

RCRW Lichen Collection, Handling, Storage & Feeding Handbook

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Introduction

Revelstoke Caribou Rearing in the Wild (RCRW.ca) is a community based society aimed at assisting with the recovery of endangered mountain caribou (*Rangifer tarandus caribou*) by capturing pregnant caribou in late winter, placing them in a secure enclosure, and allowing them to bare and rear their young safely from predators. All animals are released when the youngest calf is approximately 2-3 weeks old. This method has been shown to increase calf survival to 10 months of age by 2-3 times that of wild born calves.

Newly captured females cannot be immediately fed commercial caribou feed when they are introduced to the maternity pen, but rather must be transitioned from their natural diet of arboreal (tree) lichens at a rate of 10% change/day until they are eating 100% commercial feed (John Cook, pers. comm.).

These Terms of Reference provide details on the collection, handling, storage and feeding of arboreal lichens for the purpose of RCRW's mountain caribou maternity penning project.

Target Lichen Species

Mountain caribou are an ecotype of woodland caribou. They are behaviourally adapted to living in mountainous environments as compared to woodland caribou which inhabit gentler topography in Canada's boreal forest. Mountain caribou exclusively feed on arboreal lichens during late winter when deep snowpacks in the alpine facilitate easy access. The preferred arboreal lichen species for mountain caribou are *Bryoria* spp. (Photo 1) and *Alectoria sarmentosa* (Photo 2) (Kinley et al 2006).

Within the Columbia Mountains Ecosystem (CME), *Bryoria* primarily grows at higher elevations near treeline in old subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) forests (Kinley et al 2006), also referred to as the ESSF (Engelmann spruce/subalpine fir) biogeoclimatic zone. *Alectoria* is typically found at lower elevations within the Interior Cedar/Hemlock (ICH) biogeoclimatic zone, however both species often grow together with dominance dictated by elevation. *Bryoria* is generally a dark brown in colour versus *Alectoria* which is typically a light green colour. Mountain caribou are known to prefer *Bryoria* over *Alectoria* although they readily consume both species. When possible, *Bryoria* is the primary species to be targeted for lichen collection for the RCRW project. However, due to the high quantities required either species is acceptable. Terrestrial lichen (e.g. *Cladina* spp.) typically used by boreal woodland caribou was found to be not palatable to mountain caribou and therefore its collection is not supported for use by the RCRW project.

Lichen Harvesting Locations & Volunteer Coordination

Although nutrition is not deemed to be a contributing factor in the decline of mountain caribou within the CME (McLellan et. al. 2006), the RCRW Board of Directors has agreed that lichen should not be

picked within current known mountain caribou habitats unless it is from trees that can no longer contribute to lichen production, such as those felled for harvesting purposes or from blowdown events. This limits lichen collection from standing trees within the CME to areas south of the Trans-Canada Highway (TCH) or from downed trees within areas north of the TCH. RCRW will canvass forest licensees to determine where they will be harvesting such that collection field trips can be arranged when possible. The public should not attempt to access recently harvested areas due to extreme safety hazards. Harvest events within recent cutblocks will be coordinated and led by RCRW staff that will ensure that all safety precautions are taken.

Revelstoke Mountain Resort (RMR) provides excellent opportunities for lichen collection from standing trees due to easy access to all biogeoclimatic zones from valley bottom ICH to alpine ESSF and its close proximity to Revelstoke. In addition, there are no mountain caribou within its boundaries. Mature forest in the vicinity of RMR's Maintenance Facility (11U 419208 5646243) provides excellent opportunities during snow free periods, primarily for the collection of *Allectoria* and some *Bryoria*. As the high elevation snowpack develops in late December and the ski hill opens, there are many areas with plentiful amounts of easily accessible *Bryoria* that can be reached from the top of "The Stoke" or "The Ripper" chair lifts. RMR has been very cooperative by providing free lift tickets to lichen harvesting volunteers that are under the direction of RCRW staff.

Other areas that can provide easy harvesting opportunities are the Mt. Cartier trail, the Mt. McPherson cross country ski area, the Mt. Hall snowmobiling area or anywhere else where there are mature/old coniferous forests south of the TCH.

Those interested in assisting with lichen collection can send an email message to: rcrwlichen@gmail.com. The person assigned to coordination of lichen collection will monitor the inbox and contact those expressing interest. All volunteers under the supervision and/or direction of RCRW staff (volunteer or paid staff) are required to complete and sign the attached waiver form (Appendix A). The RCRW lichen collection coordinator must also keep a spreadsheet of the names and hours of volunteers. Keeping track of volunteer hours is a requirement for some of RCRW's funders.

Collection & Handling Methods & Guidelines

- It is preferred that harvesters use latex or nitrile gloves to reduce the possibility of the transfer of scent and potentially disease or other contaminants to the lichen;
- Lichen can be picked directly from lower tree branches or from fallen trees with ease;
- Higher branches can be pruned using a pole saw and the lichen subsequently removed from the branches;
- Natural blowdown or recently felled trees provide substantial quantities in one location;
- Large branches should be removed from the lichen. Small quantities of twigs are not considered to be a problem but high concentrations of twigs are not palatable;
- Excess water and/or snow should be shaken off as much as possible;
- Lichen can be placed directly into Low Density Polyethylene (LDPE) garbage bags but should not remain there for extended periods. Lichen should be removed from garbage bags as soon as possible (i.e. within 24 hrs) in order to inhibit the conditions that foster the growth of mold and fungus.

Drying & Storage of Lichen

Lichen needs to be air dried in order to reduce the likelihood of mold and fungus growth as well as to facilitate weighing in a consistent manner. The Ministry of Forests, Lands, and Natural Resource Operations (FLNR) has a large warehouse in Revelstoke where the RCRW lichen is dried (Photo 3). Regardless of the location, the general procedures to follow are:

- Remove lichen from the bags it was collected in within 24 hrs of picking, sooner if temperatures are warm (e.g. >10 C);
- Evenly spread the lichen in a layer not exceeding approximately 15 cm onto wooden pallets. The pallets permit air movement underneath the lichen to facilitate drying. If weather permits, the lichen can be dried outside on a deck or anywhere else with good air flow and dry conditions;
- Allow the lichen to air dry for a minimum of 48hrs at approx. 20 C or until the lichen feels very light in weight and is evenly dried. Turn the lichen over if the bottom is still damp. Fans can be used to expedite drying, especially if the lichen is very wet;
- Remove any large contaminants such as sticks or concentrations of small twigs, etc;
- Transfer the dried lichen into mesh soccer ball bags (or equivalent). The mesh bags allow for good air flow which is critical to lichen survival and the prevention of mold and fungus growth;
- Weigh the bags of lichen. Tag the bags and label them with the weight (kg), as well as the harvest location and date. Full soccer ball bags of lichen weigh approximately 3-4 kg each;
- Hang the dried, labelled bags of lichen outdoors under cover in an area with good air ventilation, ensuring that there is air flow between the bags. The FLNR “Cone Shed” provides an ideal location for RCRW to store lichen for the maternity penning project (Photo 4);
- Keep an inventory of the quantities and species of lichen in storage. Post a current copy of the spreadsheet on the RCRW Google Drive.

The shelf life of properly dried and stored lichen is indefinite. The State of Alaska uses lichen that is occasionally several years old for captive caribou. Surplus lichen that was collected for a caribou transplant in the South Purcell Mountains in 2012 was analyzed for nutritional content in 2014 along with fresh samples collected in the same area and there was no significant difference in the nutritional analysis between the 2 samples. This permits the collection of lichen year round and even years in advance if necessary.

Feeding Lichen to Caribou

Adult caribou consume approximately 3.2 kg of food/adult/day (John Cook, pers. comm.). In order to transition new captives onto commercial caribou feed, the rate of change should not exceed 10%/day (e.g. on day 1 in captivity their food would be comprised of 90% lichen:10% commercial feed, day 2 would be 80% lichen:20% commercial feed, etc until on day 9 they are being fed 100% commercial feed). This allows the bacteria in their rumens to adjust accordingly without causing gastric issues. It may be beneficial to firstly feed new captives *Bryoria* as it was likely the dominant lichen species being consumed at the time of capture.

Excessively dry lichen can be unpalatable to caribou. Naturally high humidity levels at capture time (end of March) would normally result in soft textured lichen that caribou readily eat. However, if the lichen feels very dry and especially if it “crunches” in the hand, it is advised that it be re-hydrated by allowing it to soak in clean water for a couple of hours. The vacant barge slip just south of the boat dock provides an ideal location to rehydrate lichen. The boat dock at Monashee Guide Outfitting should not be used due to the potential for contaminants from adjacent boats and their motors.

Literature Cited

Kinley T.A., T. Goward, B. McLellan, and R. Serrouya. 2006. The Influence of Variable Snowpacks on Habitat Use by Mountain Caribou. The Eleventh Mountain Caribou Workshop, Jasper, AB.

McLellan B.N., R. Serrouya, and J. Flaa. 2006. Mountain caribou censuses in the North Columbia Mountains. B.C. Ministry of Forests and Canadian Parks Service, Revelstoke, British Columbia, Canada.



Photo 1: RCRW volunteers collecting *Bryoria* spp. at Revelstoke Mountain Resort



Photo 2: *Alectoria sarmentosa*



Photo 3: Lichen (*Byroria spp.*) being dried in the FLNR Warehouse in Revelstoke



Photo 4: Bags of dried lichen hanging in the FLNR "Cone Shed" in Revelstoke