

*C. E. Wilson*

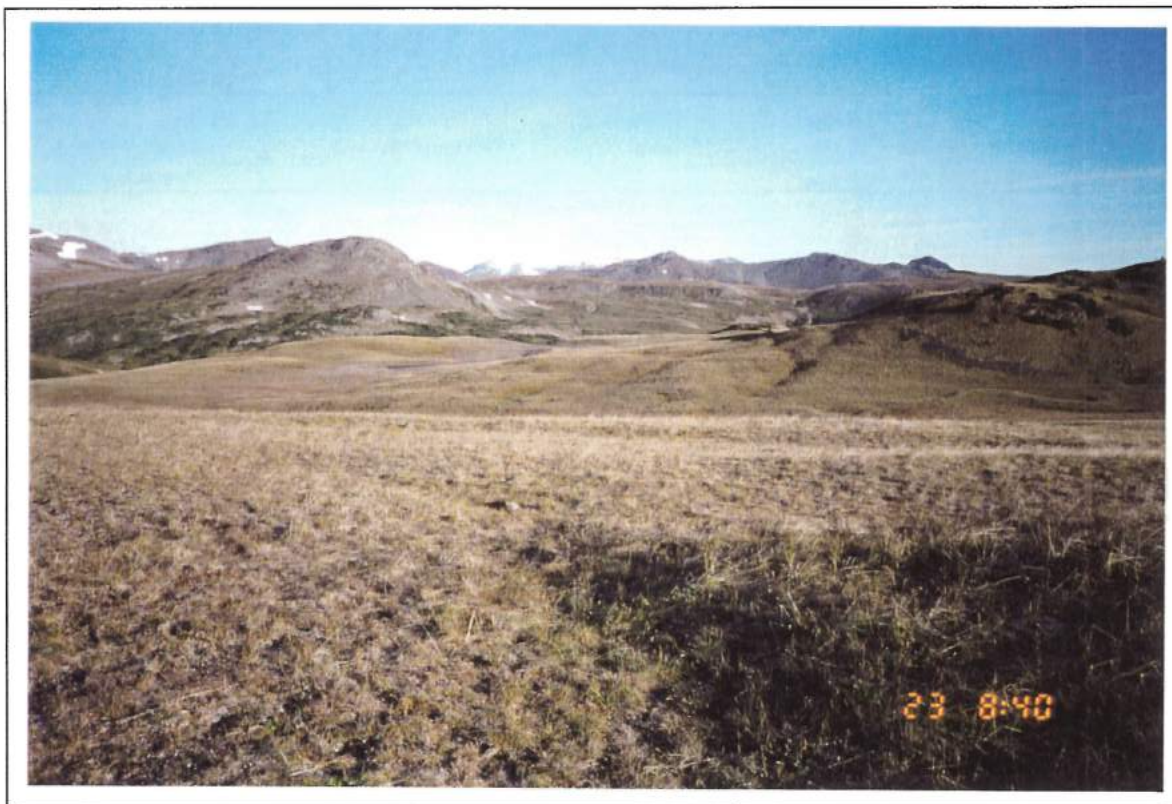
***LICHEN ABUNDANCE  
INVENTORY OF THE  
TELKWA RANGE***

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The sedge, grass and lichen covered Alpine Tundra of the Telkwa Range

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## INTRODUCTION

RJA Forestry Ltd. was hired to conduct a lichen abundance inventory of the Telkwa Range during September of 1996. The inventory was part of a larger, BC Environment study regarding the survival, habitat use and productivity of the Telkwa Range caribou herd. The objective of the lichen inventory was to determine the relative abundance of arboreal forage lichens and terrestrial lichens. The results of this study will be used in conjunction with other ongoing studies to determine potential winter range for caribou.

Two types of Arboreal lichen were surveyed in this project: *Bryoria* and *Alectoria*. Both of these lichens were usually found festooning from trees branches. Lichens are essential to the survival of woodland caribou, particularly during winter months when other food sources are scarce. The winter snow pack determines the height at which caribou can reach to forage on arboreal lichens. The maximum height used is 4.5 m.

Arboreal lichen abundance was classified on a 6-class rating system according to "Estimating The Abundance of Arboreal Forage Lichens" (June 1992). A Class 0 tree has no arboreal lichen, not even a wisp, below 4.5 m and a Class 5 tree has 625 g or more of arboreal lichen below 4.5 m. Overall, arboreal forage lichen abundance was low; very few Class 4 and 5 trees were present and *Bryoria* was found to be the dominant arboreal lichen genus.

Additional information was also collected on the abundance of terrestrial lichens by placing several ground plots within the larger arboreal lichen plots. Terrestrial lichens are a food source for woodland caribou as well as arboreal lichens, particularly *Cladonia* species. Caribou are adept at detecting lichen beneath the snow after which they will paw through the snow to uncover the lichen.

The following report outlines the procedure and results of the inventory.

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## DESCRIPTION OF STUDY AREA

### *Location*

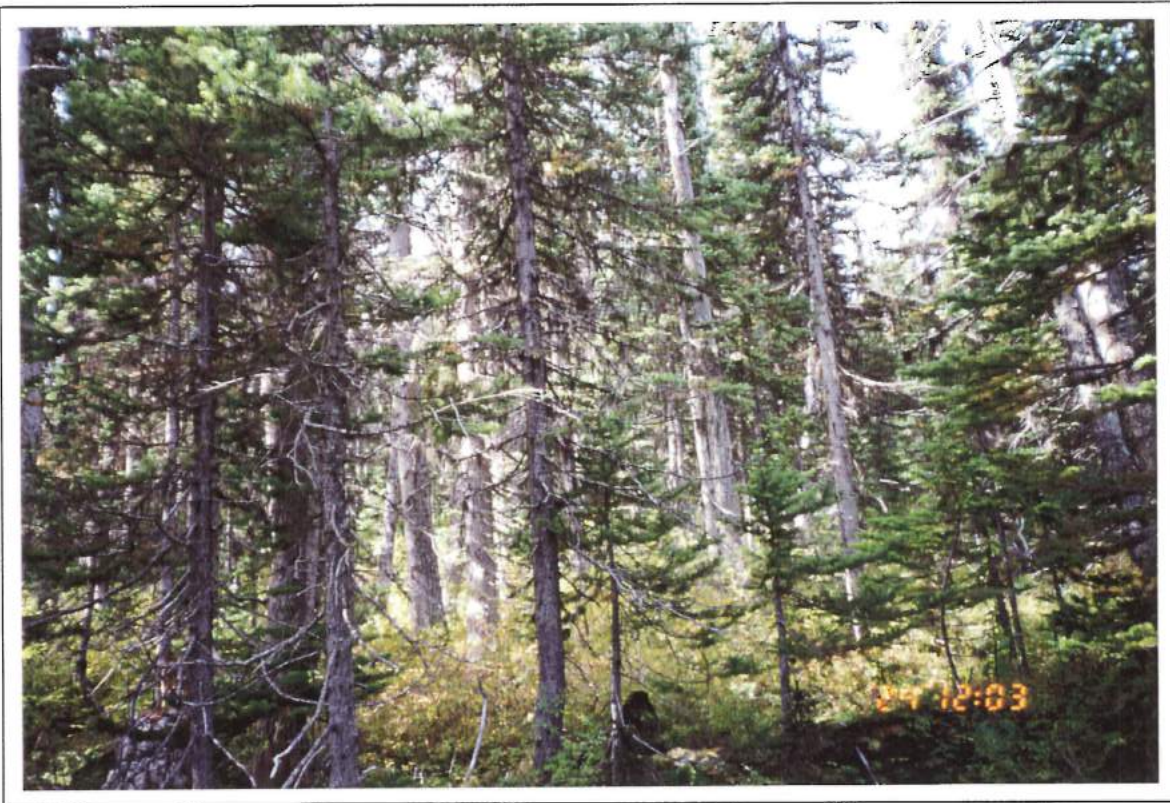
The Telkwa Range is located approximately 50 km south of Smithers B.C. and east of the Howson Range. The Telkwa Range is composed of vast, open plateaus and rolling hills covered with alpine sedges, grasses and lichens. The highest peak on the Telkwas is approximately 2300 m and is hidden by glaciers. The Telkwa Range was divided into two main areas: east ranges and west ranges. The ranges are separated by Mooseskin Johnny Lake and Howson Creek to the north and Thautil River to the south.

### *Biogeoclimatic*

The Telkwa Range is located in the Bulkley Range ecoregion and includes two biogeoclimatic zones: the Engelmann Spruce Subalpine Fir (ESSF) zone which lies below the Alpine Tundra (AT) zone. The ESSF moist, cold (ESSFmc) subzone characterizes the ESSF zone in this area and begins at approximately 1200 m continuing until approximately 1800 m. Between the ESSFmc and the AT lies the ESSFmc parkland (ESSFmcp) subzone. The parkland subzone appears as a transitional area between the forested timber below and the open, treeless expanse of the alpine above. The ESSFmc is characterized by cold winter temperatures and a light snowpack, summers tend to be cool but fairly dry, (A Field Guide To Site Identification and Interpretation of the Prince Rupert Forest Region, 1993).

### Forests

The dominant tree species are subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) with a minor component of hybrid white spruce (*Picea engelmannii x glauca*) and lodgepole pine (*Pinus contorta*). Mature stands consist of widely spaced trees with a relatively open canopy and a high ratio of live trees to dead or broken trees. Younger stands were typically denser but the canopy was still relatively open. The understory varies from a thick, tangled mass of false azalea (*Menzessia ferruginea*) to a continuous carpet of moss such as Heron's Bill Moss (*Dicranum fuscescens*), step moss (*Hylocomnium splendens*), and *Barbilophozia* spp.. *Vaccinium* species were also present throughout. The herb cover was poorly developed in submesic to mesic sites and includes such species as heart-leaved arnica (*Arnica cordifolia*) and one-sided winter green (*Orthelia secunda*). Wetter sites tend to produce a dense, herbaceous species mix of hellebore (*Veratrum viride*), valerian (*Valeriana sitchensis*), viola (*Viola* sp.), and meadow rue (*Thalictrum occidentale*) (**Figure 1**).

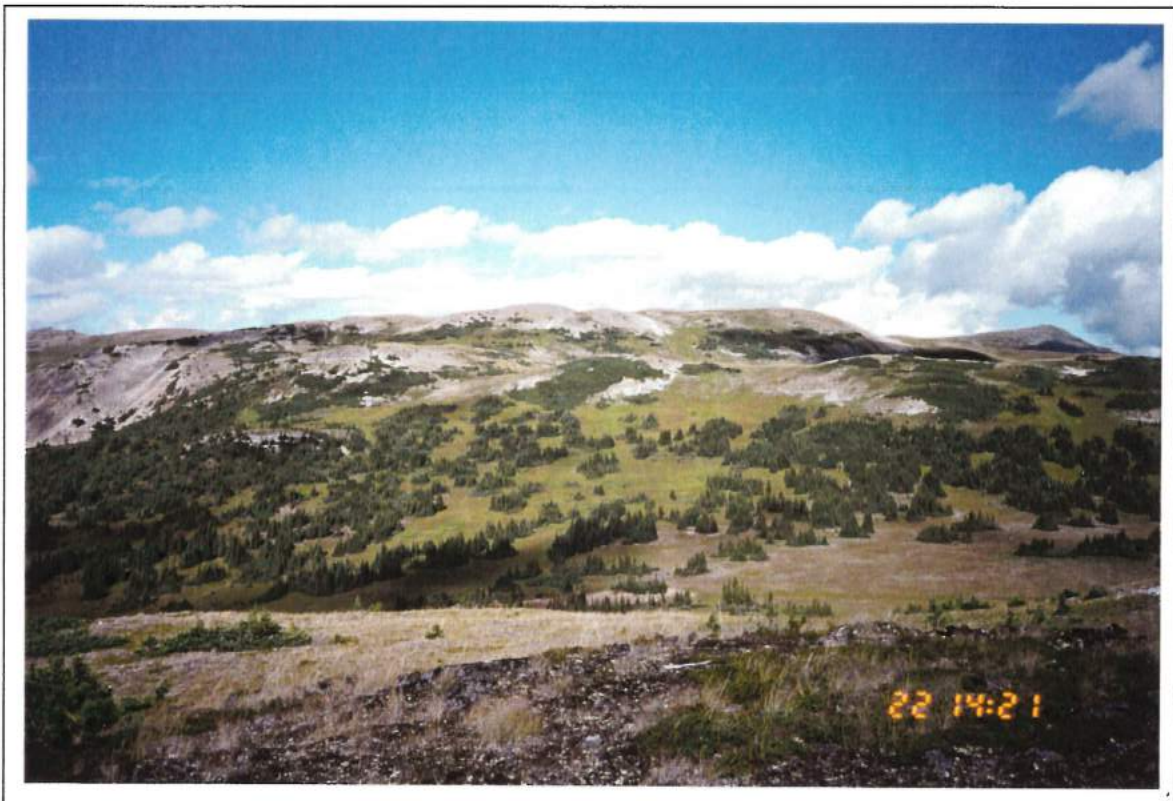


**Figure 1:** Typical Subalpine fir forest.

### ***Parkland***

At higher elevations and harsher environmental extremes, the trees gradually thin out, beginning the parkland subzone. The parkland is a transitional ecosystem between the true alpine and the forest below. The progression from forest to the treeless alpine tundra was generally characterized by a gradual transition, although abrupt transitions do occur.

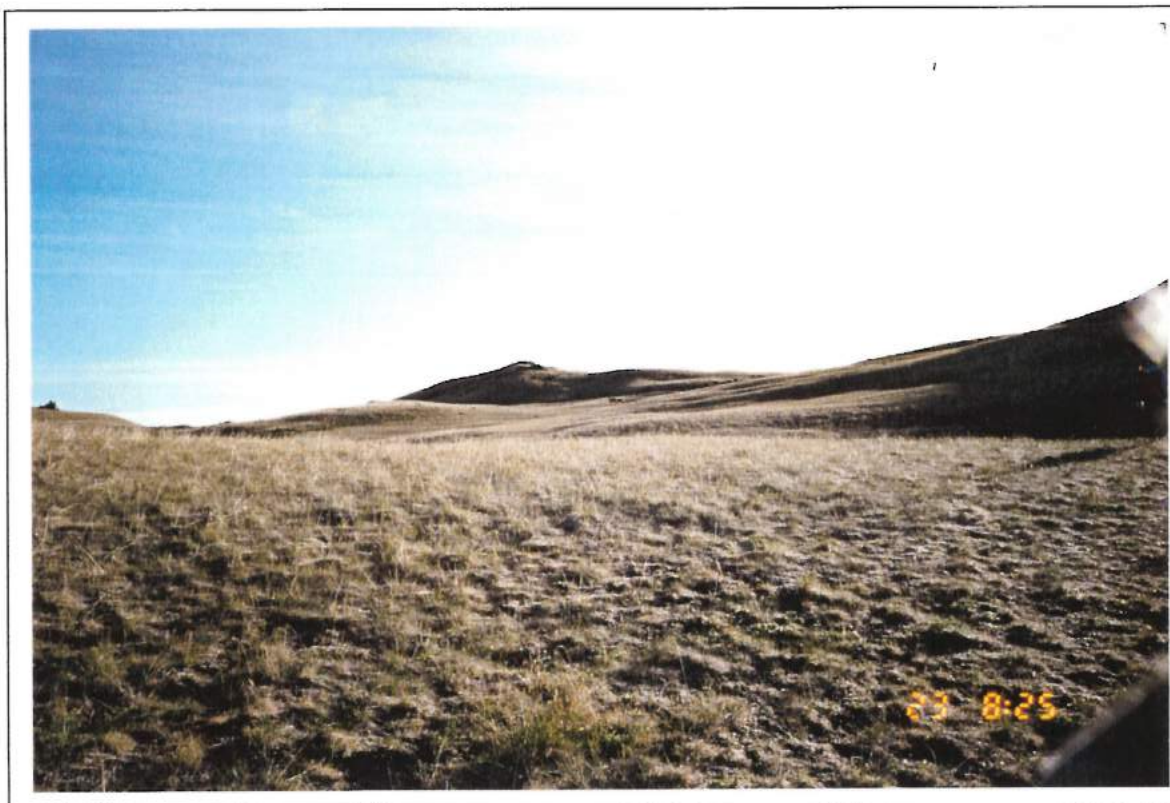
The progression was commonly associated with a decrease in tree height due to severe stress, wind and snow press. Clumps of trees, varying in size and distribution, were a common transitional pattern. These clumps appear as islands of trees surrounded by a ring of shorter trees also known as krummholtz trees. Tree islands were commonly interspersed by wet seepage areas, wetlands or streams. In other areas, the parkland zone was an abrupt transition from forest to alpine tundra. In this case the parkland occurs as an extremely dense, twisted field of krummholtz trees about waist high. Movement through this type of parkland ecosystem was limited to narrow trails through a tangle of tough but flexible low lying limbs (**Figure 2**).



**Figure 2:** Parkland; gradual transition.

### ***Alpine***

A large portion of the alpine tundra of the Telkwa Range is characterized by vast open plateaus. Huge expanses of open fields exhibit almost a "Yukon tundra - type" environment. Mountain peaks are not "peaks" characteristic of the rugged coastal mountains, but flat, table top plateaus with no vegetation cover taller than 30 cm. Sedges, grasses, lichens and other hardy, low lying species dominate this inhospitable environment. Movement was limited only by the valleys that run between the open ridge tops (**Figure 3**).



**Figure 3:** Typical Alpine Tundra plateau.

### **Environment**

Environmental impact in the form of mining, logging and recreation is present in the area. Abandoned mines and old machine tracks in the alpine are remnants of past mineral explorations. Current geological surveys are still occurring and actively searching for minerals. Logging has reached into the high elevation ecosystems, particularly surrounding the eastern section of the Telkwas. The Telkwas are relatively accessible and recreational activities such as snowmobiling, ATVing, hunting, hiking and backcountry skiing are popular. Four by four trails continue beyond logging roads and are in turn followed by hiking trails. Several cabins were present including a trapper's cabin and a well maintained winter cabin at the back end of Starr Creek. **Figure 4** shows the trail from Mooseskin Johnny lake up into an alpine bowl. This photo was taken from Transect 17.



**Figure 4:** Looking west from Transect 17, a trail is evident up into the bowl.

### **Topography & Wildlife**

The slopes of the western range are generally steeper than the eastern range. Slopes were straight and unbroken with common rock outcrops, seepage sites and windthrow. The alpine to parkland transition is generally quite abrupt. Transects in this area include 21, 19, 18, and 17 (**Map I**). In this area the proportion of *Alectoria* to *Bryoria* was approximately equal. Wildlife evidence included visual observation of mountain goats above tree line, scattered in small herds along cliff ledges, and moose tracks and pellets visible in the wetlands. There was no caribou sign. Arboreal and terrestrial lichen abundance was low to moderate.



The eastern range of the Telkwas tends to be more rolling and hummocky than the western range; except for some ridges along the eastern slopes. Along the north, west and particularly the south side of the range, the terrain features are gentle, rolling hills. The transition from alpine to parkland to forest is very gradual. Arboreal lichen abundance is low overall except for Transect 16 on the northwest side and Transect 11 on the northeast side. Transects 16 and 11 both had the highest abundance of arboreal forage lichen. *Bryoria* was more abundant than *Alectoria*. Terrestrial lichen such as *Cladonia* and *Cladina* had a high percent cover on south aspects or on crest site positions, while genera such as *Peltigera* and *Nephroma* had a higher cover in wetter forested sites.

A caribou herd was sighted in the alpine along the eastern range, above Transect 5. Caribou tracks and pellets were also evident along the southern slopes of the eastern range. **Figure 6.** The southern slopes of the eastern range are notably characterized by wetland complexes and open, undulating terrain. Food, water, cover, and access are important wildlife habitat features in this area. In or near wetland ecosystems throughout the Telkwa Range, moose sign was very abundant. Tracks, pellets and browsed vegetation were abundant. Mountain goats were observed on rocky cliffs and ledges. Black bear and grizzly sign was noted in alpine areas along the southern slopes of the eastern range. Other species included red squirrels, marten, porcupine, rabbits, woodpeckers, chickadees, nuthatches and other song birds.



**Figure 7:** Woodland caribou tracks; Transect 5.

## METHODOLOGY

For this inventory, the manual "Estimating the Abundance of Arboreal Forage Lichens" (June 1992) was used. Additional project criteria regarding data collection were set by the Ministry of Environment, Lands and Parks.

### *Collection Of Existing Material*

During the preliminary stages of the project, all necessary information was gathered. This included such items as aerial photographs, 1:20 000 TRIM and wildlife capability maps and reference material.

### *Air Photo Preparation*

A sampling plan was completed based on a review of the aerial photographs. Approximate Transect locations, supplied by the project monitor, were transferred from the TRIM maps to the aerial photos. The feasibility and location of each Transect was assessed using the stereoscope. Transects generally started at treeline and traversed along the ridges. Accessible drop-off and pick-up locations determined the Transect length and bearing. A total of 22 Transects were initially planned but only 20 Transects were sampled

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### *Field Work*

A two person survey crew carried out the field component of this project. Access into the area was by helicopter. The survey team was transported to another ridge (i.e. transect location) at midday resulting in an average of two completed Transects per day.

### **Sampling methodology**

The survey team was dropped off above treeline. A transect, at a predetermined bearing, was followed. Each transect began when the majority of trees were taller than 4.5 m. All bearings and pick-up sites were determined by aerial photograph interpretation prior to running the Transect. This prevented any lost time due to non-traversable areas. Plot locations were spaced at 500 m intervals along the Transect line. The first plot was located at or near treeline where trees were on average, greater than 4.5 m tall.

At each sampling location, two types of plots were completed. The first type, a fixed-area plot, estimated the abundance of arboreal lichen per tree, while the second type, macro plots, estimated the percent cover of terrestrial lichen.

### **Fixed-Area Plots**

The fixed area was determined by measuring the radius required to include 5 to 10 trees per plot within the average stand dominated by trees greater than 4.5 m. This radius determined on the first day, remained constant throughout the entire project and was 4.0 m.

The plots were established by counting every tree that fell within the 4.0 m radius. Tree Number 1 was always the first tree north of the plot, and the other trees were numbered clockwise from the first tree. All trees greater than 4.5 m were included, as well as dead snags, these being recorded in the data as dead. Lichen abundance was only estimated below a height of 4.5 m on the tree. The 4.5 m mark was determined by using a 3 m collapsible tent pole held 1.5 m above the ground at the base of every tree.

The classification ratings and photographs within the field guide were used to estimate the abundance of arboreal lichen below 4.5 m for each tree. Arboreal lichen species include *Alectoria spp.* and *Bryoria spp.*. The percentage of *Alectoria* versus *Bryoria* was recorded for

every tree. A six class system was used depending on the percentage of live and dead branches below 4.5 m. Each class corresponds to a quantity range of lichen measured in grams. For example, a Class 4 rating corresponds to 250 to 625 g of lichen. Another unit of measure used consisted of measuring the number of 5 g clumps present. Photographic references were used to determine the size of a 5 g clump (**Table 1**).

**Table 1.** Relationship of Lichen Classes to Biomass (*Estimating the Abundance of Arboreal Forage Lichens* pg. 21).

Class	Quantity of lichen (g)	Quantity of lichen (5-g clumps)
0	0	0
1	> 0 - 5	> 0 - 1
2	> 5 - 50	> 1 - 10
3	> 50 - 250	> 10 - 50
4	> 250 - 625	> 50 - 125
5	> 625	> 125

Each of the above lichen classes was then associated with the growth form and vigour of each tree. A three series system is used to classify the type of branches below 4.5 m (**Table 2**).

**Table 2:** Branch Type Series, (*Estimating the Abundance of Arboreal Forage Lichens* pg. 4).

Series A	Mostly Live
Series B	Mixed Living and Dead Branches
Series C	Mostly Dead Branches

#### Data Collection:

The data collected at each fixed plot included the following: date, transect number, transect bearing, plot number, slope, aspect, longitude and latitude (NAD 83), tree number, type of branches, arboreal abundance class, percent *Alectoria* and percent *Bryoria*, and a photograph.

### **Macro Plots**

For each fixed area plot, four macro plots were also completed. At each site a random number was generated using a random numbers table. The random number determined the bearing from plot center to Macro Plot Number 1. Four macro plots were placed along this bearing at intervals of 2 m. At each macro plot, the tent pole was used to make a 0.5 m square on the ground for a total area of 0.25 square meters. The percentage cover of terrestrial lichen, identified to genus, was recorded within each 0.5 m square. The percent cover was estimated using the "Comparison Charts For Visual Estimation Of Foliage Cover" found in "Describing Ecosystems in the Field". Any unidentifiable lichens were collected, recorded as unknowns and identified at a later date.

#### Data Collection

Other collected data included: date, transect number, plot number, macro plot number, random bearing, terrestrial lichen genera, and percent cover of non-lichen ground cover such as forbes, grasses, moss, shrubs, dead wood, litter, rocks, fungi and water.

## Data

All of the raw data collected has been transferred from field cards to an Excel spreadsheet format as per request of the Ministry of Environment, Lands and Parks (**Appendix I**). Each spreadsheet page corresponds to one arboreal lichen plot and four macro plots. The original plot cards will also be provided to the ministry and are enclosed in **Appendix II**.

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## RESULTS & DISCUSSION

A total of 20 Transects were surveyed along 20 ridges (**Map I**). Each Transect varied in length depending on terrain features and accessibility. The majority of the transects were 2 to 3 km long with an average of 5 fixed plots and 20 macro plots per Transect.

The results of the inventory are summarized as follows:

### Arboreal Lichen:

- Arboreal lichen abundance was low.
- The percentage of Class 4 and 5 trees that support high amounts of *Alectoria* and *Bryoria* were low.
- Class 1 to 3 trees were the most common.
- Trees with absolutely no arboreal lichen were rare.
- The distribution of arboreal lichen was not even, varying from ridge to ridge.
- Transects 11 and 16 (see Map I) had the highest abundance of lichen of the 20 transects sampled.
- *Bryoria* was by far the dominant arboreal lichen species.

### Terrestrial Lichen

- Terrestrial lichen abundance was low to moderate.
- The distribution of terrestrial lichen was not even.
- Transects 1, 10 and 15 were rated high for an average percent cover of terrestrial lichens per macroplot.
- The predominant terrestrial lichen species were *Cladonia*, *Peltigera*, *Nehproma* and *Cladina*.

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## ARBOREAL LICHEN

### Arboreal Lichen Abundance

The abundance of arboreal lichen was low based on the data collected and general observations. Of 20 Transects 30% had a moderate abundance of arboreal lichen and 70% had a low abundance of arboreal lichen. The distribution of Class 4 and 5 trees was relatively low compared to the distribution of Class 1 to 3 trees. Class 4 and 5 trees made up only 11% of 931 trees sampled, Class 5 trees contributed less than 1% to that value. Class 1, 2 and 3 trees accounted for 88% of the trees sampled. Hence, the majority of trees had an average of 0.1 to 250 g of lichen below 4.5 m. Trees with absolutely no lichen were uncommon and made up just under 2% of the sample population. This was still more, however, than the number of Class 5 trees. **Chart 1** shows the distribution of lichen classes throughout the study area.

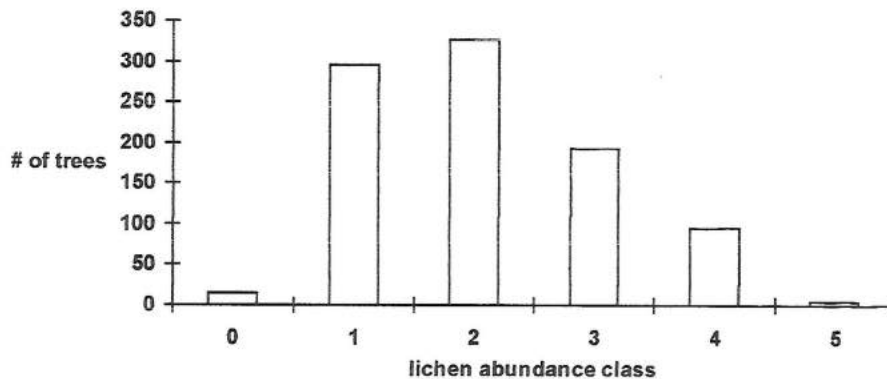


Chart 1: The number of trees per arboreal lichen class out of a total of 931 trees.

### The Distribution of Lichen Abundance Per Transect

Arboreal forage lichens were not equally distributed throughout the Telkwa Range. Some areas had more arboreal lichen than others. Sites with low abundance, moderate abundance and rare sites with high abundance are scattered throughout the area. The areas with the highest abundance of arboreal lichen included the northwestern ridge east of Mooseskin Johnny Lake (Transect 16) and the northeastern ridge at the headwaters of Goathorn Creek (Transect 11).

Two other trends were determined based on sampling data and general observation. One, the distribution along a Transect was not even; the abundance of arboreal lichen had a tendency to decrease with decreasing elevation and the variability between plots along a Transect was quite high. There were definitely plots within Transects that had a high abundance of arboreal lichen. For example, Transect 11, plot 2 had primarily (>50%) class 4 and 5 trees as well as plots 4 and 5 along Transect 16. On average, however, the arboreal lichen abundance was moderate for those two Transects.

Two, older trees had a higher abundance of arboreal forage lichen than younger trees. It appeared that the young regenerating trees had very little lichen compared to several older trees. This may be a function of inoculation periods and lichen growth rates. Quantitative data was not gathered to support this hypothesis.

### Ratings

The ratings were arbitrarily assigned relative to the study area. The results were based on sampled Transects. Transects with primarily (>50%) Class 4 and 5 trees were given a high rating, Transects with primarily Class 3 and 4 trees were given a moderate rating, and Transects with primarily Class 0, 1, 2 and 3 trees were given a low rating.

Transects 11 and 16 were given a moderate rating, although these transects stood apart from the other 18. It was visually obvious that these areas had a much higher abundance of arboreal lichen than other Transects even though the percent of Class 4 and 5 trees only made up 42% of the total. Transects 1, 3, 4, and 10 were also rated as moderate lichen abundance areas. Of 20 Transects sampled, 30% of the area had moderate amounts of arboreal forage lichen.

Transects 2, 5, 6, 7, 8, 9, 13, 14, 15, 17, 18, 19, 21 and 22 have been rated as low arboreal lichen abundance areas. These transects were quite common in the study area. Of 20

Transects, 70% had a low abundance of arboreal lichen. Few Transects (20%) had trees with absolutely no lichen (Class 0). Out of a total of 931 trees, 2% were class 0.

**Table 3** shows the arboreal lichen class distribution among the Transects surveyed. The number of trees per class are given and a total of 931 trees were sampled.

**Table 3: The Distribution of Arboreal Lichen Classes**

Transect #	# of Trees Class 0	# of Trees Class 1	# of Trees Class 2	# of Trees Class 3	# of Trees Class 4	# of Trees Class 5
1	0	5	16	11	12	0
2	0	17	25	11	0	0
3	0	1	4	18	15	0
4	0	1	7	16	3	0
5	0	4	34	10	0	0
6	6	18	22	0	0	0
7	2	42	26	1	0	0
8	0	10	14	11	3	0
9	0	18	25	14	3	0
10	0	1	11	16	7	0
11	0	7	1	17	11	4
13	0	33	12	6	3	0
14	0	20	20	7	0	0
15	0	23	6	6	5	0
16	0	10	0	28	25	1
17	0	6	4	4	0	0
18	4	36	7	0	0	0
19	3	10	6	4	3	0
21	0	4	6	5	5	0
22	0	31	11	8	0	0

### Caribou Daily Intake

A low abundance was characterized by a majority of Class 0, 1, 2 and/or 3 trees. In these cases, even if every tree were a Class 3, the abundance of arboreal forage lichen would still be low. For example, a stand density of 400 stems per hectare could provide a maximum of 75,000 g per ha of lichen available below 4.5 m to woodland caribou. This was determined by multiplying the grams of lichen per Class 3 trees by 400 stems per hectare. According to the manual, a Class 3 tree has a maximum biomass of 250 grams of arboreal lichen. An 80 kg caribou may eat 1300 to 5000 g of lichen per day depending on the time of year and other available food sources (Holleman, Luick and White 1979). Therefore, one hectare could provide one caribou with 20 - 77 days of food.

A moderate rating would consist of primarily Class 3 and 4 trees. Since Class 4 trees correspond to >250-625 g per tree, a stand density of 400 trees per hectare would provide a maximum of 187,500 g per hectare of arboreal forage lichen. One hectare could potentially provide 50 - 192 days of available lichen per caribou.

Following this analysis a high rating of primarily Class 5 trees would result in a minimum of 187,500 g per hectare of lichen. Class 5 trees correspond to >625 g of arboreal lichen per tree and an absolute maximum value is difficult to ascertain without a quantitative lichen inventory.

However, if there were 1000 g of lichen per tree and 400 stems per hectare, one hectare could provide 80 - 308 days of available lichen.

Considering the growth rate of lichen, only a few centimeters annually at best, it would be difficult for a large herd of woodland caribou to survive solely on arboreal forage lichens in a low abundance area for more than one season. This suggests that terrestrial lichens may be a very important supplementary food source in the Telkwa Range and Caribou might also be forced to migrate seasonally to lower elevations to obtain lichens.

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### Transect Characteristics

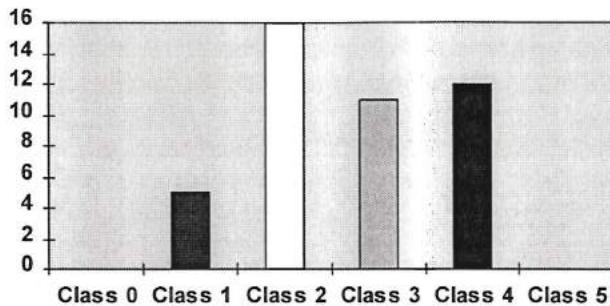
A total of 22 Transects were planned but only 20 Transects were sampled. The Transects are numbered from 1 - 22 but numbers 12 and 20 were omitted due to time constraints. Transects representative of Transects 12 and 20 were sampled however. The abundance of arboreal lichen was categorized in three classes: high, medium and low since absolute lichen values were not possible. Each arboreal lichen class corresponded to a range of values. No direct comparison can be made using absolute values of biomass in grams, unless a quantitative study is carried out.

The distribution of branch types varies along each Transect. There were three branch type series; A, B and C and these series correspond to the branches present below 4.5 m. Series A indicates that most of the branches were living. Series B indicates that there were mixed living and dead branches and series C indicates that most of the branches were dead.

The following section provides a brief description of each Transect, the abundance of arboreal lichen (**Map II**), distribution of lichen classes and type of branches present.

Transect 1: This Transect was along a southwest facing ridge and ran at 236°. The ridge is on an isolated mountain at the southern end of the Telkwa Range. The top of this mountain is a flat plateau interspersed with wetlands. Along the ridge, the aspect was warm and the slope is gentle. Walking was unconstrained by low amounts of coarse woody debris and a poorly developed understory. The soil was dry and shallow with frequent rock out crops. Xeric sites were common and characterized by dry indicator species including several terrestrial lichens. Meadows and swamps of various sizes cover the landscape. Moose sign was abundant as pellets, tracks and browsed vegetation.

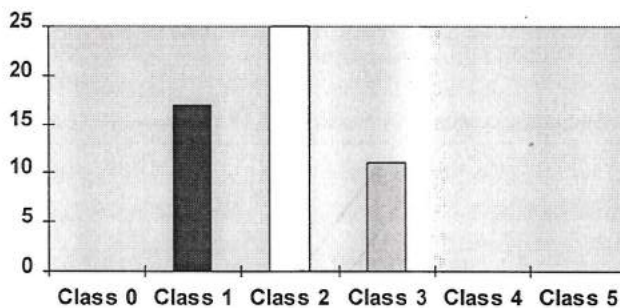
The abundance of arboreal forage lichen below 4.5 m was moderate. Class 5 trees were absent from all plots but several Class 2, 3, and 4 trees were present. Of 5 plots and 44 trees sampled, 36% were Class 2, 27% were Class 4 and 25% were Class 3 (**Chart 2**). Live branches and a mixture of dead and live branch types were present. Of 44 trees, 45% were Series B, 32% were Series A and 23% were Series C. Toward the lower elevation of the Transect, near a wetland, the number of dead branches increased.



**Chart 2:** The number of trees per lichen class for Transect 1.

Transect 2: This Transect was located at the southern tip of the Telkwa Range and ran at a southwest bearing of 231°. The slope is gentle most of the way until the steep banks of Houston Tommy Creek intersects the Transect. Game trails forge their way through dense shrubs along the shores of the creek. The terrain was covered by a thick subalpine fir forest mixed with short, snowpressed krummholz trees near the parkland and suppressed regenerating trees at the lower elevations. Forested wetlands (swamps) were common throughout.

The abundance of arboreal lichen was relatively low. No Class 4 or 5 trees were present. Of 6 plots and 53 trees, 47% were Class 2, 32% were Class 1 and 21% were Class 3 (**Chart 3**). Approximately 40% of the trees had dead branches below 4.5 m, 38% were a mixture and 23% were mostly live branches.

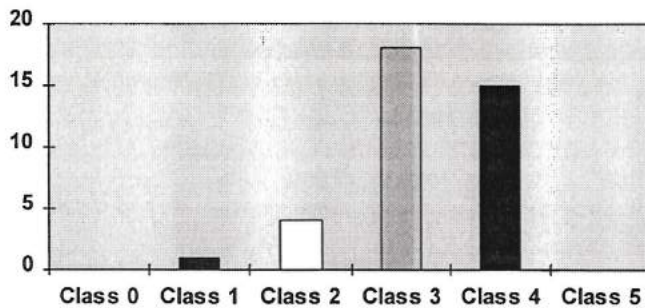


**Chart 3:** The number of trees per class for Transect 2.

Transect 3: This Transect was located on a ridge at the very southern tip of the Telkwa Range and has a southeasterly aspect. The Transect ran at 161°. The topography is a wide expanse of open, undulating and gently rolling terrain. Small ridges and crests expose bedrock through shallow soil while depressions display wet meadows, streams and ponds. Tree islands were numerous and dispersed on elevated microsites. Wildlife habitat was high, motility was unconstrained, escape cover was readily accessible and water was present. Caribou tracks were discovered in a wetland area along the Transect, as well as one moose antler.

Arboreal forage lichen abundance was moderate. Class 3 and 4 trees dominate the landscape. Of 4 plots and 38 trees, 39% were Class 4 and 40% were Class 3 (**Chart 4**). No Class 5 trees were present. Approximately 47% of the trees had a mixture of live and dead branches, 34% were live and 18% were dead.

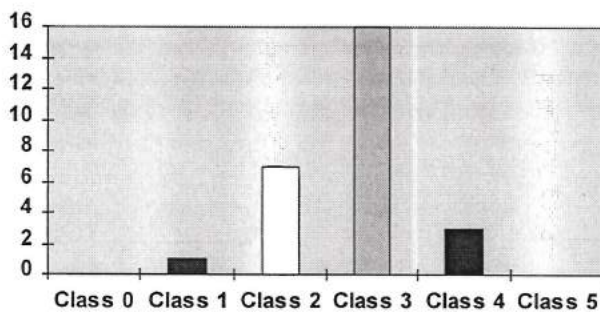




**Chart 4:** The number of trees per class for Transect 3.

Transect 4: This Transect was located at the southern end of the Telkwa Range facing a southeasterly direction. The Transect ran at 151°. The slope is gentle and rolling. The landscape was composed of large islands of trees and hummocks. Although many depressions were dry, several contained small lakes. This wide expanse of rolling hills is very characteristic of the southern end of the Telkwa Range. The combination of lakes, trees, and open sedge-covered hills appears to be prime wildlife habitat. Food, water, easy motility, escape terrain and cover were available.

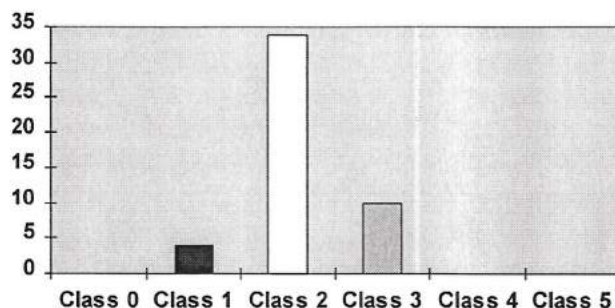
The abundance of arboreal lichen was moderate. Class 3 trees dominate the landscape. Of 2 plots and 27 trees, 59% were Class 3, 26% were Class 2 and 11% were Class 4. No Class 5 trees were present (**Chart 5**). Most of the trees had dead branches below 4.5 m. Approximately 46% of the trees had dead branches, 22% had a mixture of live and dead and 15% had mostly live.



**Chart 5:** The number of trees per class for Transect 4.

Transect 5: This Transect was located at the southern end of the Telkwa Range and ran east at a bearing of 93°. Above the tree line, there is a wide, open plateau composed of dry, windswept undulating terrain. Ten woodland caribou were sighted in the alpine as the helicopter approached. After the survey team landed, a closer view confirmed the number of caribou. The sex ratio was 8 females to 2 males. No young calves were present. The herd appeared healthy and no radio collars were visible. After approaching us, their curiosity waned and they gradually meandered off in a westerly direction. Judging from the landscape, the area is well used. Numerous pellets and tracks were present along this ridge.

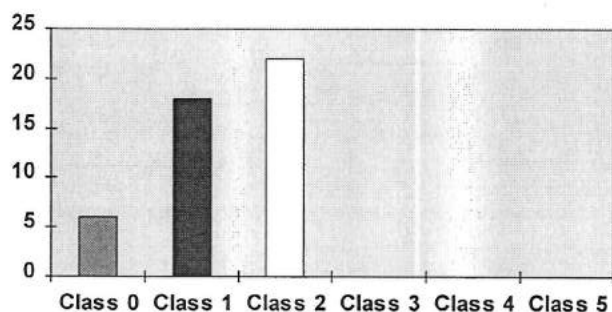
In the forested area below, the abundance of arboreal lichen was relatively low. Most of the trees were Class 2. Of 5 plots and 48 trees, 71% were Class 2, 21% were Class 3 and 8% were Class 1. No Class 4 or 5 trees were present (**Chart 6**). The number of trees with live branches below 4.5 m was only 9% of the 48 trees, while 38% were mostly dead and 44% were a mixture of live and dead.



**Chart 6:** The number of trees per class for Transect 5.

Transect 6: This Transect was located along a ridge on the eastern side of the Telkwa Range, near the southern end of the range and the bearing ran southeast at 109°. An extensive alpine plateau gradually transforms into forest. The upper half of the ridge is gently sloped. Soils are shallow and undulating terrain produces wet depressions. The canopy was open and regenerating trees were high. Along the lower half of the ridge, near a major gully, the slope gradient increases dramatically. Seepage sites were abundant, as were snags and coarse woody debris. A road was present at the bottom, below the creek. As it crosses the creek the road becomes a 4x4 ATV trail that ends near treeline. At the end of the ATV trail a cabin is present and from there a walking trail leads up into the alpine.

The abundance of arboreal forage lichen was relatively low. Of 5 plots and 46 trees, 48% were Class 2 and 39% were Class 1. No Class 3, 4 or 5 trees were present (**Chart 7**). The majority of the trees had live branches below 4.5 m or 58%, while 36% were mostly dead and 33% were a mixture.

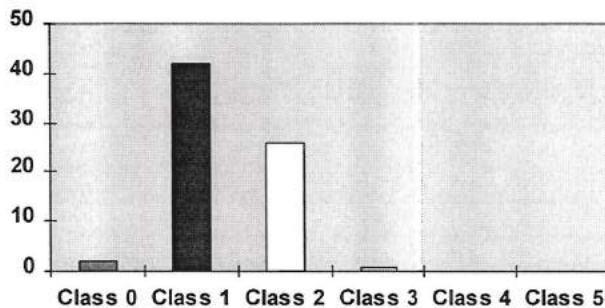


**Chart 7:** The number of trees per class for Transect 6.

Transect 7: This Transect was on a ridge along the east side of the Telkwa Range and near the southern end of the range. The bearing was southeast at 101°. Transect 7 was one ridge north of Transect 6. The alpine ecosystem is similar to the previous Transect in that it is a wide, open plateau. The ridge line gently moves into the forest where slopes are gentle and an old scraggly forest of subalpine fir covers the landscape. The canopy was open and the understory was composed of a thick layer of herbaceous species. The area was poorly drained and wetlands

were abundant and very large. Moose sign was evident as tracks, pellets and browsed willow shrubs.

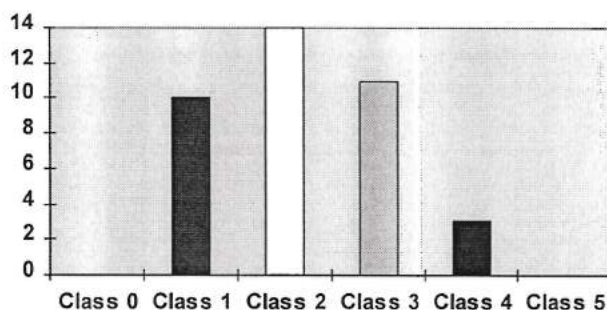
The abundance of arboreal forage lichen was low. Of 7 plots and a total of 71 trees, 60% of the trees were Class 1 and 37% were Class 2. No Class 4 or 5 trees were present (**Chart 8**). The majority of the trees sampled (75%), had dead branches, 14% had a mixture and 12% had live branches below 4.5 m.



**Chart 8:** The number of trees per class for Transect 7.

Transect 8: This Transect was located on the east side of the Telkwa Range between Emerson Creek and Dockrill Creek. It ran at a bearing of 78°. The slope is gentle for the upper half of the ridge but gets steeper further downhill. A subalpine fir forest, with a well developed understory, was present.

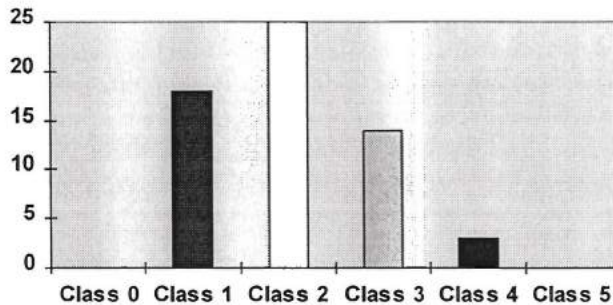
The abundance of arboreal forage lichen was relatively low. Of 4 plots and a total of 35 trees, the dominant tree classes were Class 2, 3, and 1 in decreasing order (**Chart 9**). Many of the branches below 4.5 m were dead. Approximately 63% of the trees had mostly dead branches, 30% had a mixture and 8% had mostly live branches.



**Chart 9:** The number of trees per class for Transect 8.

Transect 9: This Transect was located along a ridge on the east side of the Telkwa Range, just north of Dockrill Creek. The bearing ran at 74°. The slope is very steep from the treeline down into a ravine. A thick, dense, dark forest with a moss carpet understory covers the landscape down into the ravine, where there is a 3 m wide creek. Up the other side of the creek the slope is steep and blowdown was common. Access was difficult until near the end of the Transect. A large swamp occurs over the edge of the incline, within a depression. Moose sign was abundant.

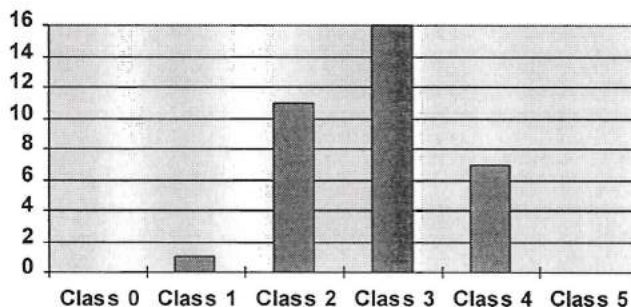
The abundance of arboreal forage lichen was low. Of 7 plots and 60 trees, the majority (42%) were Class 2, 30% were Class 1 and 23% were Class 3 (**Chart 10**). The dominant type of branches present below 4.5 m were dead. Approximately 68% out of 60 trees had mostly dead branches while 17% had a mixture and 15% had mostly live.



**Chart 10:** The numbers of trees per class for Transect 9.

Transect 10: This Transect was located on the east side of the Telkwa Range, near the north end of the range. The Transect bearing ran due east at 90°. A wide, twisted band of krummholtz trees is present on steep ground between the open alpine and forested area below. The upper half of the ridge is moderately steep down into a small creek. Along the other side the slope remains steep, until the peak. The subalpine fir forest was open and the understory was well developed. Blowdown increases along the other side of the creek. Trees appeared unhealthy and were discoloured. A large sphagnum-sedge swamp displayed moose tracks. Other sign included porcupine, rabbit and weasel.

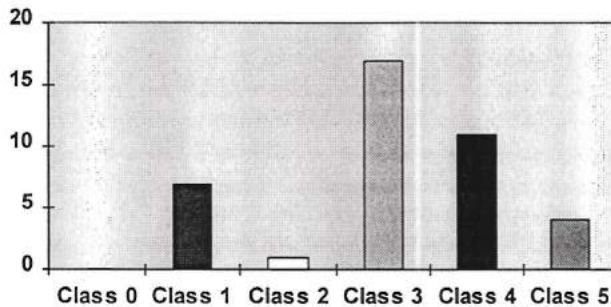
The abundance of arboreal lichen was moderate below 4.5 m. Class 4 trees were present, although they only make up 18% of the total. Of 4 plots and 35 trees, most (46%) of the trees were Class 3 while 31% were Class 2. (**Chart 11**). The branch type most common below 4.5 m was dead branches. Of 35 trees, 54% had mostly dead branches, 29% had a mixture and 17% had mostly live branches.



**Chart 11:** The number of trees per class for Transect 10.

Transect 11: This Transect was located along the north end of the Telkwa Range and the Transect ran at a bearing of 335°. The upper half of the ridge is gentle and rolling with a cover of small, dense trees bearing very little lichen. The lower half of the Transect is a very steep incline and then a steep drop down into a large swamp. Along the Transect, a cover of widely spaced, old subalpine fir trees supported an abundance of arboreal lichen.

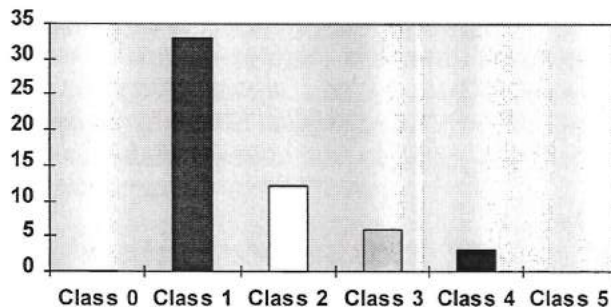
The abundance of arboreal lichen was rated moderate but this Transect had the second highest for the Telkwa Range study area. Class 5 trees were present but made up only 10% of the total. Of 4 plots and 40 trees, 43% were Class 3, 28% were Class 4 and the rest made up Class 1 and 2. (**Chart 12**). Several of the trees (45%) had branches which were a mixture of dead and live branches, while 33% were live branches and 23% were mostly dead.



**Chart 12:** The number of trees per class for Transect 11.

**Transect 13:** This Transect was located along a ridge at the north end of the Telkwa Range, west of Cabinet Creek and Transect 11. The Transect ran at a bearing of 28°. Along the upper half of the Transect, the topography is ridged with very, dry shallow soils and exposed bedrock on crest positions. Along the lower half of the Transect the slope decreases and small wetlands occur throughout. A mixture of tree species was present including spruce, pine and subalpine fir. Moose sign was evident near the swamps.

The abundance of arboreal lichen was low. Of 6 plots and 54 trees, 61% were Class 1, 22% were Class 2, 11% were Class 3, and 5% were Class 4 (**Chart 13**). Of 54 trees, 48% of the trees had mostly dead branches, 30% had a mixture and 22% had mostly live.

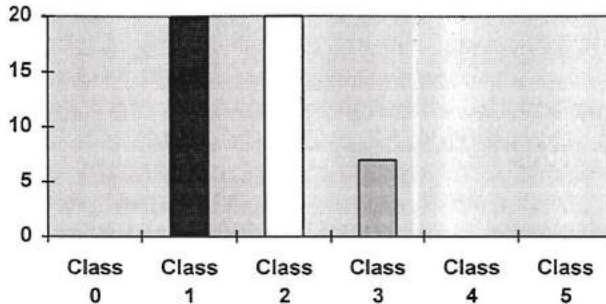


**Chart 13:** The number of trees per class for Transect 13.

**Transect 14:** This Transect was located along a ridge at the northwest corner of the Telkwa Range. The Transect ran at 24°. The upper half of the Transect is composed of several long ridges that were very dry and had shallow soil. Trees species include pine as well as subalpine fir. The lower portion of the Transect is slightly undulating with a dense tree cover and a thick, dense understory of false azalea. Tree species include subalpine fir, pine, and spruce. The slope is moderate until the break which abruptly slopes down into a gully.

The abundance of arboreal lichen was low. Of 6 plots and 47 trees, Class 1 and 2 trees were dominant. No Class 4 or 5 trees were present. Approximately 43% were Class 1 and 43% were

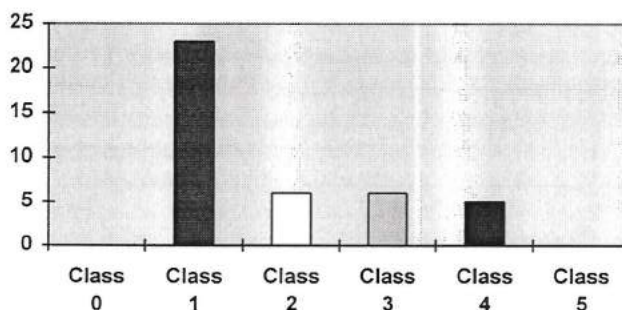
Class 2 (**Chart 14**). A mixture of dead and live branches were most common, although more so near the top end of the Transect than near the lower portion. Spruce trees had a tendency toward dead branches, particularly below 4.5 m. Of 47 trees, 53% had a mixture, 23% had mostly live and 23% had mostly dead branches.



**Chart 14:** The number of trees per class for Transect 14.

Transect 15: This Transect was located along the northwestern corner of the Telkwa Range, west of Transect 14, and ran at a bearing of 272°. The ridge is moderately steep and the terrain is hummocky. Along the upper portion of the Transect, the landscape is covered by a dense forest of subalpine fir mixed with suppressed regeneration. Drainage is poor and wet microsites are abundant. Coarse woody debris and moss cover the forest floor. Along the lower portion of the Transect the stand opens up into widely spaced fir trees and a thick matted ground cover composed of heather, crowberry, dwarf blueberry and terrestrial lichens. Caribou antlers were found near the creek in one of the larger depressions. Moose pellets and tracks were also abundant. Lupines had been dug up in several places.

The abundance of arboreal lichen was low. A combination of Class 1, 2, 3 and 4 trees were present. Of 5 plots and 40 trees sampled, 58% were Class 1, 15% were Class 2 and 3 and 13% were Class 4. All of the Class 3 and 4 trees were present only along the upper portion of the Transect. Arboreal abundance decreased dramatically toward the lower portion of the ridge (**Chart 15**). The majority of the trees sampled had live branches below 4.5 m. About 75% of the trees had mostly live branches, 18% had a mixture and 7% had mostly dead branches.

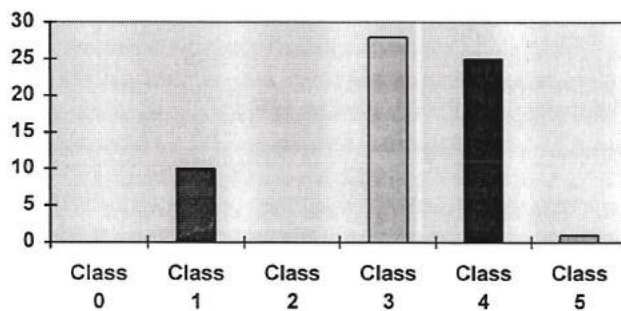


**Chart 15:** The number of trees per class for Transect 15.

Transect 16: This Transect was located along the west side of the Telkwa Range near the north end of the range, almost due east of Mooseskin Johnny Lake. The bearing ran at 252°. A large

open plateau at the top blends into an island of trees with a ring of krummholtz trees around them. The forest was dense, the underbrush was thick and the arboreal lichen abundance was low. Moving downwards the slope is relatively gentle, the forest opens up and the forest floor was covered by variety of low shrubs and herbs. Arboreal lichen increases. Ridges have dry, shallow soils and run perpendicular to the slope. Extensive sedge/willow wetlands characterize the depressions. Moose sign was abundant. The Transect ended at a steep decline into the gully of Sunset Creek.

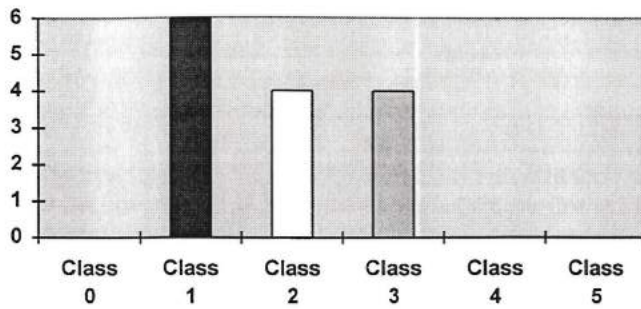
The abundance of arboreal lichen was moderate but had the highest abundance of arboreal lichen in the Telkwa Range study area. Most of the trees were Class 3 and 4. Of 6 plots and 63 trees sampled, 44% were Class 3, 40% were Class 4, 16% were Class 2 and 8% were Class 5. This is one of the two Transects that had Class 5 trees (**Chart 16**). The branch types present were a mixture of all three series. In general, the upper portion of the Transect had more live branches than the lower portion. Of 63 trees, 38% of the trees had mostly dead branches, 35% had a mixture and 27% had mostly live.



**Chart 16:** The number of trees per class for Transect 16.

Transect 17: This Transect was located along the east side of Eagle Peak mountain, along a ridge south of Scallon Creek and west of Mooseskin Johnny Lake. The Transect ran at 225°. The Transect began at the bottom of the ridge and progressed uphill. The slope is straight and steady with a moderately steep incline. Very dense, tall, azalea shrubs, along with moderate amounts coarse woody debris, compose the understory. A variety of wet microsites dot the landscape. Above the treeline is an open plateau with small alpine lakes. Along the south edge of the alpine ridge is a steep and rugged bowl with a small cabin. A trail from Mooseskin Johnny Lake ends at this cabin.

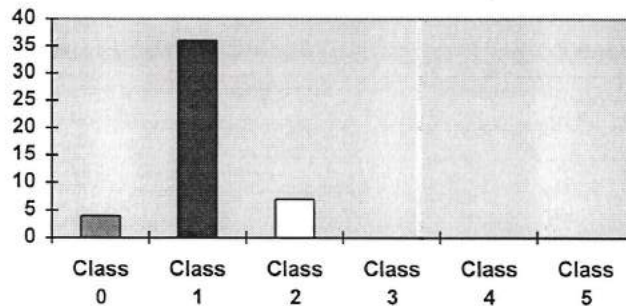
The abundance of arboreal lichen was low. No Class 4 and 5 trees were present. Of 2 plots and 14 trees 43% were Class 1 and the remainder were divided between Class 2 and 3 (**Chart 17**). A mixture of live and dead branches, and dead branches were the most common branch types. Of 14 trees, 50% had a mixture of live and dead branches, 43% had mostly dead branches and 7% had mostly live branches.



**Chart 17:** The number of trees per class for Transect 17.

Transect 18: This Transect was located along the northeast side of Eagle Peak Mountain just north of Transect 17. The bearing ran at 132°. This ridge was covered by a thick subalpine fir forest which descends rapidly down into Scallon Creek. The terrain is rough-going and relatively steep. Seepage and coarse woody debris were high. The canopy was open and the understory was well developed with tall shrubs and regenerating trees. Once across Scallon Creek the terrain abates and becomes hummocky.

The abundance of arboreal lichen was low. The majority of the trees sampled were Class 1. Of 6 plots and 47 trees, 77% were Class 1, 15% were Class 2 and 9% were Class 0 with no lichen whatsoever. No Class 3, 4 or 5 trees were present (**Chart 18**). Approximately 47% of the trees had mostly dead branches, 24% had a combination of live and dead and 24% had mostly live branches.



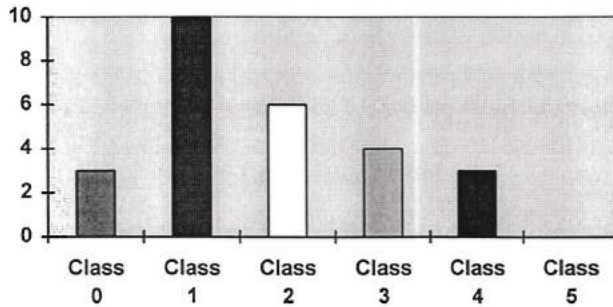
**Chart 18:** The number of trees per class for Transect 18.

Transect 19: This Transect was located on the northern tip of Eagle Peak Mountain, west of Howson Creek. The Transect ran at 132°. The transition from alpine to forest is composed of a thick, tangled band of krummholtz trees about waist high. The slope is very steep coming down towards the creek and frequent rock outcrops and cliffs impede the way. The subalpine fir forest floor was covered with blowdown and high amounts of coarse woody debris. Across the creek, the terrain is ridged. Ridge crests are dry and have shallow soils whereas lower slopes are wet receiving sites. Further on, the terrain levels out and a large wetland covers the landscape. Moose sign was abundant.

The abundance of arboreal lichen was low. The upper portion of the ridge had a higher proportion of Class 3 and 4 trees. Lower down the trend was towards Class 1 and 2 trees. Of 4 plots and 26



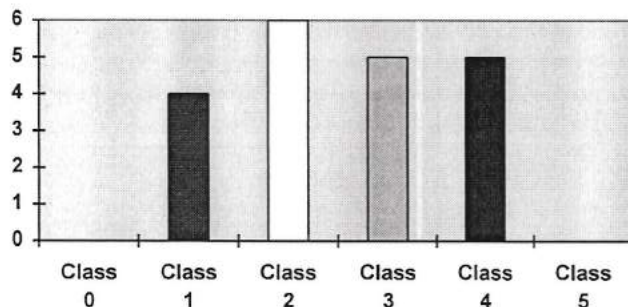
trees, only 17% were Class 3 and 4 trees, while 61% were Class 2 and 3 trees. No Class 5 trees were present (**Chart 19**). Of 26 trees, 53% had mostly dead branches, 24% had mostly live branches and 24% had a mixture.



**Chart 19:** The number of trees per class for Transect 19.

Transect 21: This Transect was located along a ridge at the northwestern corner of Eagle Peak Mountain. The Transect ran at 8°. Overall the slope is very steep. Initially the flat alpine plateau breaks over onto a steep colluvial slope. The steep slope was covered by very thick, snow-pressed subalpine fir. Further down in the subalpine fir forest, the understory was composed of tall, false azalea shrubs. Several rock outcrops, talus slopes and cliffs occur along the way eventually breaking out onto a very steep straight slope. Blowdown and coarse woody debris were abundant. The slope gradually levels out onto a flat floodplain and a very tall and wet sedge/grass wetland. Porcupine and moose sign were evident along the floodplain.

The abundance of arboreal lichen decreases downslope along the Transect. Overall the arboreal lichen abundance was moderate. Of 3 plots and 20 trees, 50% were Class 3 and 4 while the other 50% were Class 1 and 2 (**Chart 20**). Of 20 trees, 46% had mostly dead branches, 42% had a mixture of live and dead and 12% had mostly live branches.

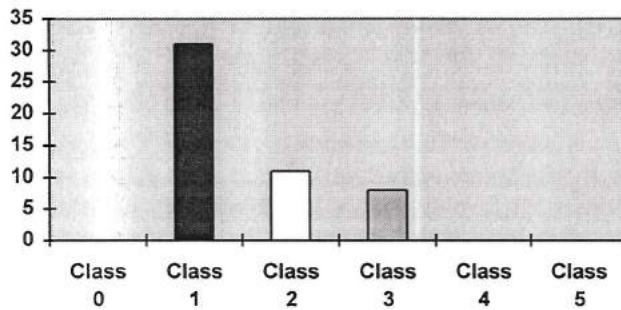


**Chart 20:** The number of trees per class for Transect 21.

Transect 22: This Transect was located along the west side of the eastern Telkwa Range. This ridge was on a relatively isolated small mountain and ran at 153°. The plateau of this mountain top is not as high as some of the surrounding mountains. Islands of trees cover the flat surface. Bear scat was evident at the top. Moving downslope, several ridges run perpendicular to the slope. The ridge crests were dry with shallow soils. Seepage sites run along the depressions. Thick patches of alder shrubs surround the seepage areas. The slope was generally moderate with short steep pitches. The forest was open and the understory was composed of low shrubs

and herbs. Pine trees become more dominant lower down on the dry crests and steep pitches. Pine stands exhibit negligible arboreal lichen but somewhat higher amounts of terrestrial lichen.

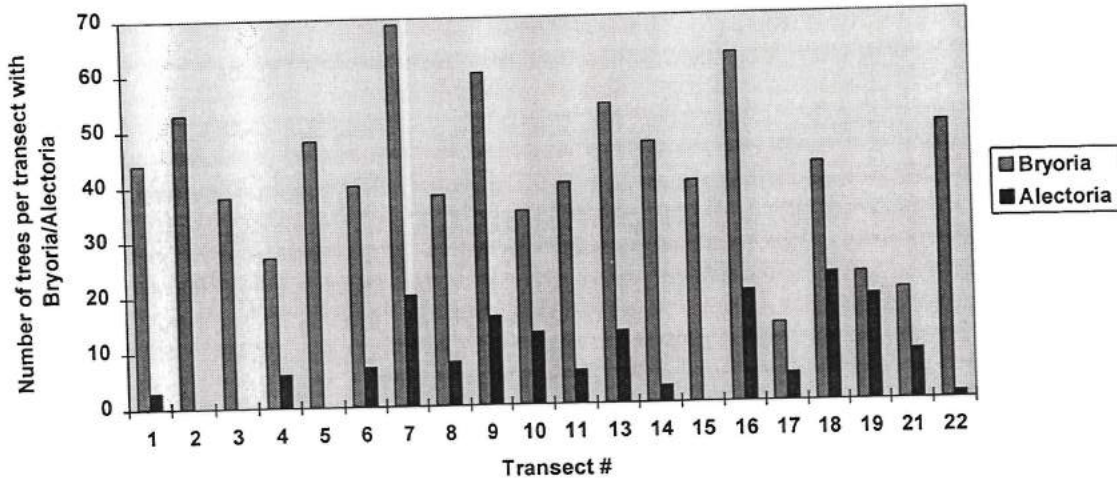
The abundance of arboreal forage lichen was low. Of 6 plots and 50 trees sampled, 62% were Class 1, 22% were Class 2 and 16% were Class 3 (**Chart 21**). Along the upper portions of the Transect the trees tended to have more live branches than dead branches. Moving downhill into the pine stands the number of dead branches increased. Overall approximately 48% of the trees had mostly live branches below 4.5 m, 14% had a combination of live and dead and 12% had all dead branches.



**Chart 21:** The number of trees per class for Transect 22.

### ***BRYORIA VS ALECTORIA***

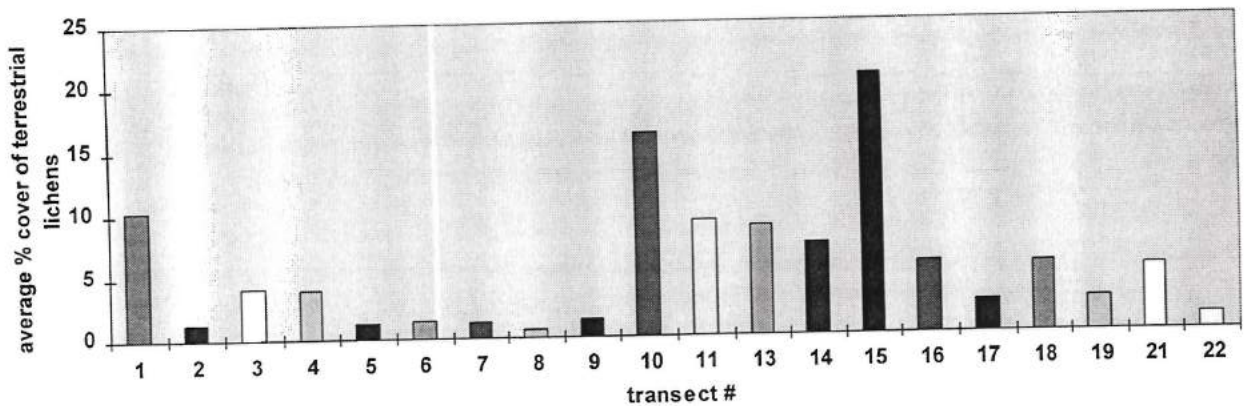
Both species readily occur on the same tree but the proportion of *Bryoria* to *Alectoria* was unbalanced; *Bryoria* was more abundant than *Alectoria*. In all Transects, the number of trees with *Bryoria* was greater than the number with *Alectoria*. *Alectoria* was present in 16 of 20 Transects sampled, whereas *Bryoria* was present in all 20 Transects. When *Alectoria* was present, very seldom was the percentage of *Alectoria* greater than *Bryoria* on a "per tree" basis. Of 931 only 8 trees had a higher percentage of *Alectoria* than *Bryoria*. Transects 18 and 19 had some of the highest proportions of *Alectoria*. **Chart 22** displays the number of trees with *Bryoria* in grey and the number of trees with *Alectoria* in black for each Transect. For example, in Transect 1, of a total of 44 trees, approximately 3 had *Alectoria* and 44 had *Bryoria*.



**Chart 22:** The number of trees in each Transect with *Bryoria* in blue and the number of trees in each Transect with *Alectoria* in red.

### TERRESTRIAL LICHEN ABUNDANCE

The abundance and type of terrestrial lichen was determined. Within each arboreal lichen plot, four macro plots were located at a random bearing from plot center. Random number charts were used to determine the bearing. The first macro plot was located 2 m from center and all macro plots were spaced 2 m apart. Each macro plot was 0.5 m on a side. The terrestrial lichen abundance was estimated by determining the percent cover for each lichen genera. An average macro plot value was then calculated per Transect. The result was a chart depicting the average macro plot percent cover of terrestrial lichens per Transect (**Chart 23**).



**Chart 23:** The average percent cover of terrestrial lichens per macro plot for each Transect.

In general, the terrestrial lichen abundance was low. The highest average percent cover for a macro plot was 21.8% along Transect 15. The second highest was 16.3% along Transect 10 and the third highest was Transect 1 with 10.3%. With respect to the survey, terrestrial lichen

abundance was arbitrarily rated as high, medium or low and was only relative to the Telkwa Range. A high rating was given to plots with greater than a 10% ground lichen cover. A medium rating was given to plots with greater than 5% and a low rating was given to plots with less than 5% lichen cover.

Of 20 Transects sampled, 3 transects had a high abundance of terrestrial lichens, 6 Transects had a moderate abundance and 11 transects had a low abundance (Map III).

Overall, *Cladonia* was the dominant terrestrial lichen genus present. It occurs primarily on dry, rocky crest site positions and on warm aspect slopes with shallow soils. The second most abundant lichen genera were *Peltigera* and *Nephroma*. These two genera were usually found in dark, damp forested environments with a mossy understory and rotting wood. Incidental species include *Cladina*, *Rhizocarpon*, *Stereocaulon*, *Parmeliopsis*, *Cetraria* and *Ichmadophila*.

Other types of ground cover present included moss, herbs, shrubs, grass, litter, decaying wood, rocks, mineral soil, fungi and roots. Moss cover was high throughout the area, as well as, shrubs, litter and decaying wood. Very little grass was present within plots, the higher grass concentrations were in the alpine ecosystem. Herbs were not abundant except for wetter sites, rocks were abundant on colluvial slopes or as rock outcrops and fungi and roots were incidentals.

The following describes the terrestrial lichen abundance per transect including the genera present.

Transect 1: The relative abundance of terrestrial lichens was high with an average cover per macro plot of 10.35% or a 16 cm. sq.. Genera included *Cladonia*, *Peltigera*, *Cetraria*, *Rhizocarpon*. Other genera observed outside the plots included *Cladina* and *Stereocaulon*.

Transect 2: The relative abundance of terrestrial lichens was low with an average cover per macro plot of 1.3% or a 18 cm. sq.. Genera included *Cladonia*, *Peltigera*, and *Cetraria*. The area was relatively wet and terrestrial lichen abundance was low.

Transect 3: Terrestrial lichen abundance was relatively moderate with an average cover per macro plot of 4.5% or an 11 cm. sq.. Several lichen genera were present including *Peltigera*, *Cetraria*, *Rhizocarpon*, *Cladonia*, and *Stereocaulon*.

Transect 4: The terrestrial lichen abundance was relatively low with an average cover per macro plot of 4.0% or a 10 cm. sq.. The terrestrial lichens present included *Cladonia* and *Peltigera*.

Transect 5: The abundance of terrestrial lichens was relatively low with an average cover per macro plot of 1.3% or a 5.7 cm. sq.. The abundance of terrestrial lichens was much higher in the alpine tundra where the ground was covered with sedges and lichens. The genera present included *Cladonia* and *Peltigera*.

Transect 6: The abundance of terrestrial lichen was relatively low with an average cover per macro plot of 1.45% or a 6 cm. sq.. Typical genera included *Cladonia*, *Peltigera* and *Rhizocarpon*.

Transect 7: The abundance of terrestrial lichens was relatively low with an average cover per macro plot of 1.3% or a 6 cm. sq.. The lichen genera present included *Cladonia* and *Parmeliopsis*.

Transect 8: The abundance of terrestrial lichen was very low with an average cover per plot of 0.69% or a 4 cm. sq.. The genera present included *Cladonia* and *Peltigera*.

Transect 9: The abundance of terrestrial lichen was relatively low with an average cover per macro plot of 1.5% or a 6 cm. sq.. Characteristic genera included *Cladonia* and *Peltigera*.

Transect 10: The abundance of terrestrial lichens was quite high with an average cover per macro plot of 16.3% or a 20 cm. sq.. Characteristic genera included *Cladonia*, *Peltigera* and *Parmeliopsis*.

Transect 11: The terrestrial lichen abundance was moderate to high with an average cover per macro plot of 9.3% or a 15 cm. sq.. The lichen genera present included *Cladonia*, *Peltigera* and *Cladina*.

Transect 13: The abundance of terrestrial lichens was moderate with an average cover per macro plot of 8.7% or a 15 cm. sq.. However, the dry ridge crests tended to have a greater average percent cover of terrestrial lichens. The genera included *Nephroma*, *Cladonia*, *Peltigera* and *Cladina*.

Transect 14: The abundance of terrestrial lichens was moderate with an average cover per macro plot of 7.4% or a 14 cm. sq.. Percent cover for terrestrial lichens was higher on dry, rocky ridges. Genera included *Cladonia* and *Peltigera*.

Transect 15: The abundance of terrestrial lichen was relatively high with an average cover per macro plot of 20.75% or a 23 cm. sq.. Lichen genera included *Cladonia*, *Peltigera*, *Nephroma*, *Cladina*, and an unidentified "tiny white crustose lichen".

Transect 16: The abundance of terrestrial lichen was relatively moderate with an average cover per macro plot of 5.8% or a 12 cm. sq.. The lichen genera present included *Cladonia* and *Peltigera*.

Transect 17: The abundance of terrestrial lichen was low with an average cover per macro plot of 2.5% or an 8 cm. sq.. The genera present included only *Peltigera*.

Transect 18: The abundance of terrestrial lichen was relatively moderate with an average percent cover per macro plot of 5.5% or a 12 cm. sq.. The genera present included *Cladonia*, *Cladina* and *Peltigera*.

Transect 19: The abundance of terrestrial lichen was low with an average cover per macro plot of 2.7% cover or an 8 cm. sq.. The genera present included *Cladonia* and *Nephroma*.

Transect 21: The abundance of terrestrial lichen was moderate with an average cover per macro plot of 5.3% or a 12 cm. sq.. The genera present included *Peltigera*, *Cladonia* and *Nephroma*.

Transect 22: The abundance of terrestrial lichen was low with an average cover per macro plot of 1.2% or a 5 cm. sq.. The genera present included *Cladonia* and *Peltigera*.

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## CONCLUSION

As a result of this arboreal lichen survey it was concluded that: 1) the abundance of arboreal lichen was low overall and 2) the distribution of arboreal lichen was not even. Of 20 Transects sampled 30% had a moderate abundance of arboreal lichen and 70% had a low abundance of arboreal lichen. There were very few trees that had absolutely no arboreal lichen whatsoever.

The distribution of arboreal lichen was patchy. Some areas had more arboreal lichen than others. The areas with the highest abundance of arboreal lichen included the northwestern ridge east of Mooseskin Johnny Lake and the northeastern ridge at the headwaters of Goathorn Creek. The distribution along a Transect was not even. The abundance of arboreal lichen had a tendency to decrease with decreasing elevation and as a result lichen abundance was quite variable within Transects.

The ratio of *Bryoria* to *Alectoria* was predominantly in favour of *Bryoria*. *Alectoria* was present in 80% of the Transects but in much smaller proportions than *Bryoria*. The overall abundance of terrestrial lichens was moderate relative to the Telkwa Range mountains. Of 20 Transects sampled and a total of 80 macro plots, 15% had a high percent cover, 30% had a moderate percent cover and 55% had a low percent cover. A high rating was defined as having an average percentage cover of greater than 10% per macro plot.

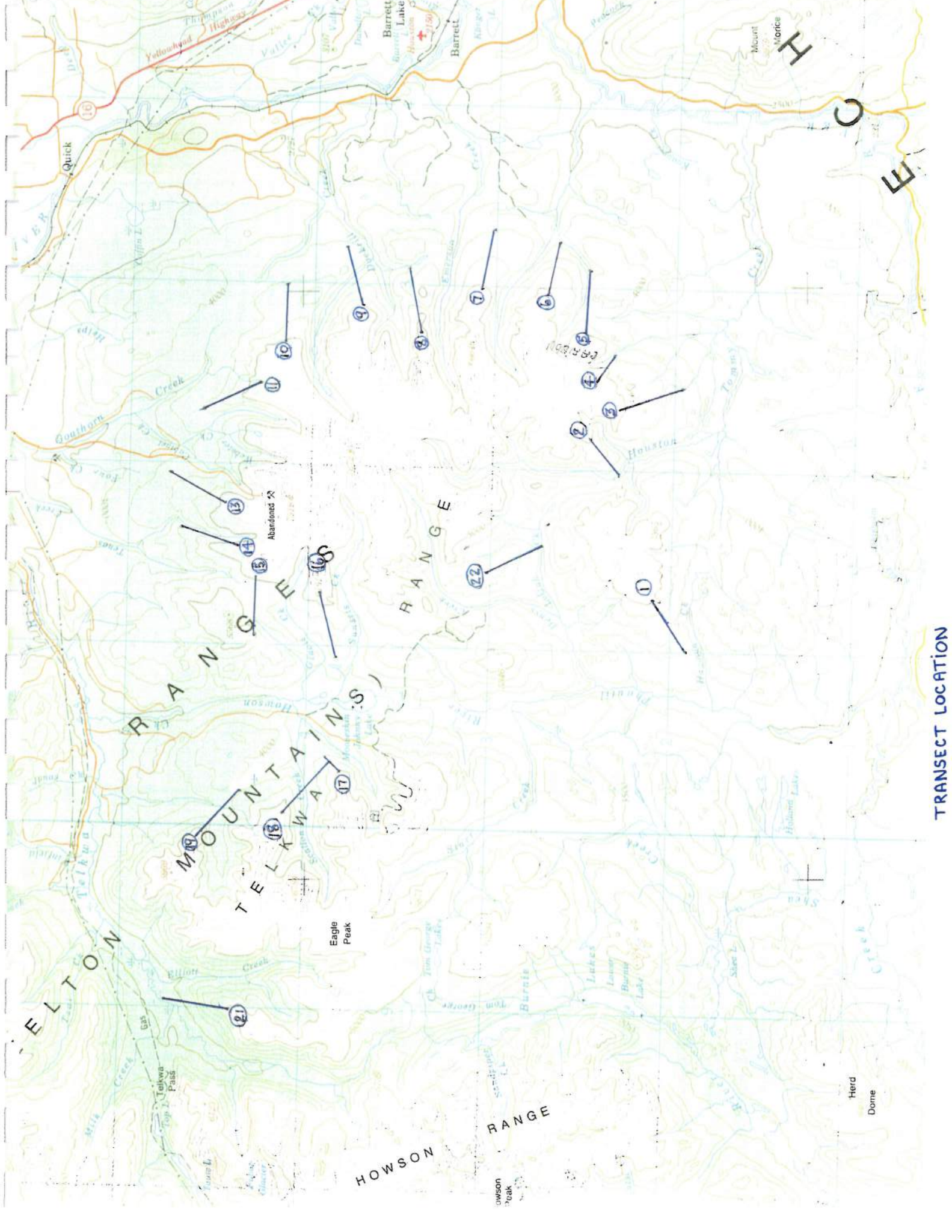
The open terrain of the alpine environment and the numerous wetlands that cover the landscape provide abundant wildlife habitat including food, water, and escape terrain. A herd of 10 caribou were sighted on the southeastern corner (Transect 5) of the range. This included 8 females and 2 males, with no young calves. Caribou sign was also evident along the entire southern portion of the range around Transects 2,3 and 4 and the northwestern corner along Transect 15. Other species sign included abundant moose, some black bear and one grizzly sign on the mountain top between Denys and Loljuh Creek (Transect 22).

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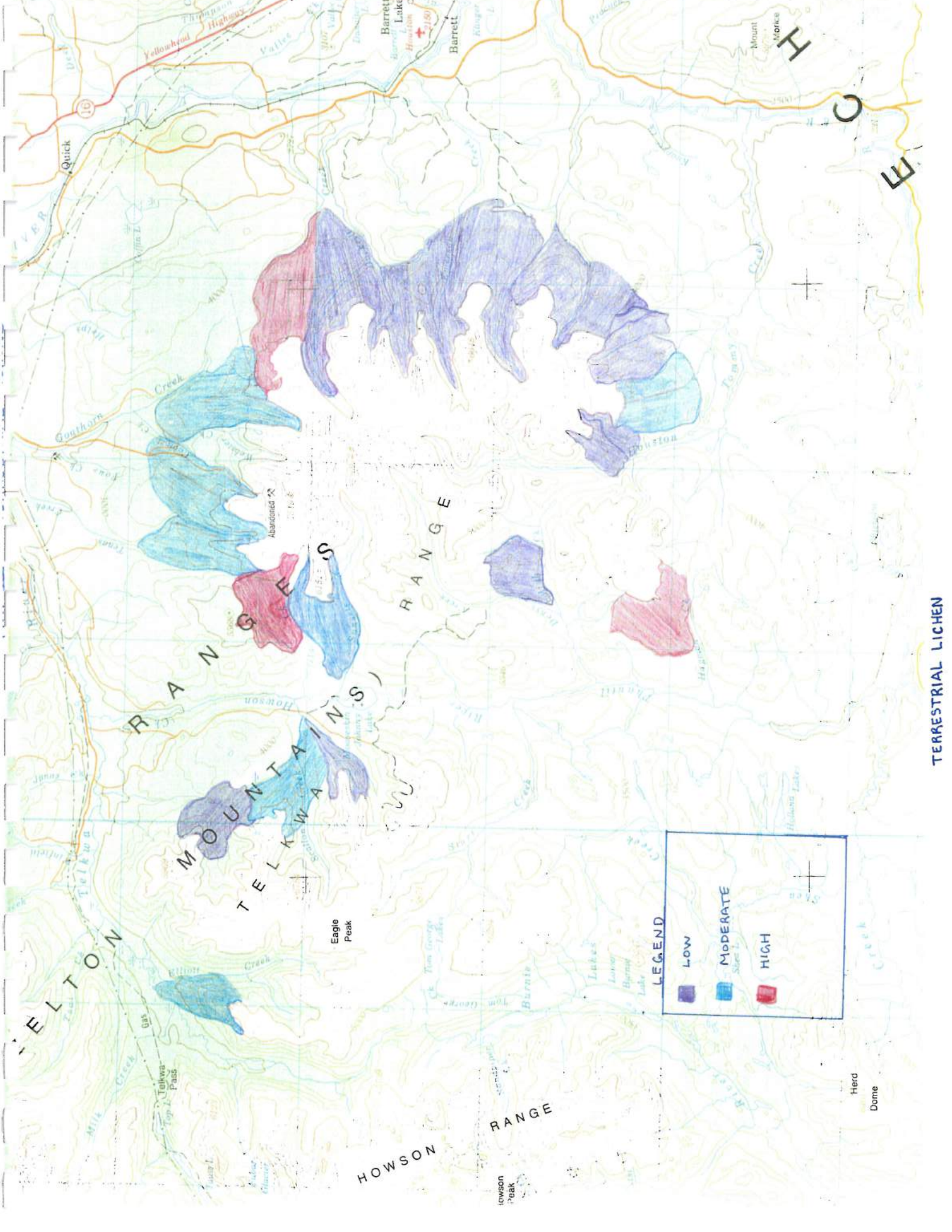
**MAP I**



TRANSECT LOCATION

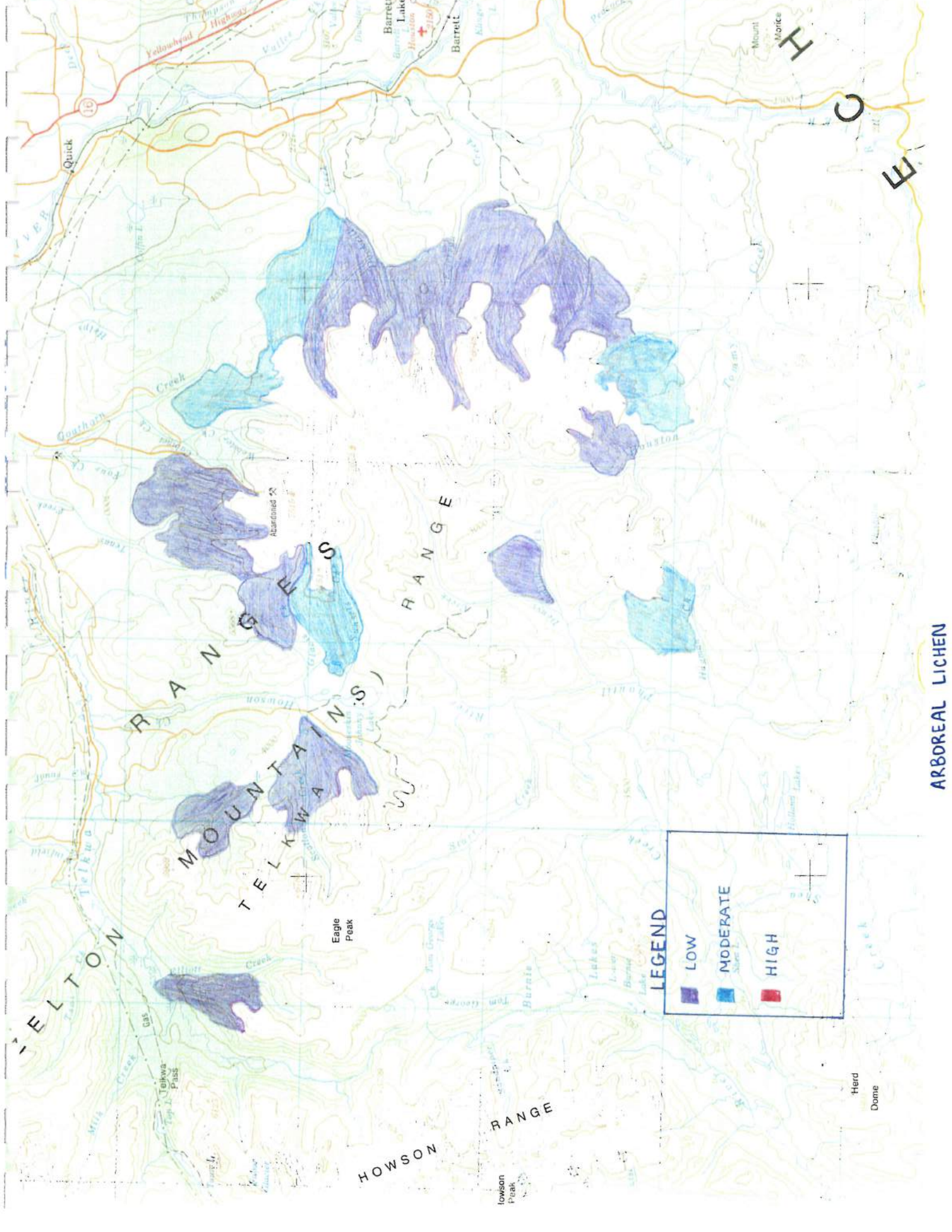


**MAP II**



TERRESTRIAL LICHEN

**MAP III**



TELKWA MOUNTAINS  
RANGE

TELTON

HOWSON RANGE

LEGEND

- LOW
- MODERATE
- HIGH

ARBOREAL LICHEN

HEC

Herd Dome

Howson Peak

Eagle Peak

Telkwa Pass

Quick

Creek

Barrett Lake

Mount Montce

Yellowhead Highway

Abandoned

Gas

Pass

Trail

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