# 6.2 MULE DEER
# SPECIES ACCOUNT

**SPECIES NAME:** **Mule Deer** ***(Odocoileus hemionus)***

**SPECIES CODE:** **M-ODHE**

## INTRODUCTION:

This document provides the background information for rating mule deer habitat values of pre-defined ecosystem units in TFL 15, south-central British Columbia. Information on mule deer habitat requirements, life requisites, and habitat / landscape use patterns has been accumulated from a variety of sources, including literature reviews, species experts, and previous inventory and mapping efforts.

## STATUS:

| | |
|---|---|
| **Status in Canada (COSEWIC 1998):** | **No formal designation** |
| **Status in British Columbia (CDC 1999):** | |
| **Provincial Management List:** | **Yellow** |
| **Global Rank:** | **S5/S4** |
| **Provincial Rank:** | **S5/S4** |
| **Identified Wildlife (Y/N):** | **N** |

## DISTRIBUTION:

***Continental Range:***

In North America, mule deer range covers most of the western half of the continent extending from the western coast to central North Dakota, east-central south Dakota, Nebraska, west-central Kansas, and extreme northwestern Oklahoma and Texas (Mackie *et al*. 1982). The northern limit approximates the tree line while the southern boundary occurs near central Mexico and through the Baja peninsula.

***Provincial Range:***

Within British Columbia, three subspecies of mule deer are identified. Mule deer (*Odocoileus hemionus hemionus)* are distributed throughout much of the interior, east of the coastal mountain range to the Alberta border. They are most common in the southern interior and northeastern portions of the province while remaining absent or sparse in coastal forests and northwestern British Columbia. West of the coastal range, including Vancouver island, is occupied by 2 species of black-tailed deer (*O. h. columbiana* and *O. h. sitkensis*), which inhabit coastal forests north to Glacier Bay National Park of Alaska. The coastal mountain range represents the approximate zone of subspecies overlap and will provide a boundary for the western most distribution of *O. h. hemionus* (Banfield 1974, Blower 1988, Stevens and Lofts 1988, Fish and Wildlife 1989*).* The black-tailed deer and mule deer are broadly characterized as different subspecies due to extreme differences in external appearances and behavior patterns.

The geographic range of mule deer encompasses most of temperate British Columbia and essentially all of the Rocky Mountain regions where the species approaches its northern limit of distribution.

***Range of Mule Deer in the Project Area:***

**Ecoprovinces:** Southern Interior

| | |
|---|---|
| **Ecoregions**: | Thompson-Okanagan Plateau, Okanagan Highland |
| **Ecosections**: | Northern Okanagan Highland, Southern Okanagan Highland, Northern Okanagan Basin, Southern Okanagan Basin |
| **Biogeoclimatic Zones**: | ESSFdc1, PPxh1, MSdm1, IDFxh1, IDFdm1 (Stevens 1995) |

***Elevational Range:***

Mule deer occur throughout all biogeoclimatic subzone variants within TFL 15, wherever suitable habitat exists. In mountainous habitats of British Columbia, mule deer are primarily migratory, using upper elevation and alpine habitats during the summer and lower valleys and south facing slopes during the winter (MELP 1996).

## KEY LIFE REQUISITES:

Mountainous habitats occupied by mule deer in British Columbia are characterized by a variety of topographical, climatic, and elevational factors. Seasonal use of habitats will vary but is typically described as open coniferous forest, climax brush, aspen stands, steep broken terrain, and river valleys (Banfield 1974).

Typical of most species, mule deer living habitat should encompass forage, security, and thermal features while allowing them to address other life requisites, such as reproduction. Mule deer habitat use strategy involves the selection of several structural and successional stages of a forested landscape during different times of the year.

### Living Habitat:

Habitat for mule deer provides several key functions by providing the necessary resources to address security, thermal, and foraging concerns. Thus, primary habitats for mule deer can be found in a landscape that provides all required life requisites interspersed in a pattern that facilitates reasonable access between habitats (MELP 1996). While mule deer occupy several unique habitat types, they have a propensity for edge or transitional habitats. Mule deer can, thus, be considered an ecotonal species, favoring high contrast forest edges that typically provide an abundance of forage in close proximity to escape and thermal cover.

### Feeding Habitat:

Mule deer are considered to be generalist feeders with diets that vary with seasonal availability of forage. Seasonal variations in diet are experienced by mule deer throughout their range in the province, as spring and summer diets consist of grasses and forbs, while, browse and other lower quality forages predominate their diet throughout the fall and winter seasons. Although succulent graminoids and forbs are utilized as supplemental forage when available, browse provides the bulk of the annual diet for mule deer (Cowan 1947, Sheppard 1960, Flook 1964). Cowan (1947) analyzed mule deer diet content to be 79% browse, 15% graminoids, and 6% forbs in the winter. Similarly, Waterhouse *et al.* (1994) reported diet compositions from winter ranges in the central interior of British Columbia as 45-76% conifers, 15-50% shrubs, 1-7% graminoids, and 1-6% forbs. Willms *et al.* (1976) recorded a shift from low shrubs, graminoids, and forbs to tall shrubs and trees as snow depths increased.

Habitats typically yielding moderate to high quantities of trees and shrubs have been described as the primary sources of annual forage for mule deer. Historically, forest fire was the major natural event resulting in a multi-structured landscape producing open habitats and, thus, abundant quantities of available trees and shrubs in the understorey. Recently, forest fire suppression has limited the availability of open habitats, however in TFL 15 this natural disturbance has been replaced by timber harvesting and other anthropogenic land surface disturbances. The resulting habitats created from these types of disturbances provide significant mule deer habitats used for feeding, and typically provide good summer foraging sites.

Winter foraging habitat preferences for mule deer are generally dictated by temperature, snow depth, quality, and quantity of forages. Areas of lower temperature and shallow snow depths (south facing slopes) are selected by mule deer during winter and result in greater concentrations of mule deer at these sites. In other areas of their North American range, Douglas-fir is a common feature of winter foraging habitat for mule deer (Geist 1981, Berg 1983, Stevens and Lofts 1988, Armleder *et al.* 1986, Dawson *et al.* 1990, Armleder and Dawson 1992, Waterhouse *et al.* 1994). Within the central interior of BC, Waterhouse *et al.* (1994) reported that the average amount of Douglas-fir in the diets of mule deer was between 24% and 73%, and was the most abundant forage species in winter diets. Wallmo (1981) found that the consumption of Douglas-fir also increased when deer used forests as a refuge from deep snow conditions in open habitats. Table 9 presents a compilation of some of the key forage species reported in the literature (Stevens and Lofts 1988, AEP1989, Waterhouse *et al*. 1994):

**Table 9: Key Forage Species for Mule Deer**

| Tree and Shrubs | Graminoids and Forbs |
|---|---|
| *Abies balsamea* | *Artemesia* spp. |
| *Amelanchier alnifolia* | *Aster* spp. |
| *Cornus stolonifera* | *Avena sativa* |
| *Elaeagnus commutata* | *Cirsium arvense* |
| *Mahonia aquifolium* | *Epilobium augustifolium* |
| *Populus tremuloides* | *Heracleum lanatum* |
| *Prunus virginiana* | *Medicago sativa* |
| *Pseudotsuga menziesii* | *Triticum* sp. |
| *Rosa acicularis* | |
| *Salix* spp. | |
| *Shepherdia canadensis* | |
| *Symphoricarpos albus* | |
| *Thuja plicata* | |
| *Tsuga heterophylla* | |
| *Vaccinium spp.* | |

The above list mentions only some of the more common forage species anticipated to occur in TFL 15. In the Rocky Mountains mule deer diets are comprised of a diversity of over 750 plant species, including 202 shrubs and trees, 484 forbs, and 84 graminoids (Kufeld *et al*. 1973).

## Security / Thermal Habitat:

Annual security habitats utilized by mule deer include rugged and broken terrain, wooded river valleys, shrubby draws, steep slopes, and dense tree or shrub growth. Winter security habitats are similarly described, although, the depth of the snowpack determines the suitability of habitat for mule deer security purposes. Ideal security cover minimizes predation rates on mule deer by limiting predators to diseased, juvenile, and exposed deer. Typical predators of mule deer include coyotes (*Canis latrans*), wolves (*Canis lupus*), mountain lions (*Felis concolor*), bobcats (*Lynx rufus*), lynx (*Lynx canadensis*), and golden eagles

(*Aquila chrysaetos*) (Banfield 1974, Mackie *et al.* 1982, Jalkotzy *et al.* 1984). Mule deer research suggests that optimal security habitat will hide an average of 90% of a mule deer from view at a 60m distance or less (Thomas et al. 1979). Patches of security cover need to be 180 m or more in diameter.

Thermal habitats for mule deer have only been described for over-wintering purposes, as mule deer have little requirement for summer thermoregulation. During winter, several researchers have described low temperatures and the duration and depth of snowpacks as the primary limiting factors to mule deer (Mackie *et al.* 1982, Wishart 1986, Stevens and Lofts 1988). However, the primary mode of thermoregulation is habitat selection. Specifically, mule deer concentrate in habitats with lower snow depth, gentle to moderate south and west facing slopes, climax forests with high crown closures, and lower elevations (Telfer 1978). During the winter period when mule deer utilize greater amounts of browse and other low quality forages, they encounter energy deficiencies that require them to draw upon body reserves accumulated during the summer and fall seasons. Mackie *et al.* (1982) report that mule deer survival is limited, not by forage availability, but by temperature and snow conditions. These environmental variables ultimately affect forage availability, energy expenditures, and the energy gained in feeding. Snow depths greater than 50 cm will essentially preclude the use of a habitat by mule deer, while depths of 25-30 cm impede or hinder deer movements (Walmo *et al.* 1977, Mackie *et al.* 1982, Stevens and Lofts 1988). A study by Parker *et al.* (1984) reported a 150% increase in energy required when walking in 41 cm of snow, and a 50% increase in 25 cm of snow, compared to walking on bare ground. Within the context of thermal habitat, Bunnell (1990) and Armleder *et al.* (1986) described the physical criteria generally used to identify winter range as follows:

1. Warm aspects (with the exception of large river valleys)
2. Gentle to moderate slopes
3. Lower elevations
4. Douglas-fir as the predominant tree species

Additionally, Bunnell (1990) has defined critical features of stand structure for mule deer winter range, as follows:

1. long, well developed crowns which intercept snow efficiently, thereby reducing rates of food burial and costs of movment;

2. small openings in a variable canopy that averages 65-70% closure, permitting growth of key forage species, interception of substantial amounts of snow, and provision of overhead thermal cover (thus good interspersion); and

3. multiple canopy layers with an understorey of shade-tolerant conifers that provide additional thermal and security cover and forage, if Douglas-fir is present.

## Courtship / Mating Habitat:

Rutting season for mule deer of the Rocky Mountains occurs primarily during November and December, although exact dates vary by subspecies and location (Mackie *et al.* 1982). Rutting occurs in a variety of habitats that provide abundant forage and cover opportunities. Mule deer do not have specific habitat requirements for courtship or mating activities, therefore courtship and mating habitat will not be rated separately.

## Bedding Habitat:

Mule deer do not have specific habitat requirements for bedding activities. Bedding habitat requirements are site specific and will not be rated separately. Any potential ratings for security and / or thermal cover are considered to include bedding or resting habitats.

## Reproducing Habitat:

Mule deer typically calve in late May or early June preceded by a gestation period of approximately 203 days (Robinette *et al*. 1977). Calving sites are generally in protected areas with abundant food, nearby water, and security cover. These sites are often located on gentle terrain such as terraces and benches in otherwise steep topography between the animal's winter and summer ranges. Security cover (provided by shrubby understorey vegetation or coarse woody debris), forage areas, and thermal cover combine to comprise optimum calving areas.

## Migrating Habitat:

Migratory movements are characteristic of mule deer in mountainous habitats (Banfield 1974, Mackie *et al.* 1982). Fall and early winter movements are associated with increased snow depth while spring and early summer movements are influenced by the emergence of green vegetation in areas of high snow melt. Generally, mule deer movements are elevational and are based on prevailing weather conditions. Summer conditons allow the deer to range into upper elevation biogeoclimatic zones. Conversely, winter conditons (dependent on the severity) usually force the deer to lower elevations where the increased tree cover and reduced depths of snowpack allow them to minimize energy losses (Table 10). Stevens and Lofts (1988) report movements of up to 120 km between seasonal ranges in the Cariboo area. However, McNay and Doyle (1987) typically describe distances of mule deer migrational movements between seasonal ranges up to 2-5 km apart. As per the definition of 'migrating habitat', mule deer do not have specific habitat requirements for migratory activities. Migrating habitat will not be rated separately.

**Table 10: Expected Seasonal Habitat Use Patterns of Mule Deer in the TFL 15 Area**

| SEASON | APPROXIMATE DATES | HABITAT USE PATTERNS |
|---|---|---|
| Winter | November - March | • Habitat use in winter is restricted by snow accumulation;<br>• Habitats with topographic features that reduce snow accumulation are important;<br>• Patches of cover, ideally with shrub understorey;<br>• In areas of light snowfall, mule deer use higher elevation south-facing meadows;<br>• In areas of heavy snowfall, mule deer use lower elevation, large-crowned conifer dominated habitats (65-70% closures) with tall shrub understorey, very small forest openings, and tightly interspersed resources. |
| Spring | April – May | • After spending winter at lower elevations, mule deer generally begin to move to higher elevations during spring as snow cover recedes;<br>• Forage in habitats with topographic features that reduce snowpacks and encourage early snow melt, consequently providing early growth of herbs, grasses, and forbs (such as clearcuts, seral brush fields, et cetera);<br>• Preferred fawning habitats include dense shrubby understory in closed canopy forests or riparian forests and stream islands. |
| Summer | June – August | |

| | | |
|---|---|---|
| | | • Habitat use shifts to mid and high elevation subalpine and low alpine areas with north and east-facing slopes and abundant forage;<br>• Preferred habitats contain abundant food, especially herbs and shrubs interspersed with patches of cover. |
| Fall | September – October | • Alpine grasses and sedges starting to burn off in high-elevation summer ranges;<br>• Mule deer move downslope into mature forested habitats with high canopy closure, where understory herbs and grasses remain available. |

## SEASONS OF USE:

Mule deer habitat will be rated on the basis of two seasons of use, as follows (Table 11):

**Table 11: Seasons of Use Rated for Mule Deer**

| SEASON | CODE | DESCRIPTION (as relates to use by mule deer) | DURATION | LIFE REQUISITES THAT MUST BE MET |
|---|---|---|---|---|
| Winter | W | Snow accumulation period | November<br>December<br>January<br>February<br>March | Feeding / Thermal / Security |
| Growing | G | Leaf-out and green-up of habitats; increased forage availability; typically includes birthing | April<br>May<br>June<br>July<br>August<br>September<br>October | Reproducing / Feeding / Security |

The use of seasonal nomenclature (growing and winter) is based on that defined by RIC (1998) for the Southern Interior Ecoprovince.

## HIERARCHY OF LIFE REQUISITES:

Winter range for mule deer is defined as an area that provides the resources deer would use during all but the mildest of winter conditions. The provision of over-wintering habitat for mule deer may be as significant as any other factor in determining the quality of habitats for deer. Suitable winter habitat should afford a refuge from deep snowpacks, excessively cold temperatures, and provide ample amounts of forage. During severe winters, mule deer energy balances tip in favor of energy losses that result in reduced reproductive rates and, eventually, population decline. In the hierarchy of life requisites for this model, winter feeding habitat is considered the most critical life requisite and will be incorporated into the mule deer habitat model as follows:

1. ***Winter feeding habitat***
2. ***Reproducing (birthing) habitat***
3. ***Year-round security-thermal habitat***

## QUANTIFIABLE ECOSYSTEM ATTRIBUTES:

Table 12 describes how each life requisite for mule deer can be quantified in terms of specific ecosystem attributes, such as site series, snow depth, canopy closure, *etc*. as well as how the primary life requisites must be interposed to meet the secondary life requistes rated above. Table 12 below is a summary of these ecosystem attributes and life requisites.

**Table 12: Quantifiable Ecosystem Attributes for Mule Deer Habitats**

| Season | Primary Life Requisite | Rating Code | Quantifiable Ecosystem Attribute |
|---|---|---|---|
| Winter | Feeding | **FDW*** | • Site series: dominated by dense tree and shrub growth in association with security / thermal habitats;<br>• Quantity of deciduous trees and shrubs: the degree of interspersion and the density of plant species (primarily Douglas-fir);<br>• Quantity of herbaceous growth: the degree of interspersion and the density of forb and graminous plant species;<br>• Snow depth: tall shrubs and trees available above snow pack are critical requirements (ESSFdc1, MSdm1 units generally have higher snowpacks and, thus, lower ratings than IDF and PP units);<br>• Aspect: winter foraging activities controlled by temperature and snow depth, so areas of lower temperature and shallower snow depths receive greater use (south and west-facing slopes are selected) |
| | Security / Thermal | **STW*** | • % cover of trees and shrubs: well developed layers of trees and shrubs provide thermal and security cover;<br>• Snow depth: snow deeper than 25 cm is considered to be a hindrance to mule deer movement;<br>• Slope: gentle to moderate slopes (10-45%);<br>• Elevation: suitable winter habitats are generally, elevations below 1500 metres in shallow and moderate snowpack zones and below 1000 metres in deep snowpack zones;<br>• Forest openings that are less than 200 m wide throughout would provide for maximum deer use; |
| Growing | Feeding | **FDG*** | • Same as winter food attributes described above; |
| | Security / Thermal | **STG*** | • Same as winter security – thermal described above but without concerns regarding snowpack depths. |

*** Life requisites that were rated in the field during data collection for this model.**

## MODEL ASSUMPTIONS:

*1.* Mule deer occupy open, brushy habitats.

*2.* In winter, low elevation Douglas-fir forests provide significant habitat in which mule deer congregate.

3. Site modifiers that influence habitat suitability ratings for mule deer and generally require an upgrade in ratings include “w” (warm, southerly or westerly aspect – only during winter); while downgrades in habitat suitability ratings are usually experienced by sites with a “k” (cool, northely or easterly aspect – only during winter) and “z” (very steep, greater than 100% slope – all seasons).

# MULE DEER
# HABITAT SUITABILITY RATINGS

## RATED LIFE REQUISITES:

The life requisites that have been selected for the final ratings include:

- FDW (Winter / Feeding Habitat)
- SHW (Winter / Security Habitat)
- THW (Winter / Thermal Habitat)
- FDG (Growing / Feeding Habitat)
- SHG (Growing / Security Habitat)
- THG (Growing / Thermal Habitat)

## HABITAT SUITABILITY RATINGS SCHEME:

Mule deer habitats were rated using a 6-class rating scheme, acknowledging the species' high mobility and researchers' substantial knowledge level about its habitat requirements (Table 13).

**Table 13: Habitat Suitability Rating Scheme for Mule Deer**

| Suitability Rating | Level of Use by Mule Deer | Suitability Limits (%) |
|---|---|---|
| 1 | Very High | 76 – 100 |
| 2 | High | 51 – 75 |
| 3 | Moderately High | 26 – 50 |
| 4 | Moderate | 6 – 25 |
| 5 | Low | 1 – 5 |
| 6 | Nil | 0 |

## PROVINCIAL BENCHMARKS:

Provincial benchmarks for mule deer have been determined from a number of sources, each providing relevant information at varying scales and levels of resolution. These sources include:

1) provincial big game abundance and distribution mapping at 1:2,000,000 scale (Blower 1988);
2) MELP provincial benchmark habitat list developed for use with TEM wildlife interpretatins (RIC 1998).

Mule deer abundance and distribution in British Columbia has been mapped at a scale of 1:2,000,000 by Blower (1988). This map provides a rudimentary record of provincial benchmarks against which mule deer habitat suitability ratings can be delineated for TFL 15. The following table, summarized from the provincial map, provides a synopsis of the areas considered by Blower (1988) to have some of the highest mule deer densities in the province (Table 14). Note that the Northern Okanagan Basin Ecosection is included in this list.

| Table 14: Areas of Highest Reported Abundance of Mule Deer in British Columbia (densities > 1 deer / 0.2 $km^2$) | | | |
|---|---|---|---|
| **ECOPROVINCE** | **ECOREGION** | **ECOSECTION** | **GENERAL LOCATION** |
| Southern Interior | Thompson-Okanagan Plateau | Northern Thompson Upland | North Thompson River |
| | | Southern Thompson Upland | City of Kamloops |
| | | Thompson Basin | Copper Creek |
| | | Northern Okanagan Basin | City of Kelowna |
| | Interior Transition Ranges | Southern Chilcotin Ranges | Yalakom River |
| | Northern Cascade Ranges | Okanagan Range | Okanagan River |
| Boreal Plains | Central Alberta Upland | Halfway Plateau | Charlie Lake |
| | | Clear Hills | Beatton River |
| | Peace River Basin | Peace Lowland | City of Fort St. John |
| Central Interior | Fraser Plateau | Chilcotin Plateau | Churn Creek |
| | | Fraser River Basin | Town of Gang Ranch |
| | | Cariboo Basin | San Jose River |
| | | Cariboo Plateau | Meleese Lake |
| | Chilcotin Ranges | Central Chilcotin Ranges | French Bar Creek |
| Southern Interior Mountains | Selkirk Bitterroot Foothills | Selkirk Foothills | Lower Arrow Lake |
| | Nothern Columbia Mountains | Eastern Purcell Mountains | Doctor Creek and Dutch Creek |
| | | McGillivray Range | Bloom Creek |
| | | Southern Columbia Mountains | Moyie River |
| | Southern Rocky Mountains Trench | East Kootenay Trench | Columbia River |
| | Northern Continental Divide | Border Ranges | Wigwam River |
| | Western Continental Ranges | Southern Park Ranges | Fairmont Hot Springs |

MELP (RIC 1998) has also identified high-rated habitats and provincial benchmark habitats for mule deer in British Columbia as follows (Table 15). **Note: habitats that are bolded represent the provincial benchmark against which all other mule deer habitats are compared.**

| Table 15: Provincial Benchmark Habitats for Mule Deer | | | |
|---|---|---|---|
| **Ecoprovince** | **Ecosection** | | **BGC** |
| | **Unit** | **Rating** | **Subzone** |
| **Winter Benchmarks** | | | |
| **Central Interior** | **FRB** | **1** | **IDFxm** |
| Sub-Boreal Interior | PEF | 3 | BWBSmw |
| **Southern Interior Mountains** | **EKT** | **1** | **IDFdm** |
| Southern Interior | NOB | 1 | PPxh |
| | OKR | 1 | IDFxh |
| | SOB | 1 | PPxh |
| | SOH | 1 | IDFxh |
| | THB | 1 | PPxh |
| Boreal Plains | PEL | 2 | BWBSmw |
| Taiga Plains | MUP | 3 | BWBSmw |
| Northern Boreal Mountains | MUF | 3 | BWBSmw |
| **Growing Season** | | | |
| Central Interior | CAB | 2 | IDFdk |
| Sub-Boreal Interior | PEF | 3 | BWBSmw |
| **Southern Interior Mountains** | **EPM** | **1** | **ESSFdk** |
| | MCR | 2 | ESSFdk |
| | SCM | 2 | ESSFwv/wm |
| Southern Interior | OKR | 1 | ESSFxc |
| Boreal Plains | PEL | 2 | BWBSmw1 |
| Taiga Plains | MUP | 3 | BWBSmw |
| Northern Boreal Mountains | MUF | 3 | BWBSmw |

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