deer beds conform closely to the size and shape of the body of the reclining deer and more males were found in xeric habitats. It is likely that there is no significant size difference between females and males observed.

TABLE 1. Mean percent visibility from deer beds in north, south, east, and west directions for xeric and mesic communities.

	Xeric (%)	Mesic (%)
Visibility north	9.1	38.1
Visibility south	29.6	58.6
Visibility east	28.2	56.8
Visibility west	14.1	48.6

A general observation was that no matter how steep the incline, deer beds are situated horizontally. Many beds were located in level spots created by the earth-leveling effect of tree roots. Linsdale and Tomich (1953) reported that deer bedded on steep slopes in which loose soil has been pushed downhill, creating a level site. Trails provided level resting spots on steep hillsides upon which deer frequently bedded.

Beds were selected in places where foliage was especially impenetrable and dense, providing almost complete concealment, or in high, open places where visibility was good and many escape routes were available. Does and fawns bedded more often in thickly vegetated areas. They benefit from heavy cover and rely on concealment to avoid danger. Concealment is sometimes employed by mature bucks. They often remain bedded rather than flush in response to heavy hunting pressure.

In summarizing this study, more beds were found on mesic, north-facing slopes than xeric, south-facing slopes. North-facing slopes are cooler, more densely covered, and provide a food supply with higher water content than xeric habitats. Such bedding sites provide thermoregulatory, concealment, and nutritional needs of deer, particularly females, during summer months. Many beds, used predominantly by males, were located immediately above a precipice or below cliffs, especially where steep slopes run down from the base of the cliff. This provides protection from approach on one side, excellent vision below, and convenient escape routes. Other areas where beds were consistently located

included small benches or flat areas on mountainsides. These provide level places to lie on as well as excellent vantage points and backdrop cover. Included as favorite sites were shoulders or points of big ridges and patches of sagebrush or other short brush in open country. In some areas on Timpanogos, timberline is not consistent, but rather it extends in long fingers underneath cliffs. Deer often bed near the crest of the slope where these narrow strips of timber project.

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