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## **Vegetation Types Used by Mule Deer Fawns, Mid-Columbia River, Washington**

### **Abstract**

Mule deer (*Odocoileus hemionus*) fawn surveys were conducted by boat along the Columbia River in north-central Washington from June through August, 1977-79. A total of 288 fawn observations was made in 12 vegetation types. Four vegetation types totaled 7.1 percent of the study area but accounted for 69 percent of the fawn observations. The shrub steppe vegetation type comprised 68.1 percent of the study area but accounted for only 27.1 percent of the observations. Fawns preferred vegetation types that provided both a shade producing overstory and a shrub understory. Protection from the summer heat, and possibly predators, may influence selection of vegetation types.

### **Introduction**

Vegetation types used by mule deer (*Odocoileus hemionus*) fawns are important for survival, but information on vegetation requirements is limited (Sheehy 1978). Does may influence selection of the general area and thus the vegetation types that fawns use. The extent of this influence on exact use areas, especially where several vegetation types are in close proximity, is unknown. White-tailed deer (*Odocoileus virginianus*) fawns appear to select bedding and other use areas without assistance from the doe (Jackson *et al.* 1972). Mule deer fawns probably do so also. Selection of use areas by fawns may imply preference for or avoidance of vegetation types (Martinka 1968, Suring and Vohs 1979).

This paper discusses vegetation types used and the types avoided by mule deer fawns during summer along the mid-Columbia River in north-central Washington. The importance of habitat or plant species preference and avoidance by wildlife is recognized (Neu *et al.* 1974, Hirst 1975, Collins *et al.* 1978, Stalmaster and Newman 1978, Taylor and Guthery 1980, Cairns and Telfer 1980, Wiseman and Lewis 1981, Tilton and Willard 1982). Habitat changes along the Columbia River resulting from increasing agriculture, livestock grazing, and modifications at hydroelectric dams may force wildlife managers to give special attention to protect and increase preferred vegetation types.

### **Study Area**

The study area includes the land within 402 m of the 72.4 km section of the Columbia

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River between Chief Joseph Dam and rivermile 590 in north-central Washington. Douglas County and the Colville Indian Reservation in Okanogan County border the south and north shores, respectively.

The climate of the study area is semi-arid. Summer temperatures average 23.9°C. Annual precipitation averages 240 mm, with about 13 mm per month during the summer.

The study area is characteristic of the Upper Sonoran life zone, with strands of deciduous and coniferous trees scattered along the river. Erickson *et al.* (1976) described 12 vegetation types within the 7368 ha study area and calculated acreages by identification in the field, delineation on aerial photos, and the dot-grid method (Table 1). The

TABLE 1. The amounts and occurrence of the 12 vegetation types and their summer use by mule deer fawns along the mid-Columbia River, Washington, 1977-79.

Vegetation Type	No. of separate units	Avg. size of each unit (ha)	Availability		Utilization		Apparent Selection <sup>1</sup> Behavior
			Total area (ha)	% of total area	Fawn Observations no.	%	
Conifer over shrub	40	4.5	105.4	2.5	110	38.2	Preference
Rockland	12	18.6	223.8	3.0	48	16.7	Preference
Macrophyllus vine and shrub	41	1.6	74.5	1.0	33	11.5	Preference
Riparian	33	1.2	42.5	0.6	8	2.6	Preference
Mixed deciduous and conifer tree over shrub	5	3.6	10.6	0.2	3	1.0	None <sup>2</sup>
Deciduous tree over shrub	28	1.6	46.5	0.6	3	1.0	None
Island	6	12.1	74.1	1.0	4	1.3	None
Conifer forest	13	6.1	79.7	1.1	0	0.0	None
Shrub steppe	31	163.9	5,078.1	68.1	78	27.1	Avoidance
Agricultural	36	20.6	739.8	9.9	1	0.3	Avoidance
Rock	60	7.3	447.2	6.0	0	0.0	Avoidance
Development	13	34.4	446.0	5.9	0	0.0	Avoidance

<sup>1</sup>P < 0.05.

<sup>2</sup>None indicates use was not significantly different from availability.

dominant trees, shrubs, and grasses or forbs of the 12 vegetation types are listed in Table 2.

About 175-200 mule deer summer within the study area. Coyotes (*Canis latrans*) and Golden Eagles (*Aquila chrysaetos*) are common predators, and several bobcats (*Lynx rufus*) also occur in the area.

### Methods

Vegetation types, rather than habitat types, were the most meaningful classification for this study. Vegetation type is a classification based on what actually occupies an area (Daubenmire 1952).

Fawns were counted during 30 boat surveys conducted during the last week of June through August, 1977-79. These surveys were essentially a strip census along each shore of this portion of the river. Both shores were sampled from an average distance of 30 m during each survey. This distance allowed equal proximity to all vegetation types and reduced observability bias of the different vegetation types to a level we believed to be negligible. One shore was observed on the upstream trip and the other on the downstream trip. The shores observed on the upstream and downstream trips were alternated every survey. Surveys were usually conducted from dawn to dusk to include all activity periods of fawns (Jackson *et al.* 1972). We located fawns either by direct

TABLE 2. Dominant trees, shrubs, and grasses or forbs of the 12 vegetation types in the study area<sup>1</sup>.

Vegetation type	Tree	Shrub	Grass or forb
Conifer over shrub	<i>Pinus ponderosa</i>	<i>Amelanchier alnifolia</i> <i>Philadelphus lewisii</i>	<i>Bromus tectorum</i> <i>Festuca idahoensis</i>
Rockland		<i>Artemisia tripartita</i> <i>Artemisia tridentata</i>	<i>Festuca idahoensis</i> <i>Bromus tectorum</i>
Macrophyllous vine and shrub		<i>Amelanchier alnifolia</i> <i>Clematis ligusticifolia</i>	<i>Bromus tectorum</i> <i>Festuca idahoensis</i>
Riparian	<i>Betula occidentalis</i>	<i>Symphoricarpos alba</i> <i>Philadelphus lewisii</i>	<i>Equisetum arvense</i> <i>Equisetum hemale</i>
Mixed deciduous and conifer tree over shrub	<i>Pinus ponderosa</i> <i>Betula occidentalis</i>	<i>Philadelphus lewisii</i> <i>Symphoricarpos alba</i>	<i>Bromus tectorum</i> <i>Festuca idahoensis</i>
Deciduous tree over shrub	<i>Populus trichocarpa</i> <i>Betula occidentalis</i>	<i>Crataegus columbiana</i> <i>Philadelphus lewisii</i>	<i>Bromus tectorum</i> <i>Elymus glaucus</i>
Island	<i>Juniperus scopulorum</i> <i>Pinus ponderosa</i>	<i>Purshia tridentata</i> <i>Amelanchier alnifolia</i>	<i>Artemisia ludoviciana</i> <i>Poa pratensis</i>
Conifer forest	<i>Pseudotsuga menziesii</i> <i>Pinus ponderosa</i>	<i>Purshia tridentata</i> <i>Ribes cereum</i>	<i>Bromus tectorum</i> <i>Festuca idahoensis</i>
Shrub steppe		<i>Artemisia tridentata</i> <i>Purshia tridentata</i>	<i>Bromus tectorum</i> <i>Festuca idahoensis</i>
Agricultural	Orchards, vineyards, hay, and cereal grains		
Rock		<i>Clematis ligusticifolia</i> <i>Philadelphus lewisii</i>	<i>Bromus tectorum</i> <i>Agropyron spicatum</i>
Development	Ornamental (park-like) trees and shrubs or no vegetation		

<sup>1</sup>Information from Erickson et al. (1976).

observation or, if an observed doe's behavior indicated that a fawn was present, by a ground search. Diem (1954) found that when a mule deer fawn was present, its dam would usually trot off a short distance and stop, act irritated, stamp her feet, switch her tail vigorously, and hesitate to leave the area. We found that this behavior was a reliable indicator of fawn presence. We used a predator call to flush several fawns, as suggested by Diem (1954).

Preference and avoidance of the vegetation types were determined by comparing their availability to utilization. A Chi-square test ( $P < 0.05$ ) was used to test the hypothesis that fawns occurred in vegetation types in proportion to those types available in the study area (Neu et al. 1974, Tilton and Willard 1982). We presented results in a format similar to that used by Tilton and Willard (1982), although other presentations of preference and avoidance data (Marion and Ryder 1975, Stalmaster and Newman 1979, Taylor and Guthery 1980, Wiseman and Lewis 1981) could also be applied to our data with similar results.

## Results

We made 288 observations of approximately 139 mule deer fawns. The number of fawns was estimated from the small home range of fawns (Steigers 1978, 1981; Geduldig 1981), location along the river, and group size. Although the vegetation types were scattered randomly along both shores, 94 percent of the observations were on the north-facing, Douglas County shore. Several differences between the two shores, not related

to vegetation types, probably influenced this distribution. These differences are discussed later.

The proportion of fawn observations in each vegetation type differed significantly from the availability of those types in the study area (Chi-square calculated = 2145; tabular value 11 df, 0.05 level of probability = 19.675). The null hypothesis was therefore rejected, implying fawns used vegetation types disproportionately to the availability of those types (Table 1). Fawns preferred the conifer over shrub, macrophyllous vine and shrub, rockland, and riparian types. These four vegetation types totaled only 7.1 percent of the study area but accounted for 69 percent of the fawn observations. Fawns avoided development, rock, agricultural, and shrub steppe vegetation types. Shrub steppe had the highest availability of all vegetation types within the study area (68.1 percent of the total area) but accounted for only 27.1 percent of the fawn observations.

#### Discussion

All of the vegetation types that fawns preferred, except rockland, had an overstory of trees or relatively tall shrubs and a thick understory of shrubs. These characteristics are also important components of fawning and summer habitats for fawns in western Okanogan County (Zeigler 1978), eastern Oregon (Sheehy 1978), and western South Dakota (Steigers 1981). All of the vegetation types avoided lacked this combination of overstory and understory.

Rockland and shrub steppe vegetation types were similar, except that the former had numerous large, haystack-shaped basalt rocks scattered throughout. These types provided microhabitat variations, including shade and increased moisture, which promoted succulent vegetation. We often saw fawns in the shade of these rocks and believe the rocks may have provided the function of an overstory.

Avoidance of the shrub steppe vegetation type by fawns is important. If visibility bias between the vegetation types existed, one would expect that deer using the more open shrub steppe type would be more readily observed. Apparently this large vegetation type does not meet the daytime needs of mule deer fawns.

If ungulates display no preference for any particular habitat, their distribution over a selected area containing these habitats should be about even. However, animals exhibiting a heterogeneous distribution over a given area are responding to habitat factors that relate directly or indirectly to their well-being and survival (Hirst 1975). Mule deer fawns prefer vegetation types with an overstory and shrub understory diurnally during the summer along the mid-Columbia River. Overstory importance may relate to protection from high summer temperatures (Steigers 1981) and/or moisture retention. The fact that 94 percent of the fawns were seen on the north-facing bank, which escapes the sun's direct rays and has a cooler microclimate, supports this idea. However, a road and long hunting seasons (six months for bucks and three months for does) on the north bank probably also influenced north bank-south bank distribution of all deer in the study area. An understory of shrubs may provide concealment from predators (Barrett 1981). Whatever the reasons, the combination of a shade producing overstory and a shrub understory seems to be what mule deer fawns prefer here diurnally during summer. Deer managers of arid areas used for fawning and by summering mule deer may

wish to give special consideration to vegetation types with such overstory-understory combinations by protecting existing stands and promoting the growth of new stands.

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