



# BRITISH COLUMBIA MOUNTAIN GOAT SOCIETY

SMITHERS BC CANADA

MTGOATS@BCNORTH.CA

## Ribbons of Land – Mountain Goats in Winter

February 19, 2021

### Summary

In the Interior of British Columbia, mountain goats live on large mountains that extend for kilometers. Despite all the open alpine space available, herds of mountain goats stay on very narrow ribbons of land. The herds are loyal to their ribbon of land and are susceptible to harassment and displacement by motorized recreation.

### Background

We have encountered some confusion about how much alpine is used by mountain goats. Rather than dividing an entire mountain area by the number of mountain goats to calculate the alpine area per goat, we need to understand the actual land area used by mountain goats. Think narrow ribbons rather than large polygons.

### Ribbons of land

Mountain goat home ranges are isolated to ribbons of land about 100 meters wide along the edge of steep cliffs. If mountain goats sense a predator, they flee to the nearby cliffs and hide for hours or overnight until the predator leaves.

If goats stay within their ribbon of land, they have time to escape a predator before being overtaken. But if they roam more than 100 meters from their escape terrain, they risk ambush by a predator before they can run back to safety.

Mountain goats are not fast runners. Their legs and body are adapted to climbing on narrow ledges rather than running at high speed. A predator such as a wolf, cougar or bear can run faster than a mountain goat on level ground. A mountain goat's main defence is to scramble down or up into near-vertical rock so steep that a predator cannot follow. Some local mountains lack steep cliffs to serve as escape terrain and those mountains have no mountain goat herds.

## Best ribbons of land

The quality and quantity of feed within escape terrain is low. Instead, goats prefer feeding on high quality sedges, grasses and forbs along the relatively flat ribbon of land at the top or bottom of their escape terrain.

In winter, there are other factors that define where mountain goats choose to live. The key factors in a high-quality mountain goat winter home in the alpine are:

- A ribbon of land within 100 meters of escape terrain (most important requirement)
- South or southwest exposure for sun and warmth
- Elevation where alpine plants are abundant (below 2000 meters in our region)
- Enough wind to scour snow to a depth of less than 30 cm
- Good visibility to spot predators

Real-world example.

Mount McKendrick, a small mountain east of Smithers, British Columbia, Canada, is the home of 10 mountain goats. Our directors have monitored this herd year-round for the last 11 years. The herd wanders along a ribbon of land along the top of the main cliff (white). Their winter habitat also includes a series of narrow benches near the bottom of the escape terrain (blue).

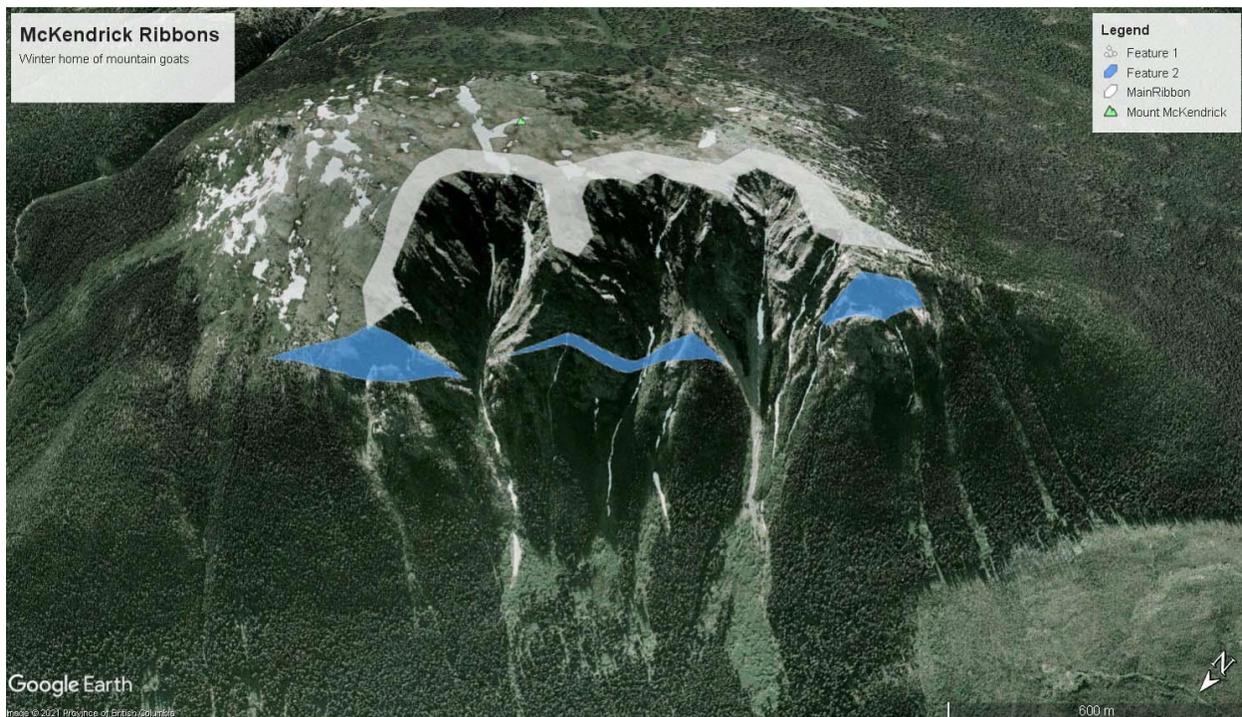


Figure 1 – White primary ribbon is at top of cliff. Blue ribbons are benches within escape terrain.

The 100 meter wide ribbons of land are not continuous. Wherever there is rock under the snow and a lack of plants for the goats to feed on, the ribbon narrows to a single track. The ribbon becomes a connecting path.

#### Total area

The total area of the mountain goat main ribbon of land (white) on McKendrick is 1000 meters long x 100 meters wide for a total of 10 hectares, plus the series of small benches measuring a total of 50 meters wide and 400 meters long for another 2 hectares for a grand total of 12 hectares. The entire alpine area is 108 hectares including the cliffs. So the ribbons of land occupied by the mountain goat herd are 11% of the total area. Or approximately 1.2 hectare per goat.



Figure 2 – Three mountain goats on a bench on Mount McKendrick

## Snowmobiles

Over the last 11 years, we observed that the mountain goats on Mount McKendrick spend a lot of time on the lower benches in winter and less time on the grass meadows at the summit due to disturbance by snowmobiles.

Snowmobiles climb from the east side of the mountain to the summit on most weekends in winter. The mountain goats flee the noise and speed of the snowmobiles and spend time feeding and resting in the steep cliffs and benches within their escape terrain. The snowmobile intrusion effectively reduces the winter habitat available to the goat herd, at least on weekends.

Whenever the snowmobiles displace the goats, the amount of land available decreases from 12 hectares to 2 hectares and the ribbon of land per goat declines from 1.2 hectares to .2 hectares.

## Large mountains

Mount McKendrick is a very small mountain. On large mountains, there can be multiple herds of mountain goats. The number of individual goats in each herd varies according to the season and the food supply. In summer, goats assemble in large herds when more feed is available. In winter, the food supply decreases. Members of the herds switch from one herd to another so that there are now more herds, but each herd has fewer members through winter until early summer.

## Surveying winter homes

Determining the number of herds and their home range on large mountains in winter is extremely difficult. Avalanche hazards can block access. Ski-mountaineers normally do not traverse the severe terrain favoured by mountain goats. Aerial surveys may have difficulty spotting goats against the snow and hidden under the cover of trees. Snowmobilers may stumble across goats in the alpine, but one of the best ways is to look for the signs of a winter home during the summer. We often follow up by installing trail cameras to verify the presence of the herd over winter.

An observer can spot a mountain goat winter home in summer by looking for deep deposits of hard winter fecal pellets accompanied by a lush growth of grasses, sedges and forbs fertilized by fecal pellets and urine from the previous winter. In contrast, summer fecal pellets are soft and scattered widely.

## Dynamic

Ribbons of land used by mountain goats are dynamic. In summer, the ribbons are at their maximum length and width. When winter arrives, many herds move from summer terrain to their winter home. As severe winter weather arrives with cold winds and deep soft snow, goats use fewer ribbons of land and each ribbon is smaller in area.

## Diet change

In severe winter weather, a herd often moves to the top of the forest at the bottom of their escape terrain. The diet changes from alpine ground plants to conifer needles and twigs of shrubs. When wind

again exposes alpine plants and the weather moderates, the herd resumes feeding on plants in the alpine portion of their winter home.

#### Ribbon expands

As the weather warms in late winter, the ribbon of land expands to include all the alpine ribbon at the top of their escape terrain. On a small mountain such as Mount McKendrick, the ribbon in winter is the same as the ribbon of land in summer. That herd stays on the same terrain all year round. On large mountain ranges, the herds have more options. Herds often leave the winter ribbon in late spring and wander along extensive ribbons of land that were unavailable in winter. These herds will not return to their winter home until snow arrives in the fall.

#### Netazul Mountain

The following image is Netazul Mountain north of Smithers BC, a typical large mountain range. The blue areas are a few of the ribbons of land we observed that are used by goat herds in summer. We have limited direct knowledge of the winter homes on Netazul. But from what we know of the criteria for mountain goat winter homes, we anticipate that some of the same ribbons of land serve as home in winter.

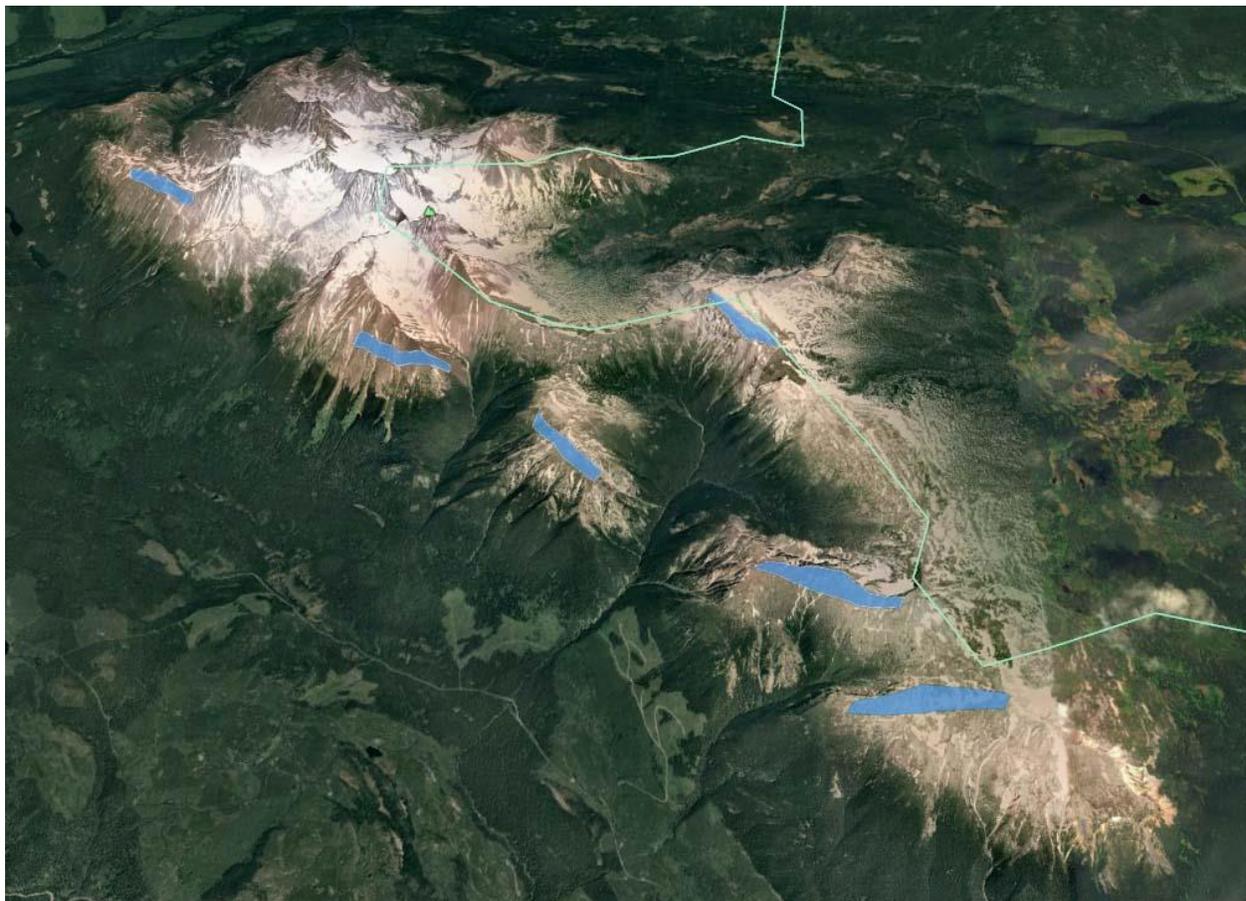


Figure 3 – Ribbons of land (blue) occupied by mountain goats in summer may also be used in winter

## Land not suitable

Mountain goat herds are very loyal to their winter home and return to the same ridge year after year. All other locations on the mountain may be unsuitable for a herd of mountain goats for the following reasons:

- The snow is too soft and deep for a mountain goat to travel
- There is a lack of escape terrain (most important factor)
- There is a lack of alpine plants under the snow
- The snow is too deep or too hard to paw for food plants beneath the snow
- There is a lack of strong wind to keep the snow depth less than 30 cm
- The location is dark or cold due to lack of sun
- There is a danger of avalanche or rockfall
- Lack of visibility leads to risk of predation
- The ribbon is occupied by another goat herd

Each winter home is a distinct “island” in a sea of snow. It is safe to assume that each herd is aware of all the possible terrain suitable for a winter home and that their final choice is the best ribbon of land available. It would be very difficult for a herd to find a new winter home in the middle of winter, so a herd will tend to stay on its chosen ribbon of land despite a severe disturbance.

Most mountain goats stay within their small ribbon of land in winter but there are exceptions:

## Billies in rut

During the brief rut in late November and early December, billies (mature males) spend all their time pursuing mature females. The billies will suspend feeding and travel across dangerous terrain between herds to reach as many females as possible.

## Harassment

If a goat herd is disturbed by a predator, normally the herd moves into its escape terrain and waits for the predator to leave the area. Most often the predator will give up the chase and leave. Sustained or repetitive harassment or displacement of mountain goat herds in winter is more likely a result of human activity. Snowmobiling or helicopter traffic in heli-skiing tenures are examples of human activity that can force a goat herd into hiding or abandonment of their winter home.

## Relaxed vigilance

Occasionally we find mountain goats as far as 300 meters from their escape terrain. When goats relax their vigilance and stretch their feeding area beyond 100 meters, the goats risk predation. If a predator such as a wolf can get between a goat and its escape terrain, the goat has little chance of escaping the encounter alive. But we have observed that it only takes a single disturbance by a predator or human and the goats snap back to the safe zone of 100 meters. Predators may routinely eliminate goats that ignore the 100 meter safe zone.

## Conclusion

There is very little land on most mountains that is suitable for mountain goats in winter. Available winter habitat is made up of a few narrow ribbons of land. If a herd is severely or repeatedly disturbed, they cannot simply move to another area. Other areas may be unsuitable or occupied by another herd.

The fact that mountain goat winter habitat is made up of small ribbons of land that conform to a very strict criteria, and that mountain goats are very loyal to their winter home are two factors that make a goat winter home so valuable and so vulnerable to disturbance.

Once a goat winter home is found, protecting the herd from human disturbance is a matter of regulating and enforcing buffer zones. We recommend a minimum 1000 meter buffer for motorized recreation.

Effective regulation by the provincial government to protect mountain goat herds from disturbance and displacement will promote biodiversity and ensure survival of existing mountain goat herds.

Prepared by staff:

Jim Easterday, director

Len Vanderstar R.P.Bio, director

British Columbia Mountain Goat Society

Smithers BC

[mtgoats@bcnorth.ca](mailto:mtgoats@bcnorth.ca)

[www.mtgoats.ca](http://www.mtgoats.ca)

[www.bcmountaingoatsociety.ca](http://www.bcmountaingoatsociety.ca)