

SPECIES ACCOUNT - MOUNTAIN GOAT (m-oram)

General

The mountain goat (*Oreamnos americanus*) is an antelope which inhabits rugged and rocky terrain at or above timberline. It is found in suitable habitat throughout most of mainland BC except for the areas of low relief in the interior of the province. Mountain goats rarely venture far from the security of very steep cliffs and rock faces. Mating takes place in November and kids are born in June (MIWG 1996). Goats are found in herds of 25-50 at mineral licks or feeding grounds from early summer through August, nursery groups of females and juveniles are from 2-25 individuals. Adult males are often solitary. As summer progresses, goats disperse and groups get smaller (Simpson *et al.* 1993). The species is yellow-listed provincially and is regionally important because it requires older age class forests for winter cover.

This document provides a preliminary description of the seasonal habitat requirements of mountain goats in the Nilkitkwa River study area. The intent of this report is to help provide a consistent approach when applying habitat suitability/capability ratings in the field as part of the Terrestrial Ecosystem Mapping (TEM) project. Seasonally important habitat attributes have been described and potentially high value ecosystem units identified for each of the biogeoclimatic subzones that occur in the Nilkitkwa River study area. The model focuses on habitat attributes that are measurable on a polygon basis and therefore represent primarily stand-level ratings.

Critical Seasons

For the purposes of the model, 2 seasons are defined, **growing** (April-September) and **dormant** (October-March).

Migration

Mountain goats undergo seasonal migrations of up to 16 km (MIWG 1996). Goats may cross inhospitable terrain such as ice fields (Nichols 1985).

Densities

Densities of up to 1.03-1.08 goats/km² have been recorded in the Telkwa and Babine Mountains, respectively (van Drimmelen 1986, 1985).

Diets

In the interior of the province, the summer diet is composed of alpine and subalpine grasses, sedges, rushes, forbs, shrubs such as *Vaccinium* (Hebert and Turnbull 1977). Winter diets also include (or may be based upon) conifers such as subalpine fir, mosses (*Hylocomium* spp., *Rhytidiadelphus* spp.), lichens (*Lobaria* sp.) and forbs (goldthread, bunchberry, trailing bramble) (MIWG 1996; Fox and Smith 1988). Natural mineral licks are visited for calcium, manganese, phosphorous and sodium (MIWG 1996).

Territoriality

Mountain goats do not defend territories. Average home range size of males in Alaska was 44.9 km², and that of females averaged 11.7 km² (Smith 1986).

CALIBRATION AND STANDARDIZATION IN BC

Best Habitats - SPK, NPR ecosections.

BGC Units - AT, CWH, ESSF, MH, MS, SBS, SWB (MIWG 1996).

Habitat Units (1:250,000) - AT, AV, CL, RO, TA.

Structural Stages - 1 (escape terrain), 2 (summer foraging), 6 (winter foraging and thermal cover), 7 (winter foraging and thermal cover) (MIWG 1996).

Provincial Distribution

Mountain goats are found throughout-much of the Rocky Mountains from 49th parallel to the Yukon border, the Cassiar Mountains in north-central BC, the Cariboo Mountains of the upper Fraser River system, the Purcell, Selkirk and Monashee Mountains of south-east BC and the Coast Mountains from the lower Fraser River to the extreme northwest portion of the province (MIWG 1996).

Information Sources

There is little local information available on goat biology. Survey information is available from the Telkwa Mountains (Van Drimmelen 1986); other studies from Alberta (McFetridge 1977), Alaska (Fox and Smith 1988; Smith and Bovee 1984), the Olympic Mountains (Houston *et al.* 1986), and other areas of the US were also used to develop the model.

Information Gaps

There is no BC data on winter diets, winter feeding habitat, or home range size.

SEASONAL NEEDS AND KEY HABITAT ATTRIBUTES

Assumptions

It is assumed that recorded habitat preferences reflect habitat requirements, and that habitat preferences are reflected in changes in individual fitness. Goats in the study area are assumed to have winter diets and habitat preferences similar to those recorded for goats in Alaska.

Limiting Habitat

Mountain goats are limited generally by the presence of suitable escape terrain (see above). In order of importance thereafter are forage availability and thermal cover (Fox *et al.* 1982). Wintering habitat providing low snow accumulations and escape terrain interspersed with forage units is limiting (especially in higher-than-normal snowfall years).

Security Habitat

Security cover in both growing and dormant seasons is composed of cliffs or rock faces with >80% slope. Cliffs >5 km in length have been rated high as mountain goat habitat, 1-5 km of cliffs has been rated moderate, 0-1 km of cliffs has been rated low (Van Drimmelen 1986). Avalanche chutes may be important indicators of suitable terrain. Undisturbed forage areas nearby are critical (Forest Practices Code 1996).

Dormant Habitat

- must be within 500 m of cliff or rock face escape terrain. Goats use lower elevations in winter (Smith 1977) and may descend to as low as 300 m elevation if forced by snow (Houston *et al.* 1986). Coastal goats generally winter below 1500 m (MIWG 1996). Southern or southwestern aspects on subalpine winter range are preferred (Simpson *et al.* 1993). On alpine winter range, goats prefer windblown alpine tundra ridgetops and northfacing cliffs and outcrops where snow does not accumulate (Adams and Bailey 1980). Goats avoid areas with snow depths >50 cm (MIWG 1996). Habitat used for thermal cover is characterized by mature timber on steep south or west-facing slopes, with increased preference for commercial old-growth forest (Smith 1986). Goats prefer areas without persistent or melt-crusted snow where cliffs are interspersed with tundra above treeline or with mountain shrub or sparse conifer habitats below treeline (Adams and Bailey 1980). Goats will use caves for cover when wind-driven rain or sleet occurs (Smith 1977). Complexes of security, thermal and feeding habitat are most valuable for goats. The best coastal winter ranges are provided by steep habitats offering a variety of aspects and timber stringer/rock outcrop complexes (K. Brunt, pers. comm.)

Growing Habitat

Goats use higher elevations in summer. Avalanche chutes, alpine and subalpine meadows and early structural stages, and talus slopes are used for foraging. When the weather is hot and sunny, north-facing cliffs may be used for thermal cover. Feeding habitats must be within 500 m of cliff or rock face security cover (see above). Kidding habitats are the most rugged portions of cliff areas (McFetridge 1977). Complexes of security and feeding habitat are most valuable for goats.

Confounding Factors

Snow depth strongly influences goat movements and habitat use, so habitat use will vary from year to year.

SUMMARY OF KEY SEASONAL HABITAT ATTRIBUTES (Table O1)

Dormant habitat is south or southwest aspect steep RO or CL (security cover) adjacent to mature (structural stages 6-7) coniferous forest (thermal and feeding) or caves, OR windblown ridgetops above treeline on any aspect.

Growing habitat is young seral stage alpine and subalpine meadow, grassland, avalanche chute, or talus (feeding habitat) within 500 m of steep RO or CL (security and thermal cover).

Table O1. Summary of habitat requirements for mountain goats in the study area.

Habitat Use	Specific Attributes Required	Structural Stage
Security Cover (all seasons)	rock or cliff; >80% slope; timber stringers	0-2; complexed with 6-7
Feeding (growing season)	early successional stages; adjacent to security cover	1-2
Feeding (dormant season)	steep, mature to old-growth forest with dense canopy adjacent to security cover; presence of <i>Lobaria</i> lichens, <i>Rhytidiadelphus</i> and <i>Hylocomium</i> mosses	6-7
Thermal Habitat (dormant season)	steep, mature to old-growth forest with dense canopy adjacent to security cover caves; windswept ridges	6-7

DRAFT ECOSYSTEM RATINGS

Assumptions

It is assumed that the regional field guide (Banner *et al.* 1993) accurately predicts ecosystem unit characteristics within the study area. We assume that recorded habitat preferences reflect habitat requirements, and that forage plant availability is correctly predicted by the site unit. We also assume that habitat selection has significant effects on fitness of individuals.

Ratings are provided for both the growing season and the dormant season. Goats are assumed to move to higher elevations (AT and ESSF habitats) during the growing season. As the highest quality mountain goat habitat provincially is in the eastern Rocky Mountains, habitats within the study area were rated a maximum of 2.

Potential High Value Growing Season Ecosystem Units

Security Cover

Best units: steep RO, CL in all three subzones.

Poor to nil units: all with gentle or no slope.

Feeding Habitat

Best units: RO, CL, TA; (all subzones); AT; structural stages 1-3 of FB, FC, LC, SL, HH, FT (ESSFmc).

Poor to nil units: Wetlands or moist forested habitats in toe positions (SBSmc2 BF, SD, SH, SS, CF, WT; ESSFmc SH, SS, CF, CS, WT, BF); structural stages 4-7.

Potential High Value Dormant Season Ecosystem Units

Feeding Habitat (dormant season)

Best units: AT and structural stages 1-2 of FC, LC, HH in the ESSFmc, which provide windblown ridge/crest habitat; structural stages 6-7 of FB, FD, FT, FO of the ESSFmc2 due to good tree growth; structural stages 6-7 of SB, TC,SO,SD due to good tree growth.

Poor to nil units: wetlands or open, gently sloped areas where snow accumulates (SBSmc2 BF, SD, SH, SS, CF, CA, WT; ESSFmc SH, SS, CF, CS, WT, BF).

Thermal Cover (dormant season)

Best units: AT and structural stages 1-2 of FC, LC, HH in the ESSFmc, which provide windblown ridge habitat; structural stages 6-7 of FB, FD, FT, FO of the ESSFmc2 due to good tree growth; structural stages 6-7 of SB, TC,SO,SD due to good tree growth.

Rating Scheme

A six class rating scheme (1=very high; 2=high; 3=moderate; 4=low; 5=very low; 6=nil) will be used for the model.

Ratings will be assigned for thermal cover (TH); security cover (SH); and feeding (FD); when TH and SH values can not be separated, the habitat will be rated for both and the code ST will be used. These codes correspond to the codes on the new Wildlife Habitat Assessment Form which will be used to assign ratings to habitats visited during field surveys.

Preliminary Ecosystem Ratings for Mountain Goats in the Growing Season (Appendix O1).

Rate for Thermal and Security cover (ST) and Feeding (FD).

Preliminary Ecosystem Ratings for Mountain Goats in the Dormant Season (Appendix O2).

Rate for Thermal Cover (TH), Security cover (SH) and Feeding (FD).

Map Adjustments

- If RO or CL habitat is <60% slope, rate nil for security cover.
- Feeding habitat and thermal cover must be complexed with suitable security cover OR adjacent to suitable security cover, or else rate nil.
- RO or CL habitat suitable as security cover, <1km in length and not adjacent to other suitable security cover should be rated 5SH. Security cover 1-5 km in length should be rated 3SH. Security cover >5km in length should be rated 2SH.
- Dormant season thermal cover habitat (forested)- canopy closure 40-50% rate 5TH, canopy closure 50-60% rate 4TH, canopy closure 60-70% rate 3TH, canopy closure >70% rate 2TH.

Field Sampling Scheme

Attributes important to mountain goats are readily recorded on standard vegetation and site description forms (Table O2).

Table O2. Field sampling scheme for mountain goat habitat.

Attribute	Sample Method
steep slopes	recorded on site description form
canopy closure	recorded on vegetation description form
slope position	recorded on site description form
structural stage	recorded on vegetation description form

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Appendix O1. Preliminary Habitat Capability Ratings for Mountain Goats in the Nilkitkwa Study Area during the Growing Season.

AT: 2FD; 4ST.

Structural stage	ESSFmc									
	site unit									
	01	02	03	04	05	06	07	09	10	
	FB	LC	FC	HH	FT	FO	FD	HG	FH	
0										3S
1	3FD;6ST	2FD;6ST	2FD;6ST	2FD;6ST	3FD;6ST	4FD;6ST	3FD;6ST	6	5FD;6ST	3S
2	3FD;6ST	2FD;6ST	2FD;6ST	2FD;6ST	3FD;6ST	4FD;6ST	3FD;6ST	6	5FD;6ST	3S
3	3FD;6ST	3FD;6ST	3FD;6ST	3FD;6ST	3FD;6ST	5FD;6ST	5FD;6ST	6	5FD;6ST	5S
4	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	6	5FD;6ST	6	6	
5	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	6	5FD;6ST	6	6	
6	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	6	5FD;6ST	6	6	
7	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	5FD;6ST	6	5FD;6ST	6	6	

Structural stage	SBSmc2									
	site unit									
	01	02	03	05	06	07	09	10	12	
	SB	PH	BM	TC	SO	BF	SD	SH	SS	RO
0										4ST; 4
1	5FD;6ST	5FD;6ST	5FD;6ST	4FD;6ST	5FD;6ST	6	6	6	6	
2	5FD; 6ST	5FD;6ST	5FD; 6ST	4FD; 6ST	5FD; 6ST	6	6	6	6	
3	5FD; 6ST	5FD;6ST	5FD; 6ST	4FD; 6ST	5FD; 6ST	6	6	6	6	
4	6	6	6	6	6	6	6	6	6	
5	6	6	6	6	6	6	6	6	6	
6	6	6	6	6	6	6	6	6	6	
7	6	6	6	6	6	6	6	6	6	

Appendix O2. Preliminary Habitat Capability Ratings for Mountain Goats in the Nilkitkwa Study Area during the Dormant Season.

AT: 3FD; 3ST

		ESSFmc							
		site unit							
structural stage		01	02	03	04	05	06	07	08
		FB	LC	FC	HH	FT	FO	FD	FI
0									
1		6	3FD; 3ST	3FD; 3ST	3FD; 3ST	6	6	6	
2		6	3FD; 3ST	3FD; 3ST	3FD; 3ST	6	6	6	
3		6	4FD; 6ST	4FD; 6ST	4FD; 6ST	6	6	6	
4		6	6	6	6	6	6	6	
5		6	6	6	6	6	6	6	
6		3FD;3ST	6	6	6	3FD; 3ST	3FD; 3ST	3FD; 3ST	
7		2TH;2FD	6	6	6	2TH;2FD	2TH;2FD	2TH;2FD	

		SBSmc2									
		site unit									
Structural stage		01	02	03	05	06	07	09	10	12	
		SB	PH	BM	TC	SO	BF	SD	SH	SS	RO
0											2ST; 2
1		6	6	6	6	6	6	6	6	6	
2		6	6	6	6	6	6	6	6	6	
3		6	6	6	6	6	6	6	6	6	
4		6	6	6	6	6	6	6	6	6	
5		5TH;5FD	6	6	5TH;5FD	5TH;5FD	6	5TH;5FD	6	6	
6		4TH;4FD	6	6	4TH;4FD	4TH;4FD	6	4TH;4FD	6	6	
7		3TH;3FD	6	6	3TH;3FD	3TH;3FD	6	3TH;3FD	6	6	