

10.0 SPECIES – HABITAT MODEL FOR ROCKY MOUNTAIN ELK

Common Name:	Rocky Mountain Elk
Scientific Name:	<i>Cervus elaphus nelsoni</i>
Species Code:	M-CEEL
B.C. Status:	Yellow-listed
Identified Wildlife Status:	None
COSEWIC Status:	Not applicable

10.1 Introduction

The information presented in this species-habitat model has been largely extrapolated from other regions as there is little documentation of Rocky Mountain elk habitat associations for this part of British Columbia. There have been no specific elk habitat studies, inventories, or surveys completed within the Dunedin study area (B. Webster, *pers. comm.*). Regional information and relevant literature from B.C. and western North America has been incorporated into this species-habitat model where applicable. At this time, general habitat ratings for the Rocky Mountain elk are predicted to have a low reliability as no model verification has been done and elk habitat ecology and diet are not well researched in this region of northeastern British Columbia. Before more reliable ratings of habitat value can be developed, data is required on the seasonal food habits and habitat selection of Rocky Mountain elk in this region.

10.2 Distribution

10.2.1 Provincial Range

Two subspecies of elk occur in British Columbia (Cannings and Harcombe, 1990; RIC, 1997e). Roosevelt elk (*Cervus elaphus roosevelti*) are provincially blue-listed with populations restricted to Vancouver Island and the Sunshine Coast. Rocky Mountain elk are found in a patchy distribution over southeastern and northeastern British Columbia with smaller populations occurring in the Okanagan and near Lytton (RIC, 1997e). The greatest elk densities are found in the East Kootenay and Muskwa/Kechika areas (RIC, 1997d).

10.2.2 Distribution in the Study Area

Populations of elk along the Liard river are at the northern limit of elk distribution in western Canada, are scattered, and are found in low numbers (Goulet and Haddow, 1985). Most elk present within this region are found in the foothills (B. Webster, *pers. comm.*). A small herd of elk (estimated at 150 animals in 1982) is known to inhabit the headwaters of the Toad River and to range north to the Liard River. B. Webster (*pers. comm.*) confirms the presence of a few elk in the headwaters of the Dunedin and Snake rivers, which are thought to winter in the foothills at the head of the Dunedin and the Snake. Distribution of elk herds in the area in 1988 can be found in maps produced by the Fish, Wildlife and Habitat Protection Department (1994). Elk distribution seems to have spread out in recent years with elk expanding into logged blocks along many of the major rivers (J. Hart, *pers. comm.*). Elk have been seen occasionally along the Liard river from the Toad river to Nelson Forks and east along the Fort Nelson river (J. Hart, *pers. comm.*). M. Labine (*pers. comm.*) reported that elk have been seen as far north as Fort Liard with a few seen in winter in cutblocks along the Liard river.

Elk are found within all of the ecoregions, ecosections and biogeoclimatic zones found within the Dunedin study area, as summarized in Table 62.

Table 62: Expected Rocky Mountain Elk Occurrence within the 6 Ecosection - BEC Variant Combinations Found within the Dunedin Study Area

<i>Ecoprovinces</i>	TAIGA PLAINS		NORTHERN BOREAL MOUNTAINS			
<i>Ecoregions</i>	Muskwa Plateau		Northern Canadian Rocky Mountains			
<i>Ecosections</i>	MUP		MUF			
<i>BEC Variants</i>	BWBSmw2	BWBSwk3	BWBSmw2	SWBmk	SWBmks	AT
Species						
Rocky Mountain Elk	•	•	•	•	•	•

Legend:

- = occurs in the variant

10.2.3 Elevational Range

Elevations within the study area range from approximately 250 m to 2,105 m. Rocky Mountain elk may be found from the BWBS zone up to the AT zone within the study area.

10.3 Ecology and Habitat Requirements

Elk may be found in coniferous forests of all ages, as well as in deciduous stands and non-forested habitats such as wetlands, vegetated slides, and rock outcrops (Nyberg and Janz, 1990). Elk prefer wet areas such as wetlands, meadows, estuaries, seepage sites, and riparian areas adjacent to streams and in alluvial floodplains of major river valleys. The moist, rich soils that typically occur in these areas provide abundant sources of preferred forage species. Elk are generally considered an ecotone species, preferring the transition zones between habitats (Skovlin, 1982). Levels of elk use have been found to decrease with increased distance from the interface of forest and nonforest communities (Skovlin, 1982).

Elk will generally winter on lower slopes and in the valleys where less snow accumulates (RIC, 1997d). In the Liard River Valley of B.C. (to the north of the study area), Goulet and Haddow found that riparian and floodplain habitats on major rivers, young burns, and grassy slopes provide suitable winter range for elk (Goulet and Haddow, 1985). In severe winters, mature coniferous forests may be critical for cover and snow interception. South-facing slopes are particularly important winter habitat. In a study of collared elk in the Fort Nelson area, most elk summering in logged blocks along the Muskwa river were migrating back to the Tuchodi Foothills in the fall, wintering in the alpine on south-facing bare hillsides, then returning to the Muskwa River area in the spring. A small number of animals were non-migratory, remaining in the logged blocks for the winter (J. Hart, *pers. comm.*).

10.4 Habitat Use (Life Requisites and Seasons)

Rocky Mountain elk habitat use for the study area is broken down into two seasons – growing and winter. Life requisites that are rated for elk include living, feeding, and security, as summarized in Table 63.

Table 63: Summary of Rated Life Requisites and Seasons for Rocky Mountain Elk in the Dunedin Study Area

Rated Life Requisites and Seasons	Code	Months of Use
Living during the growing season - food	LI_G_FD	May-September
Living during the growing season - security	LI_G_SH	
Living during the winter season - food	LI_W_FD	October-April
Living during the winter season - security	LI_W_SH	

Habitats used for reproduction (birthing) and rutting have not been rated as there is insufficient information available to distinguish these habitats. Elk are thought to calve in May within the Fort Nelson area, and the rut generally occurs in the second to third week of September along the Muskwa-Tuchodi area (J. Hart, *pers. comm.*).

Rated life requisites are described in detail below.

10.4.1 Living

Elk are generally migratory, usually frequenting alpine meadows in the summer and retreating down to river valleys in the fall. Some populations of elk are also nonmigratory, exhibiting only local shifts in habitat use (Peek, 1982). Ideal landforms range from floodplain areas with adjacent river breaks to steep avalanche tracks with >100% slope (Luttmerding *et al.*, 1990).

10.4.2 Feeding

Growing Season

Elk are primarily grazers, preferring grasses and forbs (Kufeld, 1973). They prefer open, wet areas such as wetlands, riparian areas by lakes and streams, marshy meadows, and floodplains but can also be found in a wide range of habitats including coniferous and deciduous forests in all seral stages plus non-forested habitats such as vegetated slides and rock outcrops (Goulet and Haddow, 1985). During the summer, moist, open forests are preferred, and forests with dense canopies receive little use (Peek *et al.*, 1982). Elk often select for the edge between vegetation types (Cairns and Telfer, 1980). In mountainous areas, elk will spend most of the summer at higher elevations foraging in subalpine parkland and alpine tundra.

Winter Season

In winter, elk may use open areas to forage, pawing through the snow to reach grasses and herbs (Hobbs *et al.*, 1981). If the snow crusts or the depth reaches 30 cm or more, elk will move to shrub and conifer forested habitats. Depths of more than 60 cm reduce mobility forcing elk to move to lower elevation forested habitats (RIC, 1997e) where they are forced to shift to a diet of browse, feeding on shrubs and deciduous trees. In the San Juan Mountains, Sweeny and Sweeny (1984) found that snow depths approaching 40 cm caused elk to move to areas with less snow, and depths greater than 70 cm severely limited physical movement. Important winter browse species in the vicinity of the study area are probably willows, aspen, *Prunus* spp., saskatoon, and red-osier dogwood (Goulet and Haddow, 1985).

10.4.3 Security Habitat

Good interspersed feeding areas and cover is important to elk. Optimal habitat consists of open areas interspersed with patches of trees or dense shrubs. In summer, elk will bed wherever they are finished feeding but always in close proximity to cover (Collins and Urness, 1983). Minimum security cover for elk has been defined as vegetation capable of concealing 90% of a standing elk from view at a distance of 61 m or less (Thomas *et al.*, 1979). The stand's density and diameter of trees and the density of understory vegetation determine its value as security cover (Nyberg and Janz, 1990). Topographical features may also enhance security cover for elk (Nyberg and Janz, 1990). Elevation may also serve as a form of security habitat offering some protection due to reduced numbers of predators at higher elevations. In an area of human disturbance, Morgantini (1979) found that elk would forage within 100 m to 200 m of cover during the day but would move farther into open areas to forage during the night.

10.4.4 Seasons of Use

Table 64 summarizes the rated life requisites for elk for each month of the year.

Table 64: Monthly Rated Life Requisites for Rocky Mountain Elk in the Dunedin Study Area

Month	Season*	Rated Life Requisites
January	W	LI-SH, FD
February	W	LI-SH, FD
March	W	LI-SH, FD
April	W	LI-SH, FD
May	G	LI-SH, FD
June	G	LI-SH, FD
July	G	LI-SH, FD
August	G	LI-SH, FD
September	G	LI-SH, FD
October	W	LI-SH, FD
November	W	LI-SH, FD
December	W	LI-SH, FD

Legend

W=Winter G=Growing LI=Living FD=Food SH=Security

*Seasons defined per the Chart of Seasons by Ecoprovince (RIC, 1998; Appendix B).

10.5 Habitat Use and Ecosystem Attributes

Table 65 outlines how each rated life requisite relates to specific ecosystem attributes.

Table 65: Terrestrial Ecosystem Mapping (TEM) Relationships for Each Life Requisite for Rocky Mountain Elk

Life Requisite	Ecosystem Attribute
Living Habitat (Feeding)	site: slope, aspect, elevation, structural stage, site disturbance soil/terrain: bedrock, terrain texture, flooding regime vegetation: % cover by layer, species list by layer, cover for each species for each layer
Living Habitat (Security)	site: slope, aspect, elevation, structural stage soil/terrain: terrain texture vegetation: % cover by layer, species list by layer, cover for each species for each layer tree species, dbh, height, CWD

10.6 Development of the Habitat Ratings

10.6.1 Rating Scheme

A 6-Class rating scheme of high (1), moderately high (2), moderate (3), low (4), very low (5), and nil (6) is employed due to the substantial level of knowledge on habitat use of elk (RIC, 1998). The used ratings scheme is defined in Table 66.

Table 66: Habitat Capability and Suitability 6-Class Rating Scheme
(from RIC, 1998)

% of Provincial Best	Rating	Code
100% - 76%	High	1
75% - 51%	Moderately High	2
50% - 26%	Moderate	3
25% - 6%	Low	4
5% - 1%	Very Low	5
0%	Nil	6

This rating scheme is used when assigning habitat ratings to the ecosystem units present within the Dunedin study area. The habitat ratings express the ability of the units to fulfil habitat requirements for the specific life requisites and seasons rated for Rocky Mountain elk, as previously outlined in Table 63.

10.6.2 Provincial Benchmark

The provincial standard (best in B.C.) for the winter season for the Rocky Mountain elk is the EKT ecosection, IDFdm subzone (within the Southern Interior Mountains ecoprovince), and also the MUF ecosection, SWBmk subzone (within the Northern Boreal Mountains ecoprovince) (RIC, 1998). The provincial standard for the growing season is the MUF ecosection, SWBmk subzone (RIC, 1998).

The southwestern section of the Dunedin study area is located within the MUF ecosection, which is a provincial benchmark for Rocky Mountain Elk for both the growing and winter seasons (RIC, 1998). The majority of the study area is located within the MUP ecosection which has a moderately high (75% to 51%) capability compared to the standard (RIC, 1998). The Dunedin study area is therefore expected to have quite high capability for elk.

As a smaller scale reference, the Northeastern British Columbia Biophysical Overview Mapping project has assigned Rocky Mountain elk habitat capability ratings for the ecosection/BEC variant combinations found within this region (Table 67) (Habitat Inventory Section, 1994).

Table 67: Ecosection/BEC Variant Combinations for Rocky Mountain Elk
Class Values For Habitat Capability Mapping of the Northeastern Portion of B.C. (Habitat Inventory Section, 1994)

<i>Ecosection</i>	MUP		MUF		
	<i>Variant</i> BWBSmw2	BWBSwk3	BWBSmw2	SWBmk	AT
<i>Species</i>					
Rocky Mountain Elk	2	3	1	1	2

Legend:
6-class rating scheme: Class 1 - high, Class 2 - moderately high, Class 3 - moderate, Class 4 - low, Class 5- very low and Class 6 - nil value.

10.6.3 Ratings Assumptions

Habitat ratings for elk are presented in Appendix 5. Each combination of ecosystem unit and structural stage was individually assessed for its ability to meet the Rocky Mountain elk's seasonal requirements for feeding and security. The expanded legend and field data were used to determine if these combinations provided the necessary ecosystem attributes (as outlined in Table 65) to meet these requirements. Further study is needed to validate and refine these ratings. The following assumptions have been made:

- In winter, food value ratings for units may be based primarily on either the presence of preferred food items or on the accessibility of these food items. In deep winter snow conditions, the more open habitats may not be accessible to elk. This model assumes all forested habitats, except shrub and burn units in stage 3, are accessible to elk in the average winter in this region, and food ratings for structural stages 4 to 7 are therefore assigned based on the presence and quantity of preferred forage species. Structural stages 1 to 3 are assumed inaccessible and are thus given low winter food and security ratings. When snow accumulations are low, they may be available to elk, but during more severe winters, snow will preclude access to these sites. These ratings will not be accurate for very mild winters when most habitats are accessible. When snow depths are not restrictive, elk will use more open areas and dig through the snow for vegetation, probably using stage 3 burns and clearcuts in winter when accessible.
- Elk are probably not found in the AT or SWBmks subzones in the winter due to deep restrictive snow depths and lack of cover in these high elevations. Therefore, units in the SWBmks are given a rating of very low or nil and units in the AT are given a rating of nil for winter food and security.
- Warm aspect, generally south-facing slopes are important winter range for elk. In areas of deeper snowpack, elk require denser canopied stands for snow interception. Dense, mature stands with a high conifer component probably become very important in winter when snow depths preclude use of most other habitats. Low-lying areas in the BWBSmw2 along major floodplains (mainly spruce stands) may become important for foraging and cover in winter. Adjacency of good spring range to winter range is important. Floodplains with open deciduous stands in the BWBSmw2 are assumed to green up early, as are warm aspect slopes and avalanche tracks.
- In the growing season, ecosystem units with high proportions of key seasonal food species are rated high for feeding. In general, structural stage 1 has poor foraging value as it is mainly unvegetated. Structural stages 2 to 3 should provide abundant forage and have moderate values for elk if adjacent to cover. Clearcuts should provide moderate summer values, yet elk will probably not forage in the middle of very large clearcuts due to a lack of adjacent cover (especially in areas of human disturbance). Stage 4 to 7 forests should provide good security cover and increase the value of more open feeding areas adjacent to them.
- Riparian stands, vegetated slides, wetlands, and open, deciduous dominated and mixed forests should provide moderate foraging value to elk due to the presence of a good diversity of shrubs and herbs. Open coniferous stands may be used for foraging, and wet sites with abundant growth are favoured throughout the growing season. Very wet units probably have low growing season values. High elevation sites are favoured feeding areas in the summer due to delayed phenology.
- Understory characteristics including shrub composition and density determine the value of units as security habitat. Units with a very sparse understory generally provide only poor security cover. Coniferous shrubs provide better visual screening than deciduous shrubs in winter. Larger trees provide better security, as does more CWD and structural diversity. Units with dense shrubs receive high security habitat ratings. Structural stages 1 to 2 provide poor security due to the openness of these habitats and receive ratings of nil or very low.

Elk often prefer to forage in the edge habitat between units. This preference cannot easily be addressed in the assumptions section, as ratings are being assigned only to pure ecosystem units, irrespective of the complexity, size and amount of edge of polygons.

10.6.4 Rating Adjustment Considerations

As elk have feeding preferences for edges between habitat types, interspersions of cover and feeding areas is very important in determining habitat use. For example, open feeding areas, e.g. wetlands, will have increased value if they are adjacent to units providing good security habitat, e.g. mature forest.

Proximity to human disturbance will decrease the value of habitats. The presence of roads and associated activities results in significantly decreased elk use in areas adjacent to them (Thomas *et al.*, 1979; Morgantini, 1979). In western Alberta, disturbance caused by a special hunting season forced Rocky Mountain elk off their prime winter range and into poorer quality habitats at higher elevations (Morgantini, 1979).

10.7 References

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