7.4 Species – Habitat Model for Rocky Mountain Elk

Common Name:	**Rocky Mountain Elk**
Scientific Name:	*Cervus elaphus nelsoni*
Species Code:	M-CEEL
B.C. Status:	Yellow-listed
Identified Wildlife Status:	None
COSEWIC Status:	Has not been examined

7.4.1 Distribution

7.4.1.1 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).

7.4.1.2 Distribution in the Study Area

Very low numbers of elk are present throughout the La Biche and Sandy Creek study areas (M. Labine, personal communication), and they occur in both the MAU and MUP eco-sections (BWBSmw2 variant) represented within the study areas. 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). Occasionally, small groups of elk may be found within the La Biche and Sandy Creek areas, yet these areas are on the far periphery of the known elk range with most elk in this region found in the foothills (B. Webster, personal communication).

To the southwest of the La Biche and Sandy Creek study areas, 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 (LGL, 1982 cited in Goulet and Haddow, 1985). Elk sign observed near the Liard River/Beaver River confluence during field work of Goulet and Haddow (1985) were speculated to belong to this herd (Goulet and Haddow, 1985). B. Webster (personal communication) 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 spreading out into logged blocks along many of the major rivers (J. Hart, personal communication). 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, personal communication). During the 1996 Liard River Valley Bison Survey, five elk were seen on an island in the Liard River, B.C., (Department of Resources, Wildlife and Economic Development, 1996). M. Labine (personal communication) reported that elk have been seen as far north as Fort Liard with a few seen in winter in cutblocks along the river.

7.4.1.3 Elevational Range

Elevations within the study areas range from 220 to 850 m. Elevation is not considered a limiting factor to habitat use within the study areas.

7.4.2 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 which typically occur in these areas provide abundant sources of preferred forage species.

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 west of the study area), Goulet and Haddow found that riparian and floodplain habitats on major rivers, potentially 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. Within the study area, elk are probably limited by the amount of available forage and lack of suitable winter range. In a study of collared elk in the Fort Nelson area, most elk summering in logged blocks along the Fort Nelson river were migrating back to the Tuchodi Mountains in the fall, wintering in the alpine on south-facing bared off hillsides, then returning to the Fort Nelson River area in the spring. A small number of animals were non-migratory, remaining in the logged blocks for the winter (J. Hart, personal communication). Elk, when observed in the study areas, have been concentrated along the major rivers using riparian areas and adjacent cutblocks (M. Labine, personal communication). The best habitat in the flat country is along the rivers valleys which is the main travel corridor of wolves; therefore, winter mortality is very high (B. Webster, personal communication).

7.4.3 Habitat Use (Life Requisites and Seasons)

7.4.3.1 Living

Elk are generally migratory usually frequenting alpine meadows in the summer and retreating down to river valleys in the fall. Ideal landforms range from floodplain areas with adjacent river breaks to steep avalanche tracks with >100% slope (Luttmerding *et al.*, 1990).

7.4.3.2 Feeding

7.4.3.2.1 Growing Season

Elk are primarily grazers preferring grasses and forbs. 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). 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.

7.4.3.2.2 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 elk movement. Important winter browse species in the vicinity of the study areas are probably willows, aspen, *Prunus* spp., saskatoon, and red-osier dogwood (Goulet and Haddow, 1985).

7.4.3.3 Security Habitat

Good interspersion of 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 to 200 m of cover during the day but would move farther into open areas to forage during the night.

7.4.3.4 Seasons of Use

Table 19: Seasons of Use With Rated Life Requisites for Rocky Mountain Elk in the La Biche and Sandy Creek Study Areas.

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

* as defined in RIC (1997a).

Table 20: Seasons of Use Summary for Rocky Mountain Elk in the La Biche and Sandy Creek Study Areas.

Habitat Use	Code	Months of Use*
Living during the growing season	LI_G	May-September
Living during the winter season	LI_W	October-April

*as defined in RIC (1997a).

Habitats used for reproduction have not been rated and are therefore not included in the following table. There are only few elk present in the Fort Nelson area so specific times of calving and rutting are not well known (J. Hart, personal communication). 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, personal communication).

7.4.4 Hierarchy of Life Requisites

- Winter Feeding – Winter is the most limiting season for forage availability.
- Growing Season – Ample forage is required for spring, summer, and fall
- Security and Thermal Cover is required during both the growing and winter season

7.4.5 Ratings

7.4.5.1 Rating Scheme – 6 Class, 2 Season

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 (Resources Inventory Committee, 1997a). The used ratings scheme is defined in Table 21.

Table 21: Relative Quality Classes (From RIC, 1997a And RIC, 1997g).

Code	Quality relative to the best in B.C.	Suitability/Capability
1	Equivalent (75%-100% of best)	High
2	Slightly less (50%-75% of best)	Moderately high
3	Moderately less (25%-50% of best)	Moderate
4	Substantially less (5%-25% of best)	Low
5	Much less (0%-5% of best)	Very low
6	The habitat or attribute is absent	Nil

Ecosystem units will be rated for security habitat (SH) and food (FD) values for two seasons: Growing (G) and Winter (W).

7.4.5.2 Provincial Benchmark

The provincial standard (best in B.C.) for elk is the MUF and EKT eco-sections (Rasheed, 1998). As the La Biche and Sandy Creek areas fall within the MUP and MAU eco-sections, Class 1 habitat, if present, is expected to be limited within these areas.

As a smaller scale reference, a biophysical habitat capability mapping project for the northeastern portion of British Columbia (Habitat Inventory Section, 1994) assigned a habitat capability value for Rocky Mountain elk of Class 2 (50% to 75% of the best in B.C.) for the MUP ecosection, BWBSmw2 variant. The ETP ecosection (at this time the MAU ecosection was still part of the ETP ecosection) BWBSmw2 variant was given a value of Class 4 (5% to 25% of the best in B.C.) (Habitat Inventory Section, 1994).

Referring to the habitat capability maps produced for northeastern B.C. (Habitat Inventory Section, 1994), the majority of the La Biche study area is given Class 3 (25% to 50% of the best in B.C.) Rocky Mountain elk capability with only the western edge having Class 2 (50% to 75% of the best in B.C.) capability. Most of the Sandy Creek area is rated as having Class 4 (5% to 25% of the best in B.C.) capability.

7.4.5.3 Assumptions

Habitat ratings for elk are presented in sections 7.4.5.4 and 7.4.5.5. 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 BWBS habitats, except shrub and burn units in stage 3, are accessible in winter and ratings are assigned based on what forage species are present. Structural stages 1 to 3 have minimal winter values. When snow accumulations are low, they may be available to elk but during more severe winters snow will preclude access to these sites. Structural stages 1 to 3 are therefore given low food and security ratings. 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 likely using burns and clearcuts in winter when accessible.
- During the growing season, 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 likely not forage in the middle of very large clearcuts due to 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 and open deciduous-dominated and mixed forests should provide moderate value to elk due to good diversity in shrubs and herbs. Open coniferous stands will be used for foraging, and dense, mature stands with a high conifer component will likely become very important in winter when snow depths preclude use of most other habitats. Low-lying areas with reduced snow depth along major floodplains (mainly spruce stands) likely become important for foraging in winter.
- Wet sites with abundant growth are favoured in spring and summer. Very wet units, such as BS/08 and SG wetlands, probably have low growing season values. Grasses in SG wetlands may become more available in early winter when ice forms.
- Warm aspect, generally south-facing slopes are important winter range for elk; although, these are limiting within the study areas. Adjacency of good spring range to winter range is important. Floodplains with open deciduous stands (SH/05$) will likely green up early.
- Areas where domestic cultivars have been introduced are likely to provide good forage for elk. These areas include various seismic lines and the pipe line.
- Understory characteristics including shrub composition and density will determine the value of units as security habitat. Units with very sparse understory will generally provide only poor security cover. Coniferous shrubs will provide better visual screening than deciduous shrubs in winter. Larger trees will provide better security as will more CWD and structural diversity. Stage 3a units will generally provide poor security cover as vegetation is not tall enough to screen standing elk. Stage 3b forests may provide good security cover.
- Low snow depths were considered to enhance security habitat ratings as they should allow less restrictive movement. In winter, mature ecosystem units which were likely to have better snow interception were given higher security habitat ratings.

7.4.5 References

Cairns, A. L. and E. S. Telfer. 1980. *Habitat Use By 4 Sympatric Ungulates in Boreal Mixed Wood Forest.* Journal of Wildlife Management, 44(4):849-857.

Cannings, R. A. and A. P. Harcombe (eds.) 1990. *The Vertebrates of British Columbia: Scientific and English names.* Royal British Columbia Museum Heritage Record No. 20; Wildlife Report No. R24. Ministry of Municipal Affairs, Recreation, and Culture and Ministry of Environment, Victoria, B.C.

Collins, W. B. and P. J. Urness. 1983. *Feeding Behaviour and Habitat Selection of Mule Deer and Elk on Northern Utah Summer Range*. Journal of Wildlife Management, 47(3):646-663.

Department of Resources, Wildlife, and Economic Development. 1996. *Liard River Valley Bison Survey 1996*. Unpublished. Fort Liard, Northwest Territories.

Fish, Wildlife, and Habitat Protection Department. 1994. *Wildlife Distribution Mapping, Big Game Series*. Ministry of Environment, Lands and Parks, Victoria, B.C. 16 maps, 1:2,000,000.

Goulet, L. A. and D. J. Haddow. 1985. *An Inventory of Wildlife Resources on the Liard River, Northern British Columbia: A Report of the 1978, 1980, and 1981 Field Studies.* B.C. Hydro. Report No. Ess-30.

Habitat Inventory Section. 1994. *Northeastern British Columbia Wildlife Biophysical Project Phase 1 (Overview)*, February 1994, Ministry of Environment, Lands and Parks, Wildlife Branch, Habitat Inventory Section, Victoria.

Harrison, B. Personal communication. 1998. Habitat Technician. B. C. Ministry of Environment, Lands and Parks, Ft. St. John, B. C.

Hart, J. Personal communication. 1998. District Conservation Officer. Ministry of Environment, Lands and Parks, Fort Nelson, B.C.

Hobbs, N. T., D. L. Baker, J. E. Ellis, and D. M. Swift. 1981. *Composition and Quality of Elk Winter Diets in Colorado*. Journal of Wildlife Management 46(2):333-343.

Labine, M. Personal communication. 1997, 1998. Renewable Resource Officer III. Renewable Resources. Fort Liard, Northwest Territories.

LGL Ltd. 1982. *Ungulate Distribution Along the Alaska Highway Gas Pipeline Route in Northern British Columbia and Map Folio*. Prepared by J. Roland, G. F. Searing, and L.,M. Darling for Foothills Pipelines (north B.C.) Ltd., Calgary, Alberta.

Luttmerding, H. A., D. A. Demarchi, E. C. Lea, D. V. Meidinger, and T. Vold. (eds.) 1990. *Describing Ecosystems in the Field,* 2nd Ed. MOE Manual 11. B.C. Ministry of Environment, Lands and Parks and B.C. Ministry of Forests, Victoria, B.C.

Morgantini, L. E. 1979. *Habitat Selection and Resource Division Among Bighorn Sheep, Elk and Mule Deer in Western Alberta*. Masters Thesis. University of Alberta, Edmonton, Alberta.

Nyberg, J. B. and D. W. Janz, technical eds. 1990. *Deer and Elk Habitats in Coastal Forests of Southern British Columbia.* Ministry of Forests, Special Report Series 5, Research Branch, Victoria, B. C.

Rasheed, S. 1998. Draft. *Summary of Provincial Benchmarks for Some Wildlife Species.* Ministry of Environment Lands and Parks, Victoria, B.C.

Resources Inventory Committee. 1997a. *Standards for Wildlife Habitat Capability/Suitability Ratings in British Columbia*. Review Draft, May 18, 1997. Wildlife Interpretations Subcommittee, Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria, B.C.

Resources Inventory Committee. 1997b. *Procedures for Wildlife Habitat Capability and Suitability Mapping.* Partial Draft, August 1, 1997. Wildlife Interpretations Subcommittee, Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria, B.C.

Resources Inventory Committee. 1997d. *Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Ground Based Census Techniques for Selected Cervids - Moose, Elk, Mule/Black-tailed Deer, White-tailed Deer, and Fallow Deer.* Draft - March 1997. Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria, B.C.

Resources Inventory Committee. 1997e. *Standardized Inventory Methodologies for Components of British Columbia's Biodiversity: Aerial-Based Inventory Techniques for Selected Ungulates - Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer, and Caribou.* Version 1.1 - January 1997. Wildlife Branch, Ministry of Environment, Lands and Parks, Victoria, B.C.

Resources Inventory Committee. 1997g. *Wildlife Habitat Assessment Form And Coding Rules.* Final draft, May 1, 1997. Wildlife Interpretations Subcommittee, Wildlife Branch, Ministry of Environment Lands and Parks, Victoria, B.C.

Sweeney, J. M. and J. R. Sweeney. 1984. *Snow Depths Influencing Winter Movements of Elk*. J. Mamm. 65(3): 524-526.

Thomas, J. W., H. Black, R. J. Scherzinger, and R. J. Pedersen. 1979. *Deer and Elk. in Wildlife Habitats in Managed Forests: the Blue Mountains of Oregon and Washington*. J.W. Thomas (tech. editor). U.S. Department of Agriculture, Forest Service, Agriculture Handbook, 553. pp 104-127.

Webster, B. Personal communication. 1998. Senior Wildlife Biologist, Ministry of Environment, Lands and Parks, Fort St. John, B. C.