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| **Indicator** | Alpine Community Structure |
| **Measure(s)** | * Plant community structure * Invasive plants |
| **Justification** | As the climate warms, the accepted future scenario is that treeline climbs up in elevation. This protocol will measure the speed of this and other changes to broad alpine functional groups (grasses, forbs, shrubs, trees, moss, bare ground). |
| **Description** | Permanent transects are established from just below present treeline to just above the transition from vegetation to rock (or ridgeline, whichever comes first). A 0.5 X 0.5 metre quadrat is sampled at regular intervals along the transect. |
| **Measurement Frequency** | Alpine plant changes do not happen quickly. Remeasurements will be at 4 year intervals. |
| **Sampling Strategy** | Exact locations along a fixed transect ensure that resampling is in the same place each time. |
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| **Protocol Source** | Brian Starzomski, University of Victoria. Dr. Starzomski is initiating long-term alpine monitoring at Duffey Lake Provincial Park. Using this protocol, we can incorporate the data from his study and share the results of our work. |
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| **Unit(s) of Measure** | % cover |
| **QA/QC** | Teams of 2 help to identify species and estimate cover |
| **Analysis** |  |
| **References** |  |

**Detailed Protocol**

* Locate and establish the transect

Choose a location that is accessible enough to be visited every 4 years. Locate the transects in an area that does not get regular human disturbance…away from standard routes and trails. Permanent transects are established from just below present treeline to just above the transition from vegetation to rock (or ridgeline, whichever comes first). Establish 2 transects on each of 2 or 3 aspects. Depending on how long it takes to record the data from a single quadrat, you may decide to cover just 2 aspects. At regular intervals along one side of each transect a 0.5 X 0.5 meter plot (quadrat) is examined for plant cover. The interval will be anything from 10 – 25 m depending on the length of the transect. A minimum of 10 plots is required. If the transect is greater than 250 meters, place the quadrats at equal intervals along the transect. Permanent corners are marked so that on subsequent occasions the frame is placed in exactly the same place.

* Data collection

Estimate foliar cover of each species within the quadrat. If the species is not known, enter the data in the functional group (grass, forb, shrub). Mark the sides of the quadrat at 5 cm intervals to help estimate cover (1 - 5cm X 5 cm square = 1%). The more plants that are identifiable to species, the better the information. Customized field guides will be compiled for each site.

Catalog all invasive species in the invasive species database – Invasive Alien Plant Program (IAPP) (see instructions in the BC Parks Invasive Species Guide).

* Photographs

Take 4 photos from the start and end of each transect – one in each of the cardinal directions. Aim the camera so that the vegetation makes up most of the frame (rather than the sky).

* Materials

Permanent pins for transect ends and plot corners (first year only)

50 cm X 50 cm quadrat with 5 cm marks on all sides

Data sheets – may be hard copies for pilot year, but eventually a data recorder that will store and send data recorded in the field

* Personnel Resources

Minimum of 2 people: 1 recorder and 1 observer