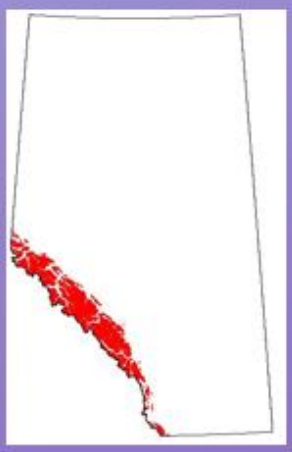
Guide to

ECOLOGICAL SITES AND PLANT COMMUNITIES FOR THE ALPINE SUBREGION



Alberta Government

ECOLOGICAL SITES AND PLANT COMMUNITIES FOR THE ALPINE SUBREGION

First approximation

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Table of Contents

List of Figures

List of Tables

Executive Summary

The Alpine Natural Subregion is a land of mountains, glaciers and snowfields extending north to south along the Continental Divide. Steeply inclined to vertical bedrock exposures, short, cold summers, strong winds and high snowfalls limit extensive tree growth in favour of low growing shrubs and herbs in sheltered areas.

The lower elevation portion of Alpine Natural Subregion (alpine) is transitional to the upper portion of the Subalpine Natural Subregion (subalpine) resulting in an ecotonal area with plant community types from both subregions occurring at the same elevation. The diversity of fauna found within these ecotonal areas is a reflection of the diversity of vegetation types. Forests at higher elevations in the subalpine are open and consist of stunted trees of subalpine fir and Engelmann spruce and occasionally whitebark pine and subalpine larch with an understory of alpine vegetation (Corns and Achuff 1982; Natural Regions Committee 2006). The alpine is a complex of plant associations dominated by dwarf shrub and herbaceous vegetation and/or lichen tundra occurring at elevations above 1900 m at the northern extent of the Rocky Mountains of Alberta in Jasper National Park (Corns and Achuff 1982) and 2150m at the south in Waterton Lakes National Park (Achuff et al. 2002).

It is hoped this classification system can be used by field staff to assess the ecology of the sites and help inform management prescriptions on lands within this subregion. This guide represents the analysis of over 970 plots described in the Alpine Natural Subregion that were subsequently split into 8 ecological sites and 52 plant community types. The dominant plant species, canopy cover, environmental conditions are outlined for each type.

We recognize that this is a preliminary classification based on available information and may change as we fill in gaps in the data. Information on alpine vegetation from the Kananaskis area south to the northern boundary of Waterton Lakes National Park is one area for which we have limited information.

Acknowledgements

The creation of this report would not be possible without the data collected in other projects. We would like to acknowledge Parks Canada for allowing us to use data from the Ecological Land Classification of Banff and Jasper National Parks (Holland and Coen 1982) and much of the vegetation data collected by Ian Corns and Peter Achuff for that project were incorporated into this guide. We would also like to acknowledge the Alberta Conservation Association and Corporate Management Service as they provided funding for the study of bighorn sheep winter range in Southern Alberta and backcountry horse use and elk carrying capacity in the Panther Corners. The vegetation data from these studies were also included in this guide. Several graduate students at both the University of Alberta (mainly under Dr. G. LaRoi), University of Calgary (mainly under Dr. C Bird) and others have contributed immensely to the knowledge of the alpine vegetation of Alberta. Their contributions are acknowledged in the Literature Cited section of this report. Finally appreciation and thanks go out to all members and former members of Land and Forest Service and Provincial Parks who were involved in data collection.

Introduction and Background

The province of Alberta is covered by a broad spectrum of vegetation zones from prairie in the south, to alpine vegetation in the mountains and dense forests in the central and northern part of the province. These broad vegetation zones have been classified into 6 natural regions and 21 subregions (Natural Regions and Subregions of Alberta 2006). Each of the 21 subregions consists of groups of ecological sites and plant communities that are influenced by environmental conditions and human impacts. Ecological sites are complex and evolving systems, with a flow of energy and matter, which is influenced by the interaction of climate, landforms, soils, vegetation and animals (Archibald et al. 1996).

The ecological site classification system outlined in this document organizes ecological information into a format that facilitates understanding and provides a structure for ecologically based management. The system has been developed primarily as a field tool to complement the user's knowledge about ecological site classification, soil description, and plant identification. The objectives of the ecological site classification are:

1. to facilitate the application of ecological information to decisions on a wide variety of activities within the realm of land management,
2. to facilitate the collection and organization of information to expedite the decision support systems,
3. to promote communication among land managers and the public,
4. to provide a common basis for integrated planning, and
5. to reduce land management costs by integrating ecological information into the decision-making process.

The purpose of this guide was to develop a framework that would easily group the plant community types in the Alpine Natural Subregion of the province. This guide supplements the work done by Beckingham et al. (1996), Beckingham and Archibald (1996) and Archibald et al. (1996) on the forested community types in the Subalpine Natural Subregion and follows their classification hierarchy (ecosite, ecosite phase, plant community). Their guides are a good description of the forested community types found within the Upper Subalpine Natural Subregion, but they provide little description of the dominant shrublands and grasslands described in both the Subalpine and Alpine Natural Subregions.

This is a preliminary classification based on available information and thus it may change as we fill in gaps in the data. Information on alpine vegetation from the Kananaskis area south to the northern boundary of Waterton Lakes National Park is one area for which we have limited information. We also acknowledge that the data used to produce this guide have come from many sources and were collected to serve various purposes and thus reflect differences in methodology. Formal multivariate classification techniques were not used given the limited data set.

Physiography, Climate and Soils

Please note this summary of Natural Subregion characteristics is largely extracted directly from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

The Alpine Natural Subregion occurs above treeline in the Rocky Mountains of Alberta. Elevationally, alpine occupies areas greater than 2150 m in southern Alberta and declines to 1900 m in more northern portions. Its lower boundary with the Subalpine Natural Subregion decreases with latitude at a rate of about 0.5 m/km northward. Delineation of a distinct boundary between the alpine and subalpine is rarely possible given the transitional nature of the subalpine but in general, we consider the alpine to be the area above trees. A cold, short, unpredictable climate (Billings 1974) along with rocky substrates that can be steep and unstable, active glaciers and permanent snowfields limit vascular plant growth and soil development is restricted primarily to sheltered locales. That said, the alpine is the most diverse natural subregion in Alberta given the number of microhabitats and evolution of the flora (Korner 1999, Moss 1955, Packer 1974). The highest number of tracked species in Alberta are found here in the alpine (ACIMS 2017).

The Rocky Mountains of Alberta are divided into two north-south trending ranges: the Main Range is the westernmost and forms the Contintental Divide; the Front Range lies to the east between the Main and the foothills. The rocks that comprise the mountains of the Main Range are generally older and more acidic than those of the Front Range (AGS -Alberta Geological Service). These differences are reflected in the soil, vegetation and flora.

The Alpine Natural Subregion has the coldest summers, shortest growing season and highest snowfall of any Subregion in Alberta (Table 3-2 for annual and seasonal climatic statistics). The climate of the Rocky Mountains in Alberta is continental with cold polar air masses during the winter that are interrupted at times by the warm-dry winds of Pacific systems (Arno and Hammerly 1984). There is more winter snow along the Continental Divide of the Main Range and the climate becomes increasingly drier as you move eastward into the Front Range. Banff, in the Front Ranges and within the Montane Natural Subregion, receives average annual precipitation of about 470 mm. Lake Louise, at the transition point between the Montane and Subalpine Natural Subregions, receives about 600mm (Environment Canada). Environment Canada 1961–1990 climate normals indicate that average precipitation amounts tend to be greatest as one moves from south (Waterton) to north (Jasper). It is felt that the total annual precipitation is at least equal to the Subalpine Natural Subregion, which potentially makes the Alpine the wettest Natural Subregion in Alberta (Strong 1992). Summer temperatures are the coldest in Alberta with July mean temperatures averaging 10^0C. Freezing temperatures occur in all months of the year. Winter temperatures are colder than the subalpine with temperatures rarely going above freezing for the whole winter. The cold temperatures help to maintain the snowpack for much of the year. Wind is also extremely important climatic factor in the alpine. Although, precipitation is abundant the strong winds likely result in very large moisture deficits (Strong 1992). Permanent snowfields and glaciers occur where snowfall exceeds snowmelt and ablation. Strong winds are characteristic of the Alpine Natural Subregion, and control snow deposition, evapotranspiration and temperature regime (Achuff 1994; Strong and Leggat 1992) and this then is reflected in the vegetation.

Topography, parent material and regional climate interact to produce an exceptionally complex mosaic of microclimates. On exposed bedrock or in areas that are perennially snow or ice covered, non-vascular plants predominate. Warmer, moister microclimates (e.g., rockfields and protected crevices), or areas where snow protects plants through the winter but melts for a few weeks in summer, provide habitats ranging in size from a few square centimetres to several hectares. Extensive vegetated areas are unusual but do occur, such as the expanse of alpine meadows in the Cardinal Divide–Tripoli Ridge area. The alpine is characterized by low growing vegetation, which helps to protect the vegetation from the dessicating winds, and allows the plants to gain heat from the ground.

Approach and Methods of Classification

Approach:

Ecological classification hierarchy and terminology

This guide adopts a similar ecological unit classification hierarchy (ecodistrict, ecosection, ecological site, ecological site phase, plant community) used in other subregions of the province. This ecological classification system is nested within Alberta's geographically based natural region and subregion classification system (Natural Regions Committee 2006).

Ecodistrict

The ecodistrict level is a unique pattern of slope, landform, soils and vegetation. Mapping of this unit is usually done at a scale of 1:1,000,000 to 1: 250,000 within the whole province (Strong and Anderson 1980). This level of the classification hierarchy is spatially defined and may or may not be unique to a subregion.

Ecosection

The natural subregion used by the Alberta Government is equivalent to the ecoregion defined by the Canada Committee on Ecological Land Classification (CCELC) as part of a multi-level national mapping system for Canada and that was used for integrated resource planning in Alberta (Marshall et al. 1996). Similarly, the ecodistrict as presently used and its associated scale of mapping is equivalent to the ecodistrict defined by the CCELC. However, the ecosection has a somewhat different meaning in the current context than it did in the national system or than it did when it was applied to integrated planning maps in Alberta in the 1980's and 1990's. For those mapping projects, the ecosection was a subdivision of the ecodistrict and was mapped at 1:20 000 to 1:50 000 as a more specific delineation of recurring landform and vegetation patterns, usually with reference to major community type groups or soil subgroups. In the current scheme, the ecosection is a term used to define one ecodistrict or an aggregation of ecodistricts that represent one or more climatic variants within a natural subregion; therefore, its mapping scale is flexible. This level of the classification system is not spatially defined. The ecosection is a unique pattern of slope, landform, soils and vegetation and may also represent a slight change in the climate of a subregion. Mapping of this unit is usually done at a scale of 1:1,000,000 to 1:100,000 and can be a grouping of ecodistricts or at smaller scales outliers in a subregion. For example the Lower Boreal Highlands subregion is split into the foothills and boreal ecosections which are influenced by their proximity and location within the Boreal and Foothills Natural Regions. Spatially these two ecosections are split by grouping ecodistricts. In contrast an example of a smaller scale ecosection (1:100,000) is the Cypress Hills outlier of the Montane subregion. Subregion ecosections have a characteristic sequence of ecological sites according to soil moisture regime (SMR) and, to a lesser degree, soil nutrient regime (SNR). Currently there is no ecosection described for this subregion.

Ecological Site

Ecological sites are ecological units that develop under similar environmental influences (climate, moisture, nutrient regime). They are groups of one or more ecological site phases that occur within the same portion of the edatope (moisture/nutrient grid). However, for this subregion the variability of moisture and nutrients among similar community types found that the traditional edatope grid (moisture/nutrients) did not adequately describe the groupings of plant communities within an ecological site. In the Alpine Natural Subregion it was found that moisture and elevation changes had a much stronger influence on grouping plant community types. As a result the edatope (Figure 1) was based on moisture (dry to wet) and elevation zone (upper, middle, lower). Each ecological site within this edatope is designated with a small letter. These letters range from "a" the driest ecological site and the last letter being the wettest. Each ecological site has been given a name that conveys some information about the ecology of the unit. Ecological sites are typically named after plant

species that are common or typical of the site (eg. d heather). The plant that the ecological site is named after, however, may not be present in every plot or stand belonging to the site. Ecological site in this classification system, is a functional unit defined by moisture and elevation changes. It is based on the combined interaction of biophysical factors which together dictate the availability of moisture for plant growth. Thus, different ecological sites vary in their moisture regime and have similar characteristic plants and soils within elevation zones.

Ecological site phase

An ecological site phase is a subdivision of the ecological site based on the dominant species in the tallest vegetation. On lowland, meadow or grassland sites where tree canopy is not present the tallest structural vegetation layer with greater than 5% cover determines the ecological site phase. Generally, ecological site phases are mappable units and spatial ecological site phase land cover datasets have been developed from AVI (Alberta Vegetation Inventory) (Derived Ecosite Phase (DEP)). Ecological site phases are identified by the ecological site letter "a" along with a number "a1" representing the phase within the ecological site. The ecological site phase has a strong ecological basis.

Plant community type

Ecological site phases may be subdivided into plant community types, which are the lowest taxonomic unit in the classification system. While plant community types of the same ecological site phase share vegetational similarities they differ in their understory species composition and abundance. Generally the plant community types are named by combining the name of the dominant plant species in each structural layer (eg. Arctic willow-White mountain avens)

Methods:

Plant community classification

Data used to create this guide were collected from over 970 field plots within the Alpine Natural Subregion. Field inventory for these plots generally followed the Ecological Land Survey Site Description Manual (2003) and uses various site, vegetation and soils forms. Plot data was analyzed using summary tables. Canopy cover of species within plots were sorted in tables until there was a consistent grouping of species with a high constancy rate. The grouped plots were then summarized to represent a plant community type.

Plant community summaries were generated by averaging plant species composition, range in composition, and percent constancy of occurrence, among vegetation inventory plots that were part of a community type. Environmental data were sorted into the same plant community groupings to create the descriptions outlined in this guide. The number of sample plots on which the description was based is also provided (e.g. n=16). Formal multivariate classification and ordination techniques were not used given the limited dataset.

Correlation of Soils and Ecological Sites

Please note this summary of Natural Subregion characteristics is extracted directly from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

Steep, upthrust limestones, dolomites, conglomerates, shales and siltstones of Paleozoic and Mesozoic age geologically define the Alpine Natural Subregion. Exposed bedrock is dominant. Surficial materials occur over about 40 percent of the area, and are mainly colluvial deposits or thin glacial deposits. Rock glaciers occur from Kananaskis Country to Jasper National Park, and periglacial landforms (e.g., lateral and terminal moraines) are associated with glaciers in Banff and Jasper National Parks.

Soil development is weak due to harsh climates and unstable parent materials. Nonsoils dominate in this subregion. Eutric Brunisols are the principal soils reflecting mainly calcareous rock substrates, but there are significant occurrences of Dystric Brunisols associated with ericaceous vegetation and acidic parent materials. Regosols are very common, with Gleysols in wet locations. Appendix 5 in the Natural Subregions guide summarizes the proportional occurrence of soil types in the Alpine Natural Subregion.

Guidelines for Determining Ecological Sites

Alberta currently uses two ecological classification methods to determine ecological sites. In the agricultural settlement area of the Province, resource managers can determine site soil conditions using AGRASID (Agricultural Region of Alberta Soil Inventory Database). In the Rocky Mountain, Foothills and Boreal Natural Regions, the Ecological Landscape Classification approach incorporates both vegetation and site conditions (climate, soils and geology) into a hierarchical ecological unit classification (e.g. subregion, ecodistrict, ecosection, ecological site, ecological site phase, plant community) (Strong and Thompson 1995). Ecological sites are areas of similar climate, moisture and nutrient regimes. The combination of moisture and nutrient regimes can be represented on a two-dimensional grid called the edatope grid. However, for this subregion the variability in moisture and nutrients in the traditional edatope did not adequately describe the groupings of plant communities within an ecological site. In this subregion it was found that moisture and elevation changes had a much stronger influence on grouping plant community types. As a result the edatope (Figure 1) was based on moisture (dry to wet) and elevation zone (upper, middle, lower). Soil moisture regime (SMR) is defined as the average amount of soil water available annually for evapotranspiration by vascular plants (Meidinger and Pojar 1991). The SMR uses nine classes to define the available soil moisture, which range from the driest (very xeric) to the wettest (hydric). Elevation changes were defined into zones (upper, middle, lower) based on the average elevation of ecological sites within a zone (Upper 2250 m (2136-2302), Middle (2187 m (2161-2213), Lower 2064 m (2004-2113)). These conditions, in addition to climate, terrain, chemical and elevations create conditions favourable to specific suite of plants referred to as Indicator Species. For example a site with a xeric-subxeric moisture regime and in the upper elevation zone is characterized by the letter "a" [stone fields (xeric-subxeric/upper zone)] ecological site. A resource manager can review the indicator plant species of the ecological site, plant community types, soils and site conditions to see if the plant community in question fits the general descriptions. The following steps provide a framework for determining ecological sites.

Step 1 Review background information and pre-stratify the area to be classified

Review information about the area of interest to learn what you can about the landscape and ecology. Consult the natural subregions and Derived Ecosite Phase (DEP) maps to ensure you are using the correct subregion guide. DEP classification may also give you the common ecological site phase for a particular polygon.

Step 2 Carry out a quick reconnaissance of the site to be classified

Take note of the variability and relationship between topography and position on the landscape and the general plant species distribution including trees and understory. Check the DEP ecological site phase maps.

Step 3 Choose a location that appears to be representative of the area to be classified

Locate an area for your assessment that appears to be representative of the site to be classified, and is homogeneous in slope, moisture and plant cover as possible. Avoid locating the sample in areas that have received significant natural disturbance. Try to avoid ecotone areas or very small areas that are transitional between relatively homogenous ecological units such as slope breaks.

Step 4 Determine the plant species composition and abundance

Determine the plant species composition and abundance within a 5x5 m plot. Also record any species that appear to be representative of the ecological unit but occur outside the plot within the same slope position and on the same parent materials. Abundance is estimated by determining the amount of ground area that is covered by the plant species when its canopy is projected onto the ground surface (Ecological Land Survey Site Description Manual 2003).

Step 5 Determine the important soil properties

To collect soils data, a soil pit should be dug or augered to a depth of at least 60 cm or until an impenetrable layer of stone and/or rock is reached, whichever is less. A deeper pit is required when the soil has a coarse to moderately coarse texture. In these cases the pit is dug deeper to see if there are finer-textured layers that are influencing ecological function below the 60 cm of coarse material. A deeper pit is also required when the plant community on the site cannot be explained by the site conditions and soil conditions above 60 cm. The minimum soils data that should be collected within a plot to classify it correctly are organic matter thickness, humus form, Ah horizon thickness, surface texture, effective texture, presence of seepage, depth to mottles, depth to gley, coarse fragment content, parent material/landform and drainage.

Step 6 Determine important site properties

Important site variables that should be collected include topographic position, slope and aspect. Moisture regime, and nutrient regime are synthetic variables that are derived from integration of site, soil and vegetation attributes.

Step 7 Determine the natural subregion, ecological site, ecological site phase and plant community type.

There are several ways to determine the ecological site, ecological site phase and plant community type. The first way is to assign an ecological classification to a site is to use the field data collected and go through the various subregion guides to identify the ecological site. You can also use the dichotomous keys to ecological site and ecological site phase. Once you find a potentially correct plant community type, check the soil, site and vegetational characteristics of your site to make sure it matches the ecological site, ecological site phase and plant community type on the various fact sheets. To consider all ecological site choices, you must compare the characteristics of your site, with the descriptions on the fact sheets for all ellipses that overlap the moisture and elevation classes of your site on the edatope grid for this subregion and adjacent subregions within the area (Ecological Land Survey Site Description Manual 2003).

How to use the Guide

The alpine is generally all the vegetation types above treeline.

The plant community types in this guide were organized into the hierarchial ecosite and ecosite phase classification outlined in "Ecosites of West-Central Alberta and Southwestern Alberta" (Beckingham et al. 1996, Archibald et al. 1996), the community types in this guide are arranged by ecological sites (ecosite) and ecological site phases (ecosite phase) for West-Central Alberta (Table 1) and Southwestern Alberta (Table 4). Ecological sites are defined as ecological units that develop under similar environmental influences (climate, moisture, nutrient regime and elevation).

The bulk of this guide is community descriptions which include information on the dominant plant species, canopy cover and environmental conditions.

Ecological units within this subregion are classified by their position on a modified edatopic grid [a specific combination of soil moisture, and elevation].

The information in this guide is presented and named by:
1. Subregion/Ecological area
a. Alpine [A]
2. Ecosection [A]
3. Dominant cover type
a. Native grasslands and lichen [a]
b. Shrublands [b]
c. Conifer [c]

NOTE: Each dominant cover type may overlay several ecological sites and ecological site phases. For example Aa (alpine grassland) community types occurs in numerous ecological sites.

3. Community types are presented and named by:
a. Subregion/Ecological area and dominant cover type [e.g. Aa (grasslands)].

How to read the fact sheets

The field guide contains 4 types of fact sheets: One for ecosection, one for ecological site, one for ecological site phase and one for plant community type.

Ecosection

There is an identification code at the top of the ecosection fact sheet and a name followed by the number of sample sites (pg 20). Each ecosection has been given a name that conveys information about the location of the unit and are frequently named after a general location within the subregion (Ecosection: Alpine (A) of the Alpine Natural Subregion). A short text description of the site is given under the General Description (pg 20), this is followed by a picture or a cross section diagram and map of the ecosection(pg 20). The section on successional relationships gives a brief note about the spatial locations and differences in ecosections (pg 20). This is followed by a list of envrionmental variables (elevation), ecodistricts and ecological sites associated with the ecosection (pg 20). Currently there are no ecosections for the Alpine Natural Subregion.

Ecological site

There is an identification letter at the top of the ecological site fact sheet and a name, moisture and elevation zone followed by the number of sample sites (pg 21). Each ecological site has been given a name that

conveys information about the ecology of the unit and are frequently named after a common plant species. A short text description of the site is given under the General Description (pg 21), this is followed by a picture or a cross section diagram of the ecological site (pg 21). Plant species that are indicators of the ecological conditions on the site are listed (pg 21). For this subregion there is no data available to develop site index for the various ecological sites. Environment and soil variables are then listed and represent a roll-up from the plant community and ecological site phase descriptions (pg 21). Variables that represent environment and soils have a number that indicates the number of the samples in which each variable class occurred. Data has been collected and analyzed from many sources over 40 years and data gaps may exist for many variables. The frequency of occurrence value indicates the number of sampled plots for which data was collected for that variable at the ecological site, ecological site phase and plant community fact sheets. Optional variables such as soil exposure, LFH thickness may also be listed and represent a roll-up for the plant community and ecological site phase.

Ecological site phase

There is an identification code at the top of the ecological site phase fact sheet and a name followed by the number of sample sites (pg 22). Each ecological site phase has been given a name that conveys information about the dominant tree species or lifeform (shrubland, grassland, tame/disturbance) of the unit and are frequently named after a common plant species. A short text description of the site and successional information maybe given under the General Description or Successional relationships (pg 22) if it is provides more detail than is available on the ecological site fact sheet. Plant species that are indicators of the ecological conditions on the site are listed with the average cover summarized from the various plant communities (pg 22). Indicator species for the ecological site phase are identified with an asterix "*" and are rolled-up to develop the indicator species list for the ecological site fact sheet. Environment and soil variables are then listed and represent a roll-up from the plant community (pg 22). Optional variables such as soil exposure, LFH thickness, forage production and stocking rate for livestock may also be listed and represent a roll-up for the plant communities.

Plant community

There is an identification code at the top of the plant community fact sheet and a name followed by the number of sample sites (pg 23). The name of the plant community is generally the common name of the indicator plant species within the various lifeform layers (tree, shrub, forb, grass, lichen, moss). This is followed by the scientific name of each indicator species and a general description of the community type describing its unique ecology. Plant species that are indicators of the ecological conditions on the site are listed with the mean cover summarized, range in cover and overall constancy (frequency of plots that the species was described (pg 23)). Environment and soil variables are then listed and represent a roll-up from the various plots and assessements (pg 23). Optional variables such as soil exposure, LFH thickness, may also be listed and represent a roll-up for various plots.

Results

This guide represents the analysis of over 970 plots described in the Alpine Natural Subregion, near Hinton, Grande Cache (Willmore Wilderness Park), Banff, Jasper, Waterton and west of Rocky Mountain House and Calgary. The 972 plots represent 52 community types. These types are split into:

a. Grass and lichen dominated community types
b. Shrub dominated community types
c. Conifer dominated community types

The dominant plant species, canopy cover, environmental conditions are outlined for each type.

General Ecological Descriptions

Please note this summary of Natural Subregion characteristics is partially extracted from the Natural Subregions guide (Natural Regions Committee 2006) and is presented here for the reader's convenience.

The alpine environment generally occurs above treeline. The Alpine Natural Subregion is characterized by low-growing vegetation and a complex array of sites produced by the interaction of elevation, topography, substrate, latitude, and regional to local climates. The resulting plant communities are correspondingly variable, and community structure and distribution patterns are not comprehensively understood.

Alpine plants and communities show adaptations to these extreme environmental conditions. The alpine plant communities tend to be low growing where they are protected from the wind and benefit from the warmer temperatures close to the ground (Ogilvie 1969). The ecological sites in the Alpine subregion are arranged along an elevation gradient and include three zones (upper, middle, lower). In general moisture increases from the upper to lower zone.

Upper Alpine Zone (2250 m (2136-2302 m))

On the driest, coldest and most exposed locations, in the "upper" alpine zone, only lichens grow on rock faces or mineral soils in a “stonefield–lichen” complex. Cover of vascular plants is limited with scattered occurrences in between rocks or in slight depressions. Examples of vascular plants that may be found here include moss campion, mountain-sorrel, nodding saxifrage and fragile fern. In places where snow deposits are shallow and sites are dry because of wind or aspect, communities composed of very low-growing tussock or cushion-form plants develop, with white mountain avens, bog sedge and alpine fescues as common associates. Stonefield–lichen complexes and mountain avens communities form the most extensive plant cover in the Alpine Natural Subregion.

Middle Alpine Zone (2187 m (2161-2213 m))

Heather and sedge snowbed communities occupy the “middle” zone. Dwarf shrub–heath communities occur on sites that have an average snowpack. Mountain–heather (Cassiope spp.) communities are usually associated with imperfectly to moderately well drained sites and slightly better drained locales support heather (Phyllodoce spp.) communities. Cassiope tetragona occurs in areas with shallower snow accumulation (<50) than Cassiope mertensiana (>1 m). Areas of deep snow accumulation that do not melt until mid summer usually support black alpine sedge–forb snowbed communities on poorly drained Gleysolic or Regosolic soils in the middle zone.

Lower Alpine Zone (2064 m (2004-2113 m))

At lower elevations where snow melts early the moist rich forb meadows dominated by globeflower, wandering daisy, Sitka valerian, western anemone occur to form the globeflower-willow ecological site. On slightly moister sites white marsh marigold, variegated horsetail and brook ragwort are common to form the white marsh marigold ecological site. Wetlands are uncommon and typically very small. Wetlands usually occur in the valley bottoms near timberline on very wet sites with standing water within the lower zone. Willow, horsetail and sedge meadow community types are typical.

Wetlands

Wetlands in the Alpine are generally unmappable at the 1:20,000 scale (Achuff et al. 2002). Water exists as glaciers and snowfields that cover about 4 percent of the area, mainly along the continental divide. Alpine lakes and the headwaters of major rivers are fed by glacial meltwaters. Wetlands are not common in the Alpine Natural Subregion and are restricted to the edges of streams, lakes and snow accumulation areas. The Alberta Wetland Classification System (2015) recognizes the hydrological, biogeochemical and biotic

processes that affect differing characteristics that can be used to define a wetland. The AWCS recognizes five classes of wetlands in Alberta: bogs, fens, marshes, shallow open water and swamps. Wetlands can be divided into two broad groups: **peatlands** and **mineral wetlands**. In general the AWCS considers bogs and fens to be peatlands and all other wetland classes (i.e. swamps, marshes and shallow open waters) are considered to be mineral wetlands (Table A). Table A attempts to fit the identified wetland communites and ecological sites in the alpine into the Alberta Wetland Classification System.

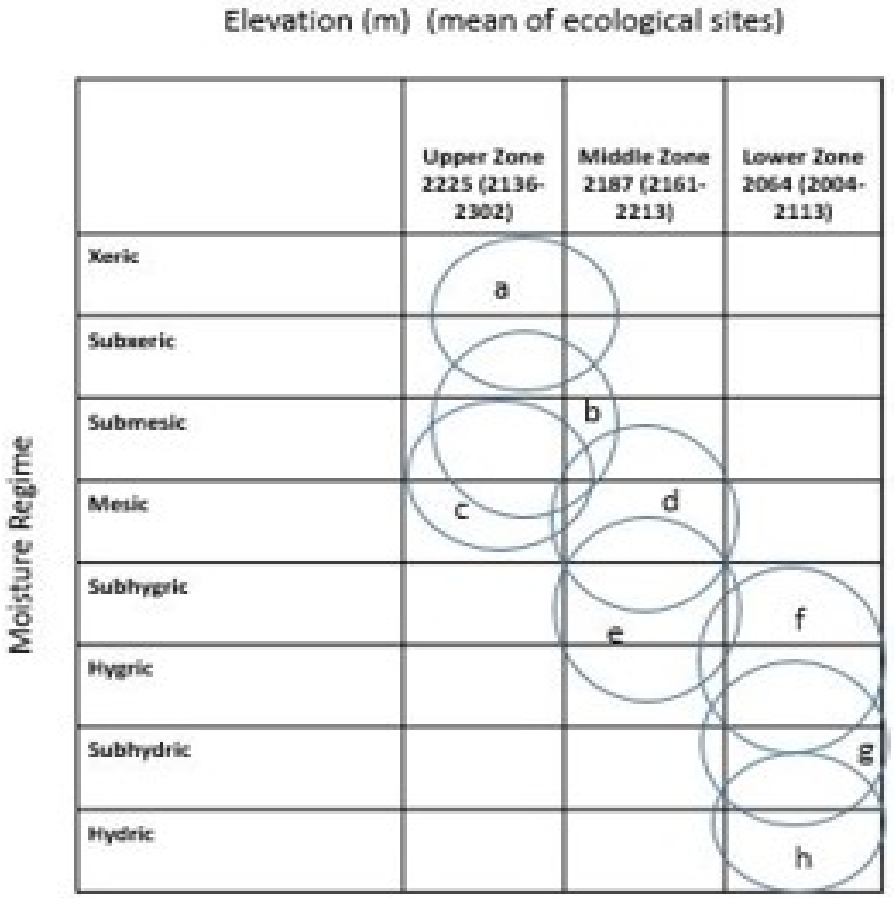
Table A: Alberta Wetland Classification System (AWCS) class and form cross walk to Ecological Sites and Phases for the Alpine Natural Subregion.

AWCS Class	AWCS Form	AWCS Code for DEP	Subregion and Ecological Site Phase Code
Bog (B)	Coniferous (W)	BW	
	Shrubby (S)	BS	
	Graminoid (G)	FG	
Fen (F)	Wooded Poor (Wp)	FWp	
	Wooded Rich (Wr)	FWr	
	Shrubby Poor (Sp)	FS	
	Graminoid Poor (Gp)	FG	
	Shrubby Rich (Sr)	FS	***Alpine***-Ah2
	Graminoid Rich (Gr)	FG	***Alpine***-Ah1
Marsh (M)	Graminoid (G)	MG	***Alpine-***Ae3,f3,g3
Open water (W)	Aquatic Veg (A)	WA	
	Bare (B)	WB	
Swamp (S)	Wooded Conifer (Wc)	SWc	***Alpine***-Ae1,f1,g1
	Wooded Mixedwood (Wm)	SWm	
	Wooded Deciduous (Wd)	SWd	
	Shrubby (S)	SS	***Alpine-***Ae2,f2,g2

The harsh site conditions (cold short growing seasons), rapid drainage and shallow rocky soils are not conducive for the development of peaty wetlands in the alpine. Only one site within the Simple bog sedge (Aa10) community had a Terric Mesisol soil described. The ecosite phases Ah2 and Ah1 are placed within the Shrubby and Graminoid rich fen AWCS categories because they occur in the landscape where water accumulates. However, it could be argued that these sites should be placed within the Shrubby Swamp (Ah2) and Marsh (Ah1) categories because they are dominated by mineral soils.

Swamps in AWCS are mineral wetlands where the water table is near or above the ground surface for variable periods during the year and must have at least 25% cover of trees or shrubs. In the AWCS classification swamps are further split into conifer, mixedwood, deciduous or shrub dominated types, with the shrubby dominated swamps further being split by hydroperiod and salinity (AWCS 2015). In the alpine Wooded Conifer Swamps barely fit this definition as the conifer tree canopy rarely exceeds 25%. Deciduous trees are extremely rare in the alpine because of the harsh growing conditions so mixedwood and deciduous swamps were not described or expected.

Many of these alpine grass and shrublands are very fragile because of exposure and cold climate. The forage productivity is very low compared to the valley bottoms. Consequently, recovery from overgrazing will likely take some time. As a result grazing by domestic livestock in the Alpine subregion should be discouraged.



Ecological sites

a=**stonefield/lichen**
xeric-subxeric
b=**mountain avens**
xeric-mesic
c=**bog sedge**
subxeric-mesic
d=**heather**
mesic
e=**black alpine sedge**
mesic-subhygric
f=**globeflower-willow**
mesic-hygric
g=**mountain marigold**
subhygric-subhydric
h=**wet meadows**
hygric-hydric

Figure 1. Edatope grid and ecological sites for the Alpine subregion.

Plant Community Keys

Plant Community Tables

Table 1. Alpine Communities

Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community
a stone fields (xeric-subxeric/upper zone)	a1 stone fields	Aa19 Shrubby cinquefoil/Early yellow locoweed/June grass (windswept ridges)
		Aa2 Wood rush-Spiked trisetum/Lichen
		Aa20 Sticky Jacob's-ladder-Saxifrage-Silver rock-cress
		Aa3 Moss campion/Saxicolous lichen
		Ab19 Arctic willow/Moss campion/Saxicolous lichen
		Ab20 Michaux's wormwood
	a2 stone seepages	Aa11 Hornemann's willowherb/Ross's sedge
		Aa15 False saxifrage
b mountain avens (xeric-mesic/upper zone)	b1 mountain avens La	
	b2 mountain avens Fa-Se	Ac1 White mountain avens (Fa-Se)
	b3 mountain avens shrubland	Ab1 White mountain avens
		Ab2 Entire-leaved mountain avens
		Ab22 Net-veined willow-Arctic willow-Entire-leaved mountain avens
		Ab4 Net-veined willow-Arctic willow-White mountain avens
	b4 mountain avens/graminoid	Aa1 Bearberry/Hairy wildrye
		Aa4 Nard sedge/White mountain avens
c bog sedge (subxeric-mesic/upper zone)	c1 bog sedge La	
	c2 bog sedge Fa-Se	
	c3 bog sedge shrubland	Ab5 Net-veined willow-Smooth willow/Bog sedge
	c4 bog sedge graminoid	Aa5 Bog sedge-Hairy wildrye/White mountain avens

Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community
d heather-grouseberry(mesic/middle zone)	d1 heather-grouseberry La	Ac2 White mountain heather-Yellow heather-Grouseberry (La)
	d2 heather-grouseberry Fa-Se	Ac3 White mountain heather-Yellow heather-Grouseberry (Fa-Se)
		Ac4 White mountain heather-Pink mountain heather-Grouseberry (Fa-Se)
	d3 heather shrubland	Ab10 Arctic willow-Yellow heather/Woolly pussytoes
		Ab11 Four-angled mountain heather-Yellow heather
		Ab12 Pink mountain heather
		Ab13 Yellow heather
		Ab23 Alpine azalea
		Ab3 Partridgefoot/Woolly pussytoes
		Ab6 Four-angled mountain heather-Yellow heather-White mountain avens
		Ab7 Net-veined willow-Arctic willow-Four-angled mountain heather-Yellow heather
		Ab8 White mountain heather-Yellow heather
		Ab9 White mountain heather-Pink mountain heather
e black alpine sedge-arctic willow (mesic subhygric/middle zone)	e1 black alpine sedge-willow Fa-Se	Ac5 Arctic willow/Black alpine sedge (Fa-Se)
	e2 black alpine sedge-willow shrubland	Ab14 Arctic willow-Net veined willow/Alpine wormwood-Woolly pussytoes
	e3 black alpine sedge graminoid	Aa6 Tufted hairgrass-Sedge
		Aa7 Black alpine sedge
f globeflower-willow (mesic hygric/lower zone)	f1 globeflower-willow Fa-Se	Ac6 Globeflower-Sitka valerian (Fa-Se)
	f2 globeflower-willow shrubland	Ab15 Arctic willow-Net-veined willow/Globeflower-Mountain cinquefoil
		Ab16 Barratt's willow-Smooth willow/Globeflower-Sitka valerian
	f3 globeflower forb	Aa12 Mountain cinquefoil/Hairy wildrye-Meadow sedge
		Aa8 Globeflower-Wandering fleabane-Sitka valerian-Western anemone

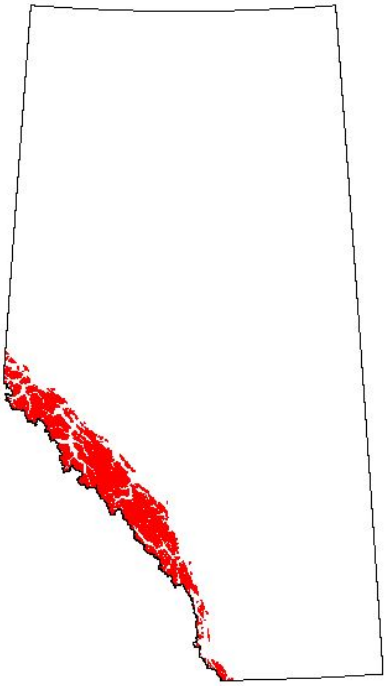
Ecological Site / Range Site	Ecosite Phase / Ecological Range Site	Reference Plant Community
	f4 fluvial streambanks	Aa16 Broad-leaved fireweed
		Aa17 Iceland purslane
		Ab24 Arctic willow-Barclay's willow/Broad-leaved fireweed
		Ab25 Net veined willow/Leatherleaf saxifrage/Enander's sedge
g mountain marigold (subhygric subhydric/lower zone)	g1 mountain marigold Fa-Se	Ac7 White marsh (Mountain) marigold-Globeflower (Fa-Se)
	g2 mountain marigold shrubland	Ab17 Arctic willow/White marsh (Mountain) marigold-Variegated horsetail
	g3 mountain marigold forb	Aa9 White marsh (Mountain) marigold-Globeflower-Brook ragwort
h wet meadows (hygric hydric/lower zone)	h1 sedge/horsetail	Aa10 Simple bog sedge
		Aa13 Showy sedge
		Aa14 Lakeshore sedge
		Aa18 Horsetail-Arctic sweet coltsfoot
	h2 willow	Ab18 Arctic willow-Net-veined willow/Golden moss-Tufted moss
		Ab21 Smooth willow-Entire-leaved mountain avens/Hair-like sedge

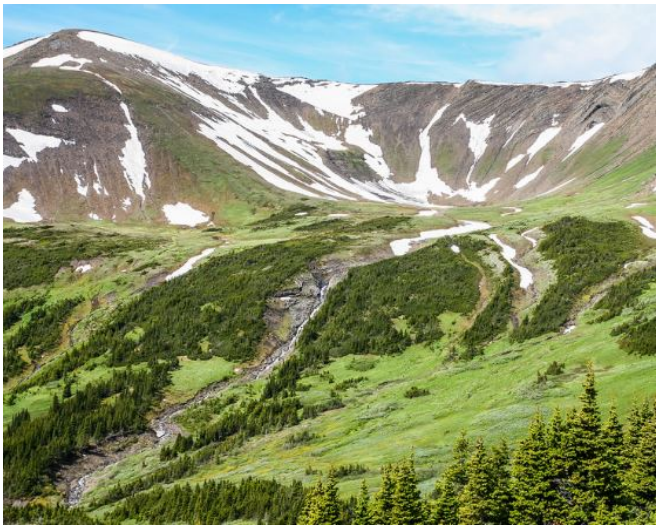
A Alpine (n=972)

Natural Subregion: Alpine

General Description

The Alpine Natural Subregion overlaps with many of the subalpine community types. Forests at higher elevations are open and consist of stunted trees of subalpine fir and Engelmann spruce with an understory of alpine vegetation (Corns and Achuff 1982; Natural Regions Committee 2006). Whitebark pine and subalpine larch may also be present. Altitudinal limits of the subalpine in Jasper National Park range from 1350 - 2200 m (Corns and Achuff 1982). The alpine subregion is a complex of plant associations dominated by dwarf shrub and herbaceous vegetation occurring at elevations above 1900 m in Jasper National Park (Corns and Achuff 1982) and above 2150 m in Waterton Lakes National Park (Achuff et al. 2002).





Environmental Variables

Elevation (range): 2139 (1635-2750) M

Ecological Sites		Site Count
a	stone fields (xeric-subxeric/upper zone)	120
b	mountain avens (xeric-mesic/upper zone)	280
c	bog sedge (subxeric-mesic/upper zone)	33
d	heather-grouseberry(mesic/middle zone)	327
e	black alpine sedge-arctic willow (mesic subhygric/middle zone)	49
f	globeflower-willow (mesic hygric/lower zone)	123
g	mountain marigold (subhygric subhydric/lower zone)	25
h	wet meadows (hygric hydric/lower zone)	15

a stone fields (xeric-subxeric/upper zone) (n=120)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecosite occurs on subxeric to xeric alpine sites at higher elevations up to 2800 m on various slopes and aspects and on colluvial rubble at lower elevations (1800m). Areas of sparse vegetation at high elevation are often described as boulder field (Daubenmire 1943, Moss 1955), fell-field (Daubenmire 1943; Moss 1955), stonefield lichen community (Ogilvie 1969), rock lichen tundra (Hettinger 1975), lichen tundra (Kuchar 1975), rock tundra (Mortimer 1978) and saxicolous lichen vegetation type (Corns and Achuff 1982). Soils of this ecological site are Orthic Regosols or non-soil occurring on Rockland (R) or Colluvial Rubble (CR). This ecosite is only sparsely vegetated with less than 20% cover with lichens contributing to most of the cover. On hard-weathering rocks, lichen variability mainly depends on the geochemistry and, subordinately, on the heterogeneity of microniches due to microtopography (Glew 1998).

Successional Relationships

This ecosite is successionally mature. In one study in Norway they found these lichen communities to be thousands of years old (Hestmark et al. 2007). Canopy cover of vegetation is sparse and composition is heterogeneous making classification very difficult in this ecological site.

Indicator Species

Shrub

SHRUBBY CINQUEFOIL
Potentilla fruticosa

ARCTIC WILLOW
Salix arctica

NET-VEINED WILLOW
Salix reticulata

Forb

HORNEMANN'S WILLOWHERB
Epilobium hornemannii

EARLY YELLOW LOCOWEED
Oxytropis sericea

MOSS CAMPION
Silene acaulis

TELESONIX
Telesonix heucheriformis

MICHAUX'S WORMWOOD
Artemisia michauxiana

Lichen

UNDIFFERENTIATED LICHENOTHELIA
Lichenothelia

N/A
Cetraria islandica

N/A
Cladonia pyxidata

Moss and Liverwort

BROOM MOSS
Dicranum scoparium

Graminoid

SPIKE TRISETUM
Trisetum spicatum

Environmental Variables

Moisture Regime: Mesic (fresh) (32), Subxeric (moderately dry) (26), Xeric (dry) (23), Submesic (moderately fresh) (15), Very Xeric (very dry) (9), Subhygric (moderately moist) (5)

Nutrient Regime: Mesotrophic (medium) (34), Submesotrophic (poor) (28), Oligotrophic (very poor) (4), Permesotrophic (rich) (4)

Elevation (range): 2153 (1652-2750) M

Slope (%): moderate slope (23), strong slope (23), very strong slope (22), steep slope (14), gentle slope (12), very gentle slope (11), nearly level (4), very steep slope (3), extreme slope (1), level (1)

Aspect: Southerly (43), Westerly (28), Northerly (23), Easterly (18), Level (2)

Topographic Position:Crest (8), Upper Slope (7), Midslope (2)

Soil Variables

Soil Drainage: Well drained (16), Rapidly drained (16), Very rapidly drained (14), Moderately well drained (2)

Soil Subgroup: ORTHIC REGOSOL (19), ORTHIC DYSTRIC BRUNISOL (8), ORTHIC SOMBRIC BRUNISOL (5), ELUVIATED DYSTRIC BRUNISOL (4), ORTHIC EUTRIC BRUNISOL (4), ORTHIC HUMIC REGOSOL (4), ORTHIC MELANIC BRUNISOL (3), CUMULIC REGOSOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Silt loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (46)

Parent Material: Rock (37), Morainal (20), Colluvial (14), Eolian (3), Fluvial (1), Glaciofluvial (1)

Soil Type: Shallow (5), Very Dry/Silty-Loamy (1)

Humus Form

a1 stone fields (n=118)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)

Characteristic Species

Shrub

[2.6] ARCTIC WILLOW*
Salix arctica

[2.3] NET-VEINED WILLOW*
Salix reticulata

[1.0] SHRUBBY CINQUEFOIL*
Potentilla fruticosa

[0.6] WHITE MOUNTAIN AVENS
Dryas octopetala

[0.4] GROUSEBERRY
Vaccinium scoparium

Forb

[1.5] MICHAUX'S WORMWOOD*
Artemisia michauxiana

[1.0] EARLY YELLOW LOCOWEED*
Oxytropis sericea

[0.5] MOSS CAMPION*
Silene acaulis

[0.5] ALPINE WORMWOOD
Artemisia norvegica

[0.4] ALPINE BISTORT
Polygonum viviparum

[0.4] THREE-TOOTHED SAXIFRAGE
Saxifraga tricuspidata

[0.3] PRAIRIE SELAGINELLA
Selaginella densa

[0.3] SPOTTED SAXIFRAGE
Saxifraga bronchialis

[0.2] INFLATED OXYTROPE
Oxytropis podocarpa

Lichen

[5.9] UNDIFFERENTIATED LICHENOTHELIA*
Lichenothelia

[0.6] N/A
Pertusaria dactylina

[0.2] N/A*
Cladonia pyxidata

[0.1] N/A*
Cetraria islandica

Moss and Liverwort

[0.3] BROOM MOSS*
Dicranum scoparium

Graminoid

[0.8] ALPINE BLUEGRASS
Poa alpina

[0.5] JUNE GRASS
Koeleria macrantha

[0.4] SPIKED WOOD-RUSH
Luzula spicata

[0.4] SPIKE TRISETUM
Trisetum spicatum

[0.3] SHORT-LEAVED FESCUE
Festuca brachyphylla

[0.2] ROCK SEDGE
Carex rupestris

Environmental Variables

Moisture Regime: Mesic (fresh) (32), Subxeric (moderately dry) (25), Xeric (dry) (23), Submesic (moderately fresh) (15), Very Xeric (very dry) (9), Subhygric (moderately moist) (5)

Nutrient Regime: Mesotrophic (medium) (33), Submesotrophic (poor) (28), Oligotrophic (very poor) (4), Permesotrophic (rich) (4)

Elevation (range): 2200.5 (1652-2750) M

Slope (%): moderate slope (23), strong slope (22), very strong slope (21), steep slope (14), gentle slope (12), very gentle slope (11), nearly level (4), very steep slope (3), extreme slope (1), level (1)

Aspect: Southerly (42), Westerly (28), Northerly (22), Easterly (18), Level (2)

Topographic Position:Crest (8), Upper Slope (7), Midslope (2)

Soil Variables

Soil Drainage: Well drained (16), Rapidly drained (16), Very rapidly drained (14), Moderately well drained (2)

Soil Subgroup: ORTHIC REGOSOL (19), ORTHIC DYSTRIC BRUNISOL (7), ORTHIC SOMBRIC BRUNISOL (5), ORTHIC EUTRIC BRUNISOL (4), ORTHIC HUMIC REGOSOL (4), ELUVIATED DYSTRIC BRUNISOL (4), ORTHIC MELANIC BRUNISOL (3), CUMULIC REGOSOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture: Silt loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (45)

Parent Material: Rock (36), Morainal (20), Colluvial (13), Eolian (3), Glaciofluvial (1), Fluvial (1)

Soil Type: Shallow (5), Very Dry/Silty-Loamy (1)

Humus Form

Sparse vegetation and extensive bare ground with lichen cover is characteristic of ecosite phase a1

Aa19 Shrubby cinquefoil/Early yellow locoweed/June grass (windswept ridges) (n=16)

(Potentilla fruticosa/Oxytropis sericea/Koeleria macrantha)

This community type is characteristic of the dry, rocky, windswept ridges in the Castle area north of Waterton Lakes National Park and one plot described in the headwaters of Willow Creek. At higher elevations this community is often replaced by the white mountian avens and saxicolous lichen community types. This community type is somewhat variable, shrubby cinquefoil, false mountain dandelion, early yellow locoweed and junegrass were found in the majority of the plots, but in areas where there is slightly more snow accumulation the cover of Idaho fescue (SAsA3) increases, and there are larger patches of species such as spotted saxifrage, brown bracted mountain everlasting and sandwort. Bare ground on these moister areas is usually less than 40%. In contrast bare ground on the drier parts of this community type exceed 60%. At lower elevations on Table Mountain bluebunch wheat grass becomes more prevalent.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	3.9	0.0-15.0	81
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	1.0	0.0-10.0	31
Tall Forb (>= 30 cm)			
YELLOW HEDYSARUM *(Hedysarum sulphurescens)*	1.4	0.0-10.0	31
Low Forb (< 30 cm)			
ALPINE STICHWORT *(Minuartia obtusiloba)*	2.3	0.0-16.5	31
PRAIRIE SELAGINELLA *(Selaginella densa)*	1.7	0.0-8.8	56
YELLOW FALSE DANDELION *(Agoseris glauca)*	1.3	0.0-6.9	69
UMBER PUSSYTOES *(Antennaria umbrinella)*	1.2	0.0-8.9	38
EARLY YELLOW LOCOWEED *(Oxytropis sericea)*	1.2	0.0-5.1	63
SPOTTED SAXIFRAGE *(Saxifraga bronchialis)*	0.9	0.0-12.0	31
COMMON YARROW *(Achillea millefolium)*	0.6	0.0-1.7	75
KITTENTAILS *(Besseya wyomingensis)*	0.6	0.0-3.4	44
SILVER-PLANT *(Eriogonum ovalifolium)*	0.2	0.0-3.1	44
Graminoid			
JUNE GRASS *(Koeleria macrantha)*	2.9	0.0-13.0	94
IDAHO FESCUE *(Festuca idahoensis)*	1.6	0.0-8.2	38
BLUEBUNCH WHEAT GRASS *(Agropyron spicatum)*	1.2	0.0-4.6	44
ROCK SEDGE *(Carex rupestris)*	1.0	0.0-9.3	19
NORTHERN AWNLESS BROME *(Bromus inermis ssp. pumpellianus)*	0.9	0.0-5.1	38
ROUGH FESCUE *(Festuca scabrella)*	0.8	0.0-6.3	31
Moss			
N/A *(Rhacomitrium sudeticum)*	2.0	0.0-27.1	31
Lichen			
N/A *(Cladonia pocillum)*	0.1	0.0-1.2	19
N/A *(Xanthoria elegans)*	0.1	0.0-1.0	19

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Xeric (dry) (7), Very Xeric (very dry) (4), Mesic (fresh) (3), Subxeric (moderately dry) (2)

Nutrient Regime: Submesotrophic (poor) (8), Oligotrophic (very poor) (3), Mesotrophic (medium) (2)

Elevation (range): 1918 (1800-2242) M

Slope (%): 16 - 30.99 (6), 31 - 45.99 (5), 46 - 70.99 (2), 6 - 9.99 (2), 10 - 15.99 (1)

Aspect: Southerly (6), Westerly (5), Northerly (3), Easterly (2)

Topographic Position: Upper Slope (7), Crest (5), Midslope (1)

Soil Variables

Soil Drainage: Very rapidly drained (9), Rapidly drained (5), Well drained (2)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (2), ORTHIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Rock (3), Colluvial (2), Glaciofluvial (1)

Soil Type:

Humus Form

Aa2 Wood rush-Spiked trisetum/Lichen (n=21)

(Luzula spp.-Trisetum spicatum/Cladonia spp.)

This community type was described on shallow talus slopes at high elevations. There is slightly more snow accumulation on this community type which favours the growth of grasses and rush species over the moss campion/lichen (Aa3) dominated community type. Two sites had a 90% and a 40% cover of Poa alpina.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
GROUSEBERRY *(Vaccinium scoparium)*	2.0	0.0-15.0	19
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.8	0.0-8.0	38
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	0.4	0.0-4.0	15
Low Shrub (< 0.5m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	0.3	0.0-5.0	20
Low Forb (< 30 cm)			
THREE-TOOTHED SAXIFRAGE *(Saxifraga tricuspidata)*	2.3	0.0-50.0	5
ALPINE WORMWOOD *(Artemisia norvegica)*	2.2	0.0-20.0	29
SMALL-LEAVED PUSSYTOES *(Antennaria parvifolia)*	1.3	0.0-18.0	19
SPOTTED SAXIFRAGE *(Saxifraga bronchialis)*	0.7	0.0-10.0	19
ALPINE BISTORT *(Polygonum viviparum)*	0.5	0.0-5.0	29
MOSS CAMPION *(Silene acaulis)*	0.3	0.0-5.0	29
WOOLLY PUSSYTOES *(Antennaria lanata)*	0.2	0.0-4.0	19
Graminoid			
ALPINE BLUEGRASS *(Poa alpina)*	4.4	0.0-90.0	45
ALPINE WOOD-RUSH *(Luzula arcuata)*	1.4	0.0-20.0	24
SPIKED WOOD-RUSH *(Luzula spicata)*	0.8	0.0-10.0	48
SPIKE TRISETUM *(Trisetum spicatum)*	0.8	0.0-5.0	62
SEDGE SPECIES *(Carex)*	0.6	0.0-9.0	14
SHORT-LEAVED FESCUE *(Festuca brachyphylla)*	0.4	0.0-3.0	43
Moss			
TUFTED MOSS *(Aulacomnium palustre)*	2.8	0.0-60.0	5
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	1.8	0.0-25.0	24
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	0.7	0.0-12.0	19
N/A *(Cladonia pyxidata)*	0.2	0.0-5.0	10
N/A *(Cetraria islandica)*	0.1	0.0-2.0	14
N/A *(Cladonia chlorophaea)*	0.1	0.0-1.0	14

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subxeric (moderately dry) (6), Mesic (fresh) (5), Subhygric (moderately moist) (3), Xeric (dry) (2), Submesic (moderately fresh) (2)

Nutrient Regime: Mesotrophic (medium) (9), Submesotrophic (poor) (2), Permesotrophic (rich) (1)

Elevation (range): 2207 (1820-2530) M

Slope (%): 46 - 70.99 (6), 6 - 9.99 (5), 10 - 15.99 (3), 31 - 45.99 (2), 71 - 100.99 (1), 16 - 30.99 (1), 2.5 - 5.99 (1)

Aspect: Southerly (9), Westerly (8), Easterly (2), Northerly (1)

Topographic Position: Midslope (1)

Soil Variables

Soil Drainage: Well drained (2), Very rapidly drained (1), Rapidly drained (1)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (2), ORTHIC HUMIC REGOSOL (2), ORTHIC REGOSOL (1), ORTHIC SOMBRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (9)

Parent Material: Rock (5), Colluvial (4), Morainal (3), Fluvial (1), Eolian (1)

Soil Type:

Humus Form

Aa20 Sticky Jacob's-ladder-Saxifrage-Silver rock-cress (n=6)

(Polemonium viscosum-Saxifraga spp.-Smelowskia calycina)

This community type was described from Waterton Lakes National Park on subxeric high elevation sites (2380-2640m) on ridgetops and upper slopes (Achuff et al. 2002). Beder (1967) described a similar community with saxifrage and silver rock-cress on ridge summits in the Snow Creek Valley of Banff National Park. Achuff et al. described the soils as Orthic Regosols or non-soil that developed on miscellaneous landscapes of rockland, talus or colluvial rubble. They found the herb and dwarf shrub layer to be very sparse (15-25% cover) and they felt this community type was successionally mature.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Low Forb (< 30 cm)			
STICKY JACOB'S-LADDER *(Polemonium viscosum)*	4.8	1.0-10.0	100
SILVER ROCK CRESS *(Smelowskia calycina)*	2.8	2.0-5.0	100
ONE-FLOWERED CINQUEFOIL *(Potentilla uniflora)*	2.5	0.0-10.0	33
SNOW CINQUEFOIL *(Potentilla nivea)*	1.8	0.0-10.0	33
MOSS CAMPION *(Silene acaulis)*	1.4	0.0-4.0	67
CUT-LEAVED FLEABANE *(Erigeron compositus)*	1.3	0.5-3.0	100
ALPINE STICHWORT *(Minuartia obtusiloba)*	1.2	0.0-3.0	83
REDDISH STITCHWORT *(Minuartia rubella)*	0.9	0.0-5.0	33
SPOTTED SAXIFRAGE *(Saxifraga bronchialis)*	0.8	0.0-3.0	67
GREEN ALPINE SANDWORT *(Minuartia austromontana)*	0.5	0.0-1.0	83
ALPINE FORGET-ME-NOT *(Myosotis alpestris)*	0.5	0.0-2.0	50
TUFTED SAXIFRAGE *(Saxifraga cespitosa)*	0.5	0.0-1.0	83
NODDING SAXIFRAGE *(Saxifraga cernua)*	0.3	0.0-0.5	67
BERING SEA CHICKWEED *(Cerastium beeringianum)*	0.2	0.0-0.5	50
ALPINE SPRING BEAUTY *(Claytonia megarhiza)*	0.2	0.0-0.5	50
Graminoid			
BROAD-GLUMED WHEAT GRASS *(Agropyron violaceum)*	0.2	0.0-0.5	50
SHORT-LEAVED FESCUE *(Festuca brachyphylla)*	0.2	0.0-0.5	50
SEDGE SPECIES *(Carex)*	0.2	0.0-0.5	50
Moss			
N/A *(Hypnum revolutum)*	1.4	0.0-8.0	33
Lichen			
ROCK-SHIELD LICHEN *(Xanthoparmelia mexicana)*	3.3	0.0-10.0	33
N/A *(Rhizoplaca melanophthalma)*	2.0	0.0-10.0	50
N/A *(Rhizocarpon geographicum)*	1.8	0.0-10.0	50
N/A *(Acarospora chlorophana)*	0.9	0.0-5.0	33
N/A *(Pseudophebe pubescens)*	0.2	0.0-0.5	50

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Xeric (dry) (4), Very Xeric (very dry) (1), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (5), Oligotrophic (very poor) (1)

Elevation (range): 2484 (2380-2640) M

Slope (%): 10 - 15.99 (4), 2.5 - 5.99 (2)

Aspect: Southerly (4), Northerly (1), Easterly (1)

Topographic Position: Crest (2)

Soil Variables

Soil Drainage: Very rapidly drained (4), Rapidly drained (2)

Soil Subgroup: ORTHIC REGOSOL (3)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material: Rock (2)

Soil Type: Shallow (4)

Humus Form

Aa3 Moss campion/Saxicolous lichen (n=55)

(Silene acaulis/Rhizocarpon geographicum-Cetraria nivalis)

This community type occurs on very dry, exposed rocky ridges and talus slopes. It is distinguished by its very low plant cover, which is dominated by lichens and its occurrence at elevations higher than the other vegetation types in the alpine. Kuchar (1975) described this community type in Jasper as a heterogeneous assemblage of plant communities which have a low vascular plant cover with low growing forms dominant, absence or relative scarcity of white mountain avens (Dryas octopetala), high cover of pebbles, rocks and boulders and usually unconsolidated variable lichen cover. Achuff et al. (2002), Corns and Achuff (1982), described a similar community type in Waterton Lakes, Banff and Jasper National Parks called saxicolous lichen tundra on ridgetops and upper slopes. They found that the soils were non-soils and rapidly drained Orthic Regosols on residual and colluvial parent materials.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	1.7	0.0-15.0	24
NET-VEINED WILLOW *(Salix reticulata)*	0.9	0.0-10.0	33
Low Forb (< 30 cm)			
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.1	0.0-20.0	24
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.0	0.0-50.0	11
MOSS CAMPION *(Silene acaulis)*	1.0	0.0-10.0	67
ALPINE BISTORT *(Polygonum viviparum)*	0.6	0.0-18.0	36
SNOW CINQUEFOIL *(Potentilla nivea)*	0.4	0.0-5.0	22
ALPINE WORMWOOD *(Artemisia norvegica)*	0.3	0.0-7.0	31
PURPLE SAXIFRAGE *(Saxifraga oppositifolia)*	0.3	0.0-5.0	26
PRAIRIE SELAGINELLA *(Selaginella densa)*	0.3	0.0-10.0	18
SILVER ROCK CRESS *(Smelowskia calycina)*	0.3	0.0-9.0	9
Moss			
HAIRY SCREW MOSS *(Tortula ruralis)*	0.4	0.0-10.0	18
BROOM MOSS *(Dicranum scoparium)*	0.3	0.0-15.0	11
Lichen			
N/A *(Rhizocarpon geographicum)*	1.6	0.0-55.0	27
N/A *(Cetraria cucullata)*	0.8	0.0-25.0	29
N/A *(Umbilicaria hyperborea)*	0.8	0.0-30.0	22
N/A *(Cetraria nivalis)*	0.7	0.0-5.0	35
N/A *(Cladonia pyxidata)*	0.4	0.0-10.0	16
N/A *(Stereocaulon alpinum)*	0.4	0.0-10.0	22
N/A *(Thamnolia subuliformis)*	0.4	0.0-5.0	31
N/A *(Cetraria ericetorum)*	0.3	0.0-5.0	20
N/A *(Cetraria tilesii)*	0.3	0.0-3.0	26
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	2.8	0.0-80.0	35

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (19), Subxeric (moderately dry) (13), Submesic (moderately fresh) (10), Xeric (dry) (5), Very Xeric (very dry) (4)

Nutrient Regime: Mesotrophic (medium) (16), Submesotrophic (poor) (8)

Elevation (range): 2237 (1833-2750) M

Slope (%): 16 - 30.99 (11), 31 - 45.99 (10), 10 - 15.99 (10), 2.5 - 5.99 (8), 46 - 70.99 (5), 0.5 - 2.49 (3), 6 - 9.99 (2), 71 - 100.99 (2), 0 - 0.49 (1)

Aspect: Southerly (13), Westerly (12), Northerly (12), Easterly (11), Level (2)

Topographic Position: Crest (1)

Soil Variables

Soil Drainage: Well drained (12), Rapidly drained (7)

Soil Subgroup: ORTHIC REGOSOL (13), ORTHIC SOMBRIC BRUNISOL (4), ORTHIC DYSTRIC BRUNISOL (4), ELUVIATED DYSTRIC BRUNISOL (3), ORTHIC EUTRIC BRUNISOL (1), ORTHIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1), CUMULIC REGOSOL (1)

Surface Texture: Silt loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (27)

Parent Material: Rock (23), Morainal (13), Colluvial (6), Eolian (2)

Soil Type: Very Dry/Silty-Loamy (1), Shallow (1)

Humus Form

Aa3 - Moss campion (*Silene acaulis*) Lichen community (A.J. Gould)

Ab19 Arctic willow/Moss campion/Saxicolous lichen (n=16)

(Salix arctica/Silene acaulis/Cetraria islandica)

Similar to plant community (Aa3) Moss campion/Saxicolous lichen but tends to be found in small debris islands (<50m2) and boulder fields which have deeper snow accumulations. This increase in moisture favours the growth of net-veined willow and arctic willow (Kuchar 1975, Hrapko and La Roi 1978).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	13.2	9.0-60.0	100
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	1.0	0.0-7.0	57
Low Shrub (< 0.5m)			
NET-VEINED WILLOW *(Salix reticulata)*	10.7	0.0-70.0	63
Low Forb (< 30 cm)			
ALPINE BISTORT *(Polygonum viviparum)*	1.3	0.0-10.0	81
SMALL-LEAVED PUSSYTOES *(Antennaria parvifolia)*	0.9	0.0-15.0	6
ALPINE WORMWOOD *(Artemisia norvegica)*	0.4	0.0-3.0	50
MOSS CAMPION *(Silene acaulis)*	0.4	0.0-2.0	88
WOOLLY PUSSYTOES *(Antennaria lanata)*	0.1	0.0-1.0	25
Graminoid			
SPIKED WOOD-RUSH *(Luzula spicata)*	1.4	0.0-15.0	56
ROCKY MOUNTAIN FESCUE *(Festuca saximontana)*	0.6	0.0-5.0	19
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	8.5	0.0-80.0	50
HAIRY SCREW MOSS *(Tortula ruralis)*	1.5	0.0-20.0	13
BROOM MOSS *(Dicranum scoparium)*	1.3	0.0-20.0	13
AWNED HAIR-CAP *(Polytrichum piliferum)*	1.0	0.0-15.0	13
Lichen			
N/A *(Pertusaria dactylina)*	3.1	0.0-50.0	6
N/A *(Lepraria neglecta)*	2.1	0.0-35.0	6
N/A *(Stereocaulon paschale)*	1.1	0.0-18.0	6
N/A *(Cetraria islandica)*	0.8	0.0-8.0	13
N/A *(Cladonia pyxidata)*	0.4	0.0-5.0	19
N/A *(Cetraria cucullata)*	0.3	0.0-4.0	13
N/A *(Cladonia uncialis)*	0.2	0.0-3.0	13
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	13.7	0.0-60.0	63

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Xeric (dry) (5), Mesic (fresh) (4), Subxeric (moderately dry) (3), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (5), Submesotrophic (poor) (4), Permesotrophic (rich) (2)

Elevation (range): 2268 (2050-2650) M

Slope (%): 10 - 15.99 (4), 16 - 30.99 (4), 6 - 9.99 (3), 31 - 45.99 (2), > 100.99 (1), 0.5 - 2.49 (1)

Aspect: Southerly (9), Northerly (4), Westerly (2), Easterly (1)

Topographic Position:

Soil Variables

Soil Drainage: Moderately well drained (2), Rapidly drained (1)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (2), CUMULIC REGOSOL (1), ORTHIC REGOSOL (1), ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (5)

Parent Material: Morainal (4), Rock (3)

Soil Type:

Humus Form

Ab19 – Extensive bareground and patches of arctic willow and moss campion is representative of the Arctic willow/Moss campion/Saxicolous lichen community (A.J. Gould)

Ab20 Michaux's wormwood (n=4)

(Artemisia michauxiana)

This community type is not common in the Alpine Natural Subregion. It occurs on rocky talus slopes and is dominated by Michaux's wormwood with a sparse cover of white mountain avens, sedges and various lichen species. Gould (2007), described this plant community type from northern Jasper National Park.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a1 stone fields

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
ROCKY MOUNTAIN ALPINE FIR *(Abies bifolia)*	1.2	0.0-5.0	25
Tall Forb (>= 30 cm)			
MICHAUX'S WORMWOOD *(Artemisia michauxiana)*	7.5	5.0-10.0	100
WILD WHITE GERANIUM *(Geranium richardsonii)*	2.5	0.0-10.0	25
Low Forb (< 30 cm)			
ONE-FLOWERED CINQUEFOIL *(Potentilla uniflora)*	3.2	0.0-10.0	50
MOSS CAMPION *(Silene acaulis)*	1.2	0.0-5.0	25
Graminoid			
SPIKE TRISETUM *(Trisetum spicatum)*	1.5	0.0-5.0	75
SHORT-LEAVED FESCUE *(Festuca brachyphylla)*	1.2	0.0-5.0	25
BEAUTIFUL SEDGE *(Carex concinna)*	0.5	0.0-2.0	25
BOG-SEDGE *(Kobresia myosuroides)*	0.5	0.0-2.0	25
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	8.7	0.0-25.0	75
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	13.2	0.0-40.0	75

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Submesic (moderately fresh) (2), Mesic (fresh) (1)

Nutrient Regime: Submesotrophic (poor) (1), Permesotrophic (rich) (1), Mesotrophic (medium) (1)

Elevation (range): 2089 (1652-2377) M

Slope (%): 31 - 45.99 (2), 46 - 70.99 (1), 10 - 15.99 (1)

Aspect: Northerly (1), Easterly (1), Southerly (1), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup: ORTHIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Colluvial (1)

Soil Type:

Humus Form

a2 stone seepages (n=2)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)

General Description

West-facing cliffs are generally too dry to support anything but Grimmia and some crustose lichens, but east-facing cliffs and outcrops can harbor a rich flora (Kuchar 1975).

Characteristic Species

Shrub

[3.5] WILD RED RASPBERRY
Rubus idaeus

[2.5] SMOOTH WILLOW
Salix glauca

[1.0] NORTHERN GOOSEBERRY
Ribes oxyacanthoides

[1.0] RED ELDERBERRY
Sambucus racemosa

[0.5] FALSE AZALEA
Menziesia ferruginea

[0.5] WHITE-FLOWERED RHODODENDRON
Rhododendron albiflorum

[0.5] GROUSEBERRY
Vaccinium scoparium

Forb

[5.0] HORNEMANN'S WILLOWHERB*
Epilobium hornemannii

[1.5] TELESONIX*
Telesonix heucheriformis

[0.5] HEART-LEAVED ARNICA
Arnica cordifolia

[0.5] BUNCHBERRY
Cornus canadensis

Moss and Liverwort

[2.5] PURPLE HORN-TOOTHED MOSS
Ceratodon purpureus

[1.0] N/A
Bryum uliginosum

[0.5] JUNIPER HAIR-CAP
Polytrichum juniperinum

Graminoid

[3.5] ROSS' SEDGE
Carex rossii

[0.5] JUNE GRASS
Koeleria macrantha

Environmental Variables

Moisture Regime: Subxeric (moderately dry) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 2011 (1950-2073) M

Slope (%): strong slope (1), very strong slope (1)

Aspect: Northerly (1), Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1), Colluvial (1)

Soil Type:

Humus Form

Aa11 Hornemann's willowherb/Ross's sedge (n=1)

(Epilobium hornemannii/Carex rossii)

This community type occurs on moist cliff faces and moist talus slopes. It tends to have a low plant cover and only occurs in small isolated spots where seepage occurs near the rock face.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a2 stone seepages

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WILD RED RASPBERRY *(Rubus idaeus)*	7.0	7.0-7.0	100
NORTHERN GOOSEBERRY *(Ribes oxyacanthoides)*	2.0	2.0-2.0	100
RED ELDERBERRY *(Sambucus racemosa)*	2.0	2.0-2.0	100
FALSE AZALEA *(Menziesia ferruginea)*	1.0	1.0-1.0	100
WHITE-FLOWERED RHODODENDRON *(Rhododendron albiflorum)*	1.0	1.0-1.0	100
GROUSEBERRY *(Vaccinium scoparium)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
HORNEMANN'S WILLOWHERB *(Epilobium hornemannii)*	10.0	10.0-10.0	100
Low Forb (< 30 cm)			
HEART-LEAVED ARNICA *(Arnica cordifolia)*	1.0	1.0-1.0	100
BUNCHBERRY *(Cornus canadensis)*	1.0	1.0-1.0	100
Graminoid			
ROSS' SEDGE *(Carex rossii)*	7.0	7.0-7.0	100
Moss			
PURPLE HORN-TOOTHED MOSS *(Ceratodon purpureus)*	5.0	5.0-5.0	100
N/A *(Bryum uliginosum)*	2.0	2.0-2.0	100
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime:

Nutrient Regime:

Elevation (range): 1950 (1950-1950) M

Slope (%): 31 - 45.99 (1)

Aspect: Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Rock (1), Colluvial (1)

Soil Type:

Humus Form

Aa15 False saxifrage (n=1)

(Telesonix heucheriformis)

This community type occurs on cool, moist cliffs, rock slides, and is found more frequently on limestone. It tends to have a low plant cover and only occurs in small isolated spots, where moisture occurs in the rock cracks (Gould 2007).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: a stone fields (xeric-subxeric/upper zone)
Ecosite Phase: a2 stone seepages

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
SMOOTH WILLOW *(Salix glauca)*	5.0	5.0-5.0	100
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	0.1	0.1-0.1	100
Low Shrub (< 0.5m)			
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	0.1	0.1-0.1	100
NET-VEINED WILLOW *(Salix reticulata)*	0.1	0.1-0.1	100
Low Forb (< 30 cm)			
TELESONIX *(Telesonix heucheriformis)*	3.0	3.0-3.0	100
SWEET-FLOWERED ANDROSACE *(Androsace chamaejasme)*	0.1	0.1-0.1	100
SCENTED PUSSYTOES *(Antennaria aromatica)*	0.1	0.1-0.1	100
FRAGILE BLADDER FERN *(Cystopteris fragilis)*	0.1	0.1-0.1	100
DWARF SAW-WORT *(Saussurea nuda)*	0.1	0.1-0.1	100
RHOMBOID-LEAVED SAXIFRAGE *(Saxifraga occidentalis)*	0.1	0.1-0.1	100
Graminoid			
JUNE GRASS *(Koeleria macrantha)*	1.0	1.0-1.0	100
ROCK SEDGE *(Carex rupestris)*	0.1	0.1-0.1	100
SHORT-LEAVED FESCUE *(Festuca brachyphylla)*	0.1	0.1-0.1	100
BOG-SEDGE *(Kobresia myosuroides)*	0.1	0.1-0.1	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	0.1	0.1-0.1	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subxeric (moderately dry) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 2073 (2073-2073) M

Slope (%): 16 - 30.99 (1)

Aspect: Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Aa15 - False saxifrage (*Telesonix heucheriformis*) community on a moist cliff (A.J. Gould)

b mountain avens (xeric-mesic/upper zone) (n=280)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecological site is characterized by a dominance of white mountain avens or entire-leaved white mountain avens in the understory. This ecosite occurs on south and west facing windswept ridges throughout the mountains with the entire-leaved mountain avens more common north of Jasper (Gould 2007). The soils are well drained Orthic Regosols, Orthic Humic Regosols, Orthic Melanic, Orthic Sombric and Orthic Eutric Brunisols. Turbic and lithic soil phases are also common. The landforms are predominantly morainal and colluvial. On areas where snow lingers low growing snow willow and arctic willow can co-dominate this ecological type.

Successional Relationships

This ecosite is successionally mature. Pockets of low growing Engelmann spruce and subalpine fir can dominate the overstory on moister sites at lower elevations in this zone.

Indicator Species

Shrub

COMMON BEARBERRY
Arctostaphylos uva-ursi

ENTIRE-LEAVED MOUNTAIN AVENS
Dryas integrifolia

WHITE MOUNTAIN AVENS
Dryas octopetala

ARCTIC WILLOW
Salix arctica

NET-VEINED WILLOW
Salix reticulata

Graminoid

NARD SEDGE
Carex nardina

HAIRY WILD RYE
Elymus innovatus

Environmental Variables

Moisture Regime: Mesic (fresh) (125), Subxeric (moderately dry) (50), Xeric (dry) (18), Submesic (moderately fresh) (12), Subhygric (moderately moist) (8), Very Xeric (very dry) (5)

Nutrient Regime: Mesotrophic (medium) (24), Submesotrophic (poor) (23), Permesotrophic (rich) (6), Oligotrophic (very poor) (2), Eutrophic (very rich) (1)

Elevation (range): 2234 (1830-2700) M

Slope (%): strong slope (95), moderate slope (53), very strong slope (48), steep slope (39), gentle slope (17), very gentle slope (15), level (3), nearly level (2), very steep slope (2)

Aspect: Westerly (102), Southerly (82), Northerly (39), Easterly (38), Level (10)

Topographic Position:Crest (11), Upper Slope (8), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Well drained (100), Rapidly drained (39), Moderately well drained (16), Very rapidly drained (6), Imperfectly drained (5), Poorly drained (3)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (47), ORTHIC MELANIC BRUNISOL (47), ORTHIC HUMIC REGOSOL (39), ORTHIC REGOSOL (20), ORTHIC SOMBRIC BRUNISOL (19), ORTHIC DYSTRIC BRUNISOL (14), ELUVIATED EUTRIC BRUNISOL (6), CUMULIC HUMIC REGOSOL (5), CUMULIC REGOSOL (5), ORTHIC HUMO-FERRIC PODZOL (2), REGO GLEYSOL (2), REGO HUMIC GLEYSOL (2), Unknown HUMIC REGOSOL (1), Unknown HUMO-FERRIC PODZOL (1), ORTHIC GLEYSOL (1), ORTHIC HUMIC GLEYSOL (1), BRUNISOLIC GRAY LUVISOL (1), ELUVIATED MELANIC BRUNISOL (1), GLEYED HUMO-FERRIC PODZOL (1), GLEYED MELANIC BRUNISOL (1), GLEYED REGOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), GRAY FERRO-HUMIC PODZOL (1)

Surface Texture: Clay loam (1), Sandy loam (1), Silt loam (1)

Effective Texture: Clay loam (1), Loam (1), Loamy sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (227)

Parent Material: Rock (154), Morainal (119), Colluvial (84), Fluvial (15), Eolian (6), Undifferentiated Mineral (2), Glaciofluvial (1), Ice (1)

Soil Type: Dry/Fine (1), Moist/Silty-Loamy (1), Very Dry/Sandy (1)

Humus Form

b1 mountain avens La (n=0)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

b2 mountain avens Fa-Se (n=21)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)

Characteristic Species

Tree

[13.0] ENGELMANN SPRUCE*
Picea engelmannii

[7.0] SUBALPINE FIR*
Abies lasiocarpa

Shrub

[20.0] WHITE MOUNTAIN AVENS*
Dryas octopetala

[5.2] ROCK WILLOW
Salix vestita

[3.1] CROWBERRY
Empetrum nigrum

[2.6] FOUR-ANGLED MOUNTAIN HEATHER
Cassiope tetragona

[1.7] SMOOTH WILLOW
Salix glauca

[1.6] RED BEARBERRY
Arctostaphylos rubra

[1.0] SHRUBBY CINQUEFOIL
Potentilla fruticosa

Forb

[1.5] ALPINE WORMWOOD
Artemisia norvegica

[1.2] PRAIRIE SELAGINELLA
Selaginella densa

[0.5] WOOLLY PUSSYTOES
Antennaria lanata

Lichen

[0.5] N/A
Cetraria nivalis

[0.3] N/A
Cetraria islandica

Moss and Liverwort

[4.8] BROOM MOSS
Dicranum scoparium

[2.1] STAIR-STEP MOSS
Hylocomium splendens

Graminoid

[1.6] HAIRY WILD RYE
Elymus innovatus

Environmental Variables

Moisture Regime: Mesic (fresh) (12), Subxeric (moderately dry) (3), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (2)

Elevation (range): 2152 (2000-2400) M

Slope (%): steep slope (6), strong slope (5), moderate slope (3), very strong slope (3), gentle slope (2), level (1)

Aspect: Easterly (7), Westerly (6), Southerly (3), Northerly (2), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (8), Moderately well drained (3), Rapidly drained (1)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (8), ELUVIATED EUTRIC BRUNISOL (2), ORTHIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (1), BRUNISOLIC GRAY LUVISOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC HUMIC REGOSOL (1), ELUVIATED MELANIC BRUNISOL (1), ORTHIC MELANIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (19)

Parent Material: Rock (15), Colluvial (10), Morainal (10), Fluvial (2)

Soil Type:

Humus Form

Ac1 White mountain avens (Fa-Se) (n=21)

(Dryas octopetala (Abies lasiocarpa-Picea engelmannii))

Restricted to the forest-tundra zone, where it occupies level or very gently sloping upland sites that accumulate much less snow than the heather dominated community types but more than the white mountain avens and northern mountain avens dominated community types (Kuchar 1975). The increased moisture tends to favour the growth of trees. Kuchar (1975) also found as more snow accumulates moss cover often changes from *Polytrichum piliferum* to *Hylocomium splendens* and *Hypnum revolutum.*

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b2 mountain avens Fa-Se

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	3.3	0.0-30.0	48
Understory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	9.7	3.0-20.0	100
SUBALPINE FIR *(Abies lasiocarpa)*	7.0	1.0-33.0	100
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	20.0	5.0-55.0	100
ROCK WILLOW *(Salix vestita)*	5.2	0.0-50.0	38
CROWBERRY *(Empetrum nigrum)*	3.1	0.0-25.0	24
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	2.6	0.0-20.0	39
SMOOTH WILLOW *(Salix glauca)*	1.7	0.0-15.0	24
RED BEARBERRY *(Arctostaphylos rubra)*	1.6	0.0-20.0	24
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1.0	0.0-20.0	10
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	1.5	0.0-8.0	52
PRAIRIE SELAGINELLA *(Selaginella densa)*	1.2	0.0-15.0	33
WOOLLY PUSSYTOES *(Antennaria lanata)*	0.5	0.0-10.0	14
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	1.6	0.0-20.0	24
Moss			
BROOM MOSS *(Dicranum scoparium)*	4.8	0.0-68.0	43
STAIR-STEP MOSS *(Hylocomium splendens)*	2.1	0.0-15.0	19
Lichen			
N/A *(Cetraria nivalis)*	0.5	0.0-8.0	24
N/A *(Cetraria islandica)*	0.3	0.0-1.0	38

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (12), Subxeric (moderately dry) (3), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (2)

Elevation (range): 2152 (2000-2400) M

Slope (%): 46 - 70.99 (6), 16 - 30.99 (5), 31 - 45.99 (3), 10 - 15.99 (3), 6 - 9.99 (2), 0 - 0.49 (1)

Aspect: Easterly (7), Westerly (6), Southerly (3), Northerly (2), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (8), Moderately well drained (3), Rapidly drained (1)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (8), ELUVIATED EUTRIC BRUNISOL (2), ORTHIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (1), BRUNISOLIC GRAY LUVISOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC HUMIC REGOSOL (1), ELUVIATED MELANIC BRUNISOL (1), ORTHIC MELANIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (19)

Parent Material: Rock (15), Colluvial (10), Morainal (10), Fluvial (2)

Soil Type:

Humus Form

b3 mountain avens shrubland (n=238)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)

Characteristic Species

Shrub

[18.2] ENTIRE-LEAVED MOUNTAIN AVENS*
Dryas integrifolia

[14.8] WHITE MOUNTAIN AVENS*
Dryas octopetala

[7.2] NET-VEINED WILLOW*
Salix reticulata

[4.0] ARCTIC WILLOW*
Salix arctica

Forb

[1.3] ALPINE BISTORT
Polygonum viviparum

[0.9] INFLATED OXYTROPE
Oxytropis podocarpa

Lichen

[5.4] UNDIFFERENTIATED LICHENOTHELIA
Lichenothelia

[0.9] N/A
Cetraria nivalis

Moss and Liverwort

[3.0] UNDIFFERENTIATED MOSS - ALL GENERA
Moss

Graminoid

[2.0] BOG-SEDGE
Kobresia myosuroides

[1.0] NORTHERN ROUGH FESCUE
Festuca altaica

Environmental Variables

Moisture Regime: Mesic (fresh) (105), Subxeric (moderately dry) (41), Xeric (dry) (18), Submesic (moderately fresh) (11), Subhygric (moderately moist) (6), Very Xeric (very dry) (5)

Nutrient Regime: Submesotrophic (poor) (23), Mesotrophic (medium) (22), Permesotrophic (rich) (6), Oligotrophic (very poor) (2), Eutrophic (very rich) (1)

Elevation (range): 2206 (1830-2590) M

Slope (%): strong slope (88), moderate slope (46), very strong slope (39), steep slope (26), gentle slope (15), very gentle slope (13), very steep slope (2), level (2), nearly level (2)

Aspect: Westerly (88), Southerly (69), Northerly (36), Easterly (29), Level (9)

Topographic Position:Crest (11), Upper Slope (8), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Well drained (80), Rapidly drained (34), Moderately well drained (13), Very rapidly drained (6), Imperfectly drained (5), Poorly drained (3)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (39), ORTHIC EUTRIC BRUNISOL (37), ORTHIC HUMIC REGOSOL (33), ORTHIC SOMBRIC BRUNISOL (17), ORTHIC REGOSOL (16), ORTHIC DYSTRIC BRUNISOL (13), CUMULIC REGOSOL (5), ELUVIATED EUTRIC BRUNISOL (4), CUMULIC HUMIC REGOSOL (3), REGO HUMIC GLEYSOL (2), REGO GLEYSOL (2), GRAY FERRO-HUMIC PODZOL (1), ORTHIC GLEYSOL (1), ORTHIC HUMIC GLEYSOL (1), Unknown HUMIC REGOSOL (1), GLEYED HUMO-FERRIC PODZOL (1), ORTHIC HUMO-FERRIC PODZOL (1), Unknown HUMO-FERRIC PODZOL (1), GLEYED MELANIC BRUNISOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), GLEYED REGOSOL (1)

Surface Texture: Clay loam (1), Sandy loam (1), Silt loam (1)

Effective Texture: Clay loam (1), Loam (1), Loamy sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (187)

Parent Material: Rock (125), Morainal (100), Colluvial (64), Fluvial (11), Eolian (6), Undifferentiated Mineral (1), Ice (1), Glaciofluvial (1)

Soil Type: Very Dry/Sandy (1), Dry/Fine (1), Moist/Silty-Loamy (1)

Humus Form

Ab1 White mountain avens (n=169)

(Dryas octopetala)

This community type occurs on wind-exposed, snow-free ridges. White mountain avens has a widespread occurrence throughout mountainous areas where it is generally restricted to limestone outcrops. The soils are shallow, stony, colluvial Regosols (Corns and Achuff 1982). Ogilvie (1969), found this community to have an abundance of cushion and mat-plants and a large number of lichens. Sedges and bog sedge can co-dominate at some sites. As one moves higher in elevation vegetation becomes sparse and plant community resemble the Moss campion/Saxicolous lichen (Aa3) and Arctic willow/Moss campion/Saxicolous lichen (Ab19) community types. Hrapko and La Roi (1978) described a number of white mountain avens dominated community types on Signal Mountain in Jasper National Park. These included White mountain avens-Large-flowered lousewort, White mountain avens-Alpine fescue, White mountain avens-Inflated oxytrope and White mountain avens-Crowberry. These community types were described on Regosolic and Sombric Brunisolic soils. All of these community types were dominated by white mountain avens and when combined represent this broad plant community.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b3 mountain avens shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	32.1	20.0-80.0	100
NET-VEINED WILLOW *(Salix reticulata)*	2.0	0.0-20.0	52
YELLOW HEATHER *(Phyllodoce glanduliflora)*	1.9	0.0-55.0	20
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	1.3	0.0-35.0	23
ARCTIC WILLOW *(Salix arctica)*	1.1	0.0-40.0	25
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	1.0	0.0-25.0	14
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	0.5	0.0-5.0	50
Low Forb (< 30 cm)			
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.0	0.0-5.0	50
ALPINE BISTORT *(Polygonum viviparum)*	0.9	0.0-13.8	63
MOSS CAMPION *(Silene acaulis)*	0.8	0.0-10.0	63
WOOLLY PUSSYTOES *(Antennaria lanata)*	0.6	0.0-25.0	17
Graminoid			
BOG-SEDGE *(Kobresia myosuroides)*	2.2	0.0-30.0	28
NARD SEDGE *(Carex nardina)*	1.0	0.0-25.0	20
RUSH-LIKE SEDGE *(Carex scirpoidea)*	0.8	0.0-30.0	26
Lichen			
N/A *(Cetraria nivalis)*	1.1	0.0-13.0	44
N/A *(Cetraria cucullata)*	0.7	0.0-10.0	38
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	1.0	0.0-50.0	7

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (70), Subxeric (moderately dry) (34), Xeric (dry) (14), Very Xeric (very dry) (5), Submesic (moderately fresh) (4)

Nutrient Regime: Submesotrophic (poor) (17), Mesotrophic (medium) (11), Oligotrophic (very poor) (2), Permesotrophic (rich) (2), Eutrophic (very rich) (1)

Elevation (range): 2280 (1880-2570) M

Slope (%): 16 - 30.99 (60), 31 - 45.99 (31), 10 - 15.99 (30), 46 - 70.99 (17), 6 - 9.99 (11), 2.5 - 5.99 (9), 0 - 0.49 (2), 0.5 - 2.49 (2), 71 - 100.99 (2)

Aspect: Westerly (68), Southerly (50), Easterly (20), Northerly (18), Level (7)

Topographic Position: Crest (10), Upper Slope (8), Midslope (2), Level (1)

Soil Variables

Soil Drainage: Well drained (59), Rapidly drained (30), Moderately well drained (6), Very rapidly drained (6), Imperfectly drained (5)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (32), ORTHIC MELANIC BRUNISOL (30), ORTHIC HUMIC REGOSOL (25), ORTHIC SOMBRIC BRUNISOL (12), ORTHIC REGOSOL (10), ORTHIC DYSTRIC BRUNISOL (10), CUMULIC REGOSOL (4), CUMULIC HUMIC REGOSOL (2), ELUVIATED EUTRIC BRUNISOL (2), GRAY FERRO-HUMIC PODZOL (1), REGO GLEYSOL (1), Unknown HUMO-FERRIC PODZOL (1), GLEYED HUMO-FERRIC PODZOL (1), ORTHIC HUMO-FERRIC PODZOL (1), REGO HUMIC GLEYSOL (1), Unknown HUMIC REGOSOL (1)

Surface Texture: Clay loam (1), Silt loam (1), Sandy loam (1)

Effective Texture: Clay loam (1), Loam (1), Loamy sand (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (140)

Parent Material: Rock (95), Morainal (73), Colluvial (52), Fluvial (5), Eolian (3), Undifferentiated Mineral (1), Glaciofluvial (1), Ice (1)

Soil Type: Very Dry/Sandy (1), Dry/Fine (1), Moist/Silty-Loamy (1)

Humus Form

Ab1 - White mountain avens dominated community in middle of slide on the slope with white flowers with white mountain avens, sedge (Aa4) and bog sedge (Aa5) community types in the foreground of the slide (A.J. Gould)

Ab2 Entire-leaved mountain avens (n=25)

(Dryas integrifolia)

This community type occurs on wind-exposed, snow-free ridges. The soils are shallow, stoney, colluvial Regosols (Corns and Achuff 1982) and willow cover can be variable in this community type. Gould (2007) felt this community was more common in the northern extent of the alpine particularly in north Jasper National Park. Porsild (1959) indicated that D. integrifolia is an arctic-alpine species, which within its main area is an ubiquitous pioneer species in rocky and gravelly places such as river flats and screes, but less common in dwarf shrub heath where it is rapidly out-competed for space. Dryas integrifolia fruits abundantly, and its immature achenes form an important food item for numerous species of small rodents and for several species of birds (Aiken et al. 2011). One site in this community type had northern rough fescue cover of 20%.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b3 mountain avens shrubland

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	2.3	0.0-20.0	32
NET-VEINED WILLOW *(Salix reticulata)*	1.7	0.0-15.0	68
RED BEARBERRY *(Arctostaphylos rubra)*	0.8	0.0-20.0	8
Low Shrub (< 0.5m)			
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	40.1	15.0-70.0	100
Tall Forb (>= 30 cm)			
ALPINE HEDYSARUM *(Hedysarum alpinum)*	0.9	0.0-15.0	44
NORTHERN HEDYSARUM *(Hedysarum boreale)*	0.7	0.0-5.0	28
Low Forb (< 30 cm)			
ALPINE BISTORT *(Polygonum viviparum)*	1.4	0.0-8.0	84
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.2	0.0-15.0	76
MOSS CAMPION *(Silene acaulis)*	0.6	0.0-5.0	80
THREE-TOOTHED SAXIFRAGE *(Saxifraga tricuspidata)*	0.3	0.0-2.0	36
Graminoid			
BOG-SEDGE *(Kobresia myosuroides)*	3.1	0.0-30.0	64
HAIRY WILD RYE *(Elymus innovatus)*	1.6	0.0-20.0	28
RUSH-LIKE SEDGE *(Carex scirpoidea)*	1.0	0.0-25.0	16
NARD SEDGE *(Carex nardina)*	0.8	0.0-15.0	16
NORTHERN ROUGH FESCUE *(Festuca altaica)*	0.8	0.0-20.0	8
Moss			
N/A *(Thuidium abietinum)*	1.2	0.0-27.0	20
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	2.0	0.0-40.3	12
N/A *(Cetraria ericetorum)*	0.8	0.0-5.0	40
N/A *(Cetraria nivalis)*	0.8	0.0-5.0	36
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	4.5	0.0-20.0	44

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (15), Submesic (moderately fresh) (4), Subxeric (moderately dry) (2), Xeric (dry) (2)

Nutrient Regime: Mesotrophic (medium) (5), Permesotrophic (rich) (4), Submesotrophic (poor) (3)

Elevation (range): 2095 (1830-2362) M

Slope (%): 16 - 30.99 (10), 10 - 15.99 (4), 31 - 45.99 (3), 46 - 70.99 (3), 2.5 - 5.99 (3), 6 - 9.99 (2)

Aspect: Southerly (11), Westerly (6), Northerly (5), Easterly (2)

Topographic Position: Crest (1)

Soil Variables

Soil Drainage: Well drained (9), Rapidly drained (2)

Soil Subgroup: ORTHIC HUMIC REGOSOL (4), ORTHIC EUTRIC BRUNISOL (3), ORTHIC REGOSOL (2), ORTHIC DYSTRIC BRUNISOL (1), GLEYED MELANIC BRUNISOL (1), ORTHIC MELANIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (12)

Parent Material: Morainal (7), Colluvial (5), Rock (5), Eolian (1)

Soil Type:

Humus Form

Ab2 – Entire leaved mountain avens community north of Jasper (A.J. Gould)

Ab22 Net-veined willow-Arctic willow-Entire-leaved mountain avens (n=5)

(Salix reticulata-Salix arctic-Dryas integrifolia)

This community type is similar to the Entire-leaved mountain avens (Ab2) community but net-veined willow cover is co-dominant in this community. Increase in snow depth will often favour the growth of low growing willow species in the mountain avens dominated community types.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b3 mountain avens shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
GROUND JUNIPER *(Juniperus communis)*	1.0	0.0-5.0	20
Low Shrub (< 0.5m)			
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	33.0	20.0-45.0	100
NET-VEINED WILLOW *(Salix reticulata)*	13.6	0.0-30.0	80
ARCTIC WILLOW *(Salix arctica)*	9.0	0.0-30.0	80
Low Forb (< 30 cm)			
ALPINE BISTORT *(Polygonum viviparum)*	1.8	0.0-5.0	80
ALPINE WORMWOOD *(Artemisia norvegica)*	1.0	0.0-5.0	60
LARGE-FLOWERED LOUSEWORT *(Pedicularis capitata)*	1.0	0.0-5.0	40
Graminoid			
NORTHERN ROUGH FESCUE *(Festuca altaica)*	3.4	0.0-15.0	40
BOG-SEDGE *(Kobresia myosuroides)*	2.0	0.0-10.0	60
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	12.0	5.0-25.0	100
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	16.0	5.0-35.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Submesic (moderately fresh) (2), Mesic (fresh) (1), Xeric (dry) (1)

Nutrient Regime: Mesotrophic (medium) (4), Submesotrophic (poor) (1)

Elevation (range): 2154 (2035-2259) M

Slope (%): 16 - 30.99 (3), 6 - 9.99 (1), 31 - 45.99 (1)

Aspect: Southerly (2), Westerly (1), Northerly (1), Easterly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Ab22 – Patches of net veined willow, arctic willow and entire leaved mountain avens with bare ground are characteristic of the Ab22 dominated community (A.J. Gould)

Ab4 Net-veined willow-Arctic willow-White mountain avens (n=39)

(Salix reticulata-Salix arctica-Dryas octopetala)

Where snow accumulates in this ecological site the higher moisture supports the growth of net-veined willow, arctic willow or Barratt's willow with white mountain avens. Hrapko and La Roi (1978) described from Jasper National Park a White mountain avens-Snow willow dominated community type on frost-sorted gravel patches alternating with small depressions, rock outcrops and boulders which afforded some shelter from wind and sites for snow accumulation in Jasper National Park. They found that snow release was early in this community type with flowering in early July. They described the soils as a Lithic Sombric Brunisol.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b3 mountain avens shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	24.9	15.0-60.0	100
NET-VEINED WILLOW *(Salix reticulata)*	13.4	0.0-55.0	79
ARCTIC WILLOW *(Salix arctica)*	6.1	0.0-30.0	70
SMOOTH WILLOW *(Salix glauca)*	3.0	0.0-40.0	18
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	0.7	0.0-5.0	54
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	0.2	0.0-2.0	18
Low Forb (< 30 cm)			
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.6	0.0-12.0	41
ALPINE BISTORT *(Polygonum viviparum)*	1.6	0.0-8.0	87
MOSS CAMPION *(Silene acaulis)*	1.2	0.0-12.0	67
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.7	0.0-20.0	26
Graminoid			
RUSH-LIKE SEDGE *(Carex scirpoidea)*	1.2	0.0-35.0	15
BOG-SEDGE *(Kobresia myosuroides)*	0.8	0.0-14.0	26
Lichen			
N/A *(Cetraria nivalis)*	1.6	0.0-10.0	56
N/A *(Cetraria cucullata)*	0.9	0.0-15.0	46
N/A *(Cetraria islandica)*	0.8	0.0-10.0	41
N/A *(Stereocaulon alpinum)*	0.8	0.0-15.0	33
N/A *(Thamnolia subuliformis)*	0.5	0.0-3.0	41

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (19), Subhygric (moderately moist) (6), Subxeric (moderately dry) (5), Submesic (moderately fresh) (1), Xeric (dry) (1)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (2)

Elevation (range): 2295 (2080-2590) M

Slope (%): 16 - 30.99 (15), 10 - 15.99 (12), 46 - 70.99 (6), 31 - 45.99 (4), 2.5 - 5.99 (1), 6 - 9.99 (1)

Aspect: Westerly (13), Northerly (12), Easterly (6), Southerly (6), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (12), Moderately well drained (7), Poorly drained (3), Rapidly drained (2)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (8), ORTHIC SOMBRIC BRUNISOL (5), ORTHIC HUMIC REGOSOL (4), ORTHIC REGOSOL (4), ORTHIC DYSTRIC BRUNISOL (2), ELUVIATED EUTRIC BRUNISOL (2), ORTHIC EUTRIC BRUNISOL (2), ORTHIC GLEYSOL (1), REGO GLEYSOL (1), ORTHIC HUMIC GLEYSOL (1), REGO HUMIC GLEYSOL (1), CUMULIC HUMIC REGOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), CUMULIC REGOSOL (1), GLEYED REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (35)

Parent Material: Rock (25), Morainal (20), Colluvial (7), Fluvial (6), Eolian (2)

Soil Type:

Humus Form

Ab4 – Net veined willow-Arctic willow-White mountain avens community (A.J. Gould)

b4 mountain avens/graminoid (n=21)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)

Characteristic Species

Shrub

[8.0] COMMON BEARBERRY*
Arctostaphylos uva-ursi

[6.8] WHITE MOUNTAIN AVENS
Dryas octopetala

[1.0] NET-VEINED WILLOW
Salix reticulata

Forb

[4.5] YELLOW HEDYSARUM
Hedysarum sulphurescens

[1.3] WILD STRAWBERRY
Fragaria virginiana

[0.8] MOSS CAMPION
Silene acaulis

Lichen

[0.7] N/A
Cetraria nivalis

[0.6] UNDIFFERENTIATED CLADONIA
Cladonia

[0.5] N/A
Cetraria islandica

Moss and Liverwort

[1.4] PIPECLEANER MOSS
Rhytidium rugosum

Graminoid

[15.2] NARD SEDGE*
Carex nardina

[12.0] HAIRY WILD RYE*
Elymus innovatus

[2.4] ROCK SEDGE
Carex rupestris

[1.4] SEDGE SPECIES
Carex

[0.7] BOG-SEDGE
Kobresia myosuroides

[0.7] JUNE GRASS
Koeleria macrantha

Environmental Variables

Moisture Regime: Mesic (fresh) (8), Subxeric (moderately dry) (6)

Nutrient Regime:

Elevation (range): 2331 (2080-2700) M

Slope (%): steep slope (7), very strong slope (6), moderate slope (4), strong slope (2), very gentle slope (2)

Aspect: Southerly (10), Westerly (8), Easterly (2), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (12), Rapidly drained (4)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (7), ORTHIC HUMIC REGOSOL (5), ORTHIC EUTRIC BRUNISOL (2), ORTHIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC HUMO-FERRIC PODZOL (1), ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (21)

Parent Material: Rock (14), Colluvial (10), Morainal (9), Fluvial (2), Undifferentiated Mineral (1)

Soil Type:

Humus Form

Aa1 Bearberry/Hairy wildrye (n=12)

(Arctostahpylos uva-ursi/Elymus innovatus)

This community type is dominated by bearberry and hairy wild rye cover. Generally found on dry, rocky, steep, south facing slopes with shallow soils in the Subalpine and Alpine Natural Subregions.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b4 mountain avens/graminoid

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	16.0	1.0-50.0	100
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	2.1	0.0-10.0	42
SMOOTH WILLOW *(Salix glauca)*	1.8	0.0-15.0	25
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1.5	0.0-7.0	58
CREEPING JUNIPER *(Juniperus horizontalis)*	0.9	0.0-8.0	17
Tall Forb (>= 30 cm)			
YELLOW HEDYSARUM *(Hedysarum sulphurescens)*	9.0	0.0-25.0	83
COMMON FIREWEED *(Epilobium angustifolium)*	1.3	0.0-10.0	50
Low Forb (< 30 cm)			
WILD STRAWBERRY *(Fragaria virginiana)*	2.6	0.0-10.0	58
FIELD MOUSE-EAR CHICKWEED *(Cerastium arvense)*	1.2	0.0-8.0	58
ALPINE FORGET-ME-NOT *(Myosotis alpestris)*	1.0	0.0-8.0	33
HAREBELL *(Campanula rotundifolia)*	0.8	0.0-5.0	50
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	24.0	0.0-50.0	92
BOG-SEDGE *(Kobresia myosuroides)*	1.5	0.0-15.0	33
JUNE GRASS *(Koeleria macrantha)*	1.5	0.0-10.0	33

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (4), Subxeric (moderately dry) (3)

Nutrient Regime:

Elevation (range): 2240 (2080-2470) M

Slope (%): 46 - 70.99 (6), 31 - 45.99 (4), 16 - 30.99 (2)

Aspect: Southerly (7), Westerly (5)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (7), Rapidly drained (4)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (3), ORTHIC REGOSOL (2), ORTHIC HUMIC REGOSOL (2), ORTHIC EUTRIC BRUNISOL (2), CUMULIC HUMIC REGOSOL (1), ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (12)

Parent Material: Colluvial (7), Rock (6), Morainal (4), Fluvial (1)

Soil Type:

Humus Form

Aa4 Nard sedge/White mountain avens (n=9)

(Carex nardina/Dryas octopetala)

In the vegetative state nard sedge (Carex nardina) species may be difficult to distinguish from bog sedge (Kobresia myosuroides) so this plant community may resemble the Bog sedge-Hairy wildrye/White mountain avens (Aa5) community type. This community type was generally described at higher elevation (mean 2422 m) than the Bog sedge dominated community type (2285 m). This community type maybe slightly moister than the other white mountain avens dominated community types.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: b mountain avens (xeric-mesic/upper zone)
Ecosite Phase: b4 mountain avens/graminoid

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	11.6	0.0-30.0	89
NET-VEINED WILLOW *(Salix reticulata)*	2.0	0.0-7.0	67
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	1.1	0.0-10.0	11
Low Forb (< 30 cm)			
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.7	0.0-5.0	67
MOSS CAMPION *(Silene acaulis)*	1.6	0.0-7.0	67
ALPINE BISTORT *(Polygonum viviparum)*	1.0	0.0-2.0	78
SWEET-FLOWERED ANDROSACE *(Androsace chamaejasme)*	0.5	0.0-1.0	56
Graminoid			
NARD SEDGE *(Carex nardina)*	30.5	5.0-70.0	100
ROCK SEDGE *(Carex rupestris)*	4.8	0.0-25.0	44
SEDGE SPECIES *(Carex)*	2.8	0.0-25.0	22
Moss			
PIPECLEANER MOSS *(Rhytidium rugosum)*	2.8	0.0-25.0	22
Lichen			
N/A *(Cetraria nivalis)*	1.5	0.0-5.0	89
UNDIFFERENTIATED CLADONIA *(Cladonia)*	1.3	0.0-10.0	33
N/A *(Cetraria islandica)*	1.0	0.0-8.0	22
N/A *(Cetraria ericetorum)*	0.7	0.0-3.0	56
N/A *(Cetraria cucullata)*	0.5	0.0-2.0	44

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (4), Subxeric (moderately dry) (3)

Nutrient Regime:

Elevation (range): 2422 (2200-2700) M

Slope (%): 10 - 15.99 (4), 2.5 - 5.99 (2), 31 - 45.99 (2), 46 - 70.99 (1)

Aspect: Southerly (3), Westerly (3), Easterly (2), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (5)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (4), ORTHIC HUMIC REGOSOL (3), ORTHIC HUMO-FERRIC PODZOL (1), ORTHIC SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (9)

Parent Material: Rock (8), Morainal (5), Colluvial (3), Undifferentiated Mineral (1), Fluvial (1)

Soil Type:

Humus Form

c bog sedge (subxeric-mesic/upper zone) (n=33)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecological site is transitional in moisture between the mountain avens and heather ecological sites. This ecological site often occurs at higher elevations on mostly snow-free, wind-exposed south-facing slopes and ridge crests (Ogilvie 1969). It is often found in association with the mountain avens ecological site where there is slightly more moisture which favours the growth of bog sedge in association with white mountain avens. The soils are shallow, stoney Regosols and Brunisols with colluvial, morainal and rock parent materials (Corns and Achuff 1982). In the subalpine bog sedge meadows can be extensive in the valley bottoms on mesic to subhygric sites.

Successional Relationships

This ecological site is successionally mature.

Indicator Species

Shrub

SMOOTH WILLOW
Salix glauca

NET-VEINED WILLOW
Salix reticulata

COMMON BEARBERRY
Arctostaphylos uva-ursi

Graminoid

HAIRY WILD RYE
Elymus innovatus

BOG-SEDGE
Kobresia myosuroides

Environmental Variables

Moisture Regime: Mesic (fresh) (17), Subxeric (moderately dry) (12), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1), Xeric (dry) (1)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (3), Permesotrophic (rich) (2)

Elevation (range): 2302 (1900-2580) M

Slope (%): steep slope (8), very strong slope (7), strong slope (6), gentle slope (6), moderate slope (2), nearly level (2), very gentle slope (2), level (1)

Aspect: Southerly (17), Westerly (9), Easterly (3), Northerly (2)

Topographic Position:Upper Slope (3), Crest (1)

Soil Variables

Soil Drainage: Well drained (18), Rapidly drained (7), Moderately well drained (2)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (8), ORTHIC REGOSOL (7), ORTHIC HUMIC REGOSOL (5), ORTHIC EUTRIC BRUNISOL (4), GLEYED CUMULIC REGOSOL (1), ORTHIC HUMO-FERRIC PODZOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (26)

Parent Material: Rock (15), Morainal (13), Colluvial (11), Fluvial (3), Fluviolacustrine (1)

Soil Type:

Humus Form

c1 bog sedge La (n=0)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

c2 bog sedge Fa-Se (n=0)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)

Characteristic Species

Environmental Variables

Moisture Regime:

Nutrient Regime:

Elevation (range):

Slope (%):

Aspect:

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

c3 bog sedge shrubland (n=2)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)

Characteristic Species

Shrub

[12.5] NET-VEINED WILLOW*
Salix reticulata

[10.0] SMOOTH WILLOW*
Salix glauca

Forb

[3.0] ALPINE FORGET-ME-NOT
Myosotis alpestris

[2.5] SMALL-FLOWERED ANEMONE
Anemone parviflora

[2.5] COMMON YARROW
Achillea millefolium

[2.5] TALL LARKSPUR
Delphinium glaucum

[2.5] MOSS CAMPION
Silene acaulis

[1.5] ALPINE BISTORT
Polygonum viviparum

[1.0] MOUNTAIN CINQUEFOIL
Potentilla diversifolia

[1.0] FIELD MOUSE-EAR CHICKWEED
Cerastium arvense

[1.0] YELLOWSTONE DRABA
Draba incerta

[1.0] ALPINE GOLDENROD
Solidago multiradiata

Lichen

[2.0] N/A
Peltigera rufescens

[1.0] N/A
Cetraria nivalis

Moss and Liverwort

[3.5] HAIRY SCREW MOSS
Tortula ruralis

[3.5] PIPECLEANER MOSS
Rhytidium rugosum

[1.5] N/A
Bryum caespiticium

Graminoid

[12.5] BOG-SEDGE*
Kobresia myosuroides

[10.0] UNDIFFERENTIATED KOBRESIA
Kobresia

[7.5] HAIRY WILD RYE
Elymus innovatus

[5.0] JUNE GRASS
Koeleria macrantha

[3.5] ALPINE BLUEGRASS
Poa alpina

Environmental Variables

Moisture Regime: Mesic (fresh) (2)

Nutrient Regime:

Elevation (range): 2320 (2300-2340) M

Slope (%): steep slope (1), strong slope (1)

Aspect: Northerly (1), Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: ORTHIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Rock (2), Morainal (1), Colluvial (1)

Soil Type:

Humus Form

Ab5 Net-veined willow-Smooth willow/Bog sedge (n=2)

(Salix reticulata-Salix glauca/Kobresia myosuoroides)

This community type is typical of dry-mesic meadows and turf in the middle to lower alpine, which may extend into transition areas with stone fields. It is similar to the Bog sedge-Hairy wildrye/White mountain avens (Aa5) community type but this type tends to grow where snowmelt lasts longer into the growing season. The increase in moisture favours the growth of net veined willow and smooth willow.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)
Ecosite Phase: c3 bog sedge shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
NET-VEINED WILLOW *(Salix reticulata)*	12.5	0.0-25.0	50
SMOOTH WILLOW *(Salix glauca)*	10.0	0.0-20.0	50
Tall Forb (>= 30 cm)			
TALL LARKSPUR *(Delphinium glaucum)*	2.5	0.0-5.0	50
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.0	0.0-2.0	50
Low Forb (< 30 cm)			
ALPINE FORGET-ME-NOT *(Myosotis alpestris)*	3.0	1.0-5.0	100
COMMON YARROW *(Achillea millefolium)*	2.5	0.0-5.0	50
SMALL-FLOWERED ANEMONE *(Anemone parviflora)*	2.5	0.0-5.0	50
MOSS CAMPION *(Silene acaulis)*	2.5	0.0-5.0	50
ALPINE BISTORT *(Polygonum viviparum)*	1.5	0.0-3.0	50
FIELD MOUSE-EAR CHICKWEED *(Cerastium arvense)*	1.0	0.0-2.0	50
YELLOWSTONE DRABA *(Draba incerta)*	1.0	0.0-2.0	50
ALPINE GOLDENROD *(Solidago multiradiata)*	1.0	0.0-2.0	50
Graminoid			
BOG-SEDGE *(Kobresia myosuroides)*	12.5	0.0-25.0	50
UNDIFFERENTIATED KOBRESIA *(Kobresia)*	10.0	0.0-20.0	50
HAIRY WILD RYE *(Elymus innovatus)*	7.5	0.0-15.0	50
JUNE GRASS *(Koeleria macrantha)*	5.0	0.0-10.0	50
ALPINE BLUEGRASS *(Poa alpina)*	3.5	0.0-7.0	50
Moss			
PIPECLEANER MOSS *(Rhytidium rugosum)*	3.5	0.0-7.0	50
HAIRY SCREW MOSS *(Tortula ruralis)*	3.5	2.0-5.0	100
N/A *(Bryum caespiticium)*	1.5	0.0-3.0	50
Lichen			
N/A *(Peltigera rufescens)*	2.0	1.0-3.0	100
N/A *(Cetraria nivalis)*	1.0	0.0-2.0	50

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (2)

Nutrient Regime:

Elevation (range): 2320 (2300-2340) M

Slope (%): 16 - 30.99 (1), 46 - 70.99 (1)

Aspect: Northerly (1), Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: ORTHIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Rock (2), Colluvial (1), Morainal (1)

Soil Type:

Humus Form

c4 bog sedge graminoid (n=31)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)

Characteristic Species

Shrub

[8.7] WHITE MOUNTAIN AVENS
Dryas octopetala

[3.1] COMMON BEARBERRY*
Arctostaphylos uva-ursi

[1.4] ENTIRE-LEAVED MOUNTAIN AVENS
Dryas integrifolia

[1.4] SMOOTH WILLOW
Salix glauca

[1.3] SHRUBBY CINQUEFOIL
Potentilla fruticosa

[1.2] BOG BIRCH
Betula glandulosa

Forb

[2.7] ALPINE BISTORT
Polygonum viviparum

[1.3] MOSS CAMPION
Silene acaulis

[1.3] YELLOW HEDYSARUM
Hedysarum sulphurescens

[1.2] INFLATED OXYTROPE
Oxytropis podocarpa

[1.1] MOUNTAIN CINQUEFOIL
Potentilla diversifolia

[1.1] ALPINE HEDYSARUM
Hedysarum alpinum

Lichen

[1.8] N/A
Cetraria nivalis

[1.1] N/A
Cetraria cucullata

[0.8] N/A
Thamnolia subuliformis

Moss and Liverwort

[1.1] UNDIFFERENTIATED MOSS - ALL GENERA
Moss

Graminoid

[30.8] BOG-SEDGE*
Kobresia myosuroides

[2.3] HAIRY WILD RYE*
Elymus innovatus

[1.2] PRESL SEDGE
Carex preslii

[0.8] PAYSON'S SEDGE
Carex paysonis

[0.3] NARD SEDGE
Carex nardina

Environmental Variables

Moisture Regime: Mesic (fresh) (15), Subxeric (moderately dry) (12), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1), Xeric (dry) (1)

Nutrient Regime: Submesotrophic (poor) (3), Mesotrophic (medium) (3), Permesotrophic (rich) (2)

Elevation (range): 2285 (1900-2580) M

Slope (%): steep slope (7), very strong slope (7), gentle slope (6), strong slope (5), very gentle slope (2), moderate slope (2), nearly level (2), level (1)

Aspect: Southerly (16), Westerly (9), Easterly (3), Northerly (1)

Topographic Position:Upper Slope (3), Crest (1)

Soil Variables

Soil Drainage: Well drained (17), Rapidly drained (7), Moderately well drained (2)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (7), ORTHIC REGOSOL (7), ORTHIC EUTRIC BRUNISOL (4), ORTHIC HUMIC REGOSOL (4), ORTHIC HUMO-FERRIC PODZOL (1), GLEYED CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (24)

Parent Material: Rock (13), Morainal (12), Colluvial (10), Fluvial (3), Fluviolacustrine (1)

Soil Type:

Humus Form

Aa5 Bog sedge-Hairy wildrye/White mountain avens (n=31)

(Kobresia myosuroides-Elymus innovatus/Dryas octopetala)

This community type often occurs on gentle to moderate slopes and saddles, that are exposed to prevailing winds which keep sites snow-free during most of the winter. The soils are shallow, stoney colluvial Regosols (Corns and Achuff 1982). It is transitional to the white mountain avens dominated community types and maybe co-dominated by hairy wildrye or white mountain avens. Hrapko and La Roi (1978) described a similar community type on Signal Mountain in Jasper National Park. They found the soils on this community type was an Orthic Melanic Brunisol which suggested the soil is older and more stable.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: c bog sedge (subxeric-mesic/upper zone)
Ecosite Phase: c4 bog sedge graminoid

Plant Composition	Canopy Cover (%)		
	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	8.7	0.0-50.0	58
COMMON BEARBERRY *(Arctostaphylos uva-ursi)*	3.1	0.0-30.0	39
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	1.4	0.0-20.0	16
SMOOTH WILLOW *(Salix glauca)*	1.4	0.0-10.0	23
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1.3	0.0-6.0	52
BOG BIRCH *(Betula glandulosa)*	1.2	0.0-20.0	16
NET-VEINED WILLOW *(Salix reticulata)*	0.7	0.0-3.0	46
Tall Forb (>= 30 cm)			
YELLOW HEDYSARUM *(Hedysarum sulphurescens)*	1.3	0.0-20.0	23
ALPINE HEDYSARUM *(Hedysarum alpinum)*	1.1	0.0-8.0	39
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.1	0.0-5.0	55
Low Forb (< 30 cm)			
ALPINE BISTORT *(Polygonum viviparum)*	2.7	0.0-20.0	81
MOSS CAMPION *(Silene acaulis)*	1.3	0.0-15.0	52
INFLATED OXYTROPE *(Oxytropis podocarpa)*	1.2	0.0-15.0	39
Graminoid			
BOG-SEDGE *(Kobresia myosuroides)*	30.8	0.0-65.0	97
HAIRY WILD RYE *(Elymus innovatus)*	2.3	0.0-20.0	45
PRESL SEDGE *(Carex preslii)*	1.2	0.0-38.3	3
PAYSON'S SEDGE *(Carex paysonis)*	0.8	0.0-24.9	3
NARD SEDGE *(Carex nardina)*	0.3	0.0-10.0	3
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	1.1	0.0-20.0	10
Lichen			
N/A *(Cetraria nivalis)*	1.8	0.0-20.0	48
N/A *(Cetraria cucullata)*	1.1	0.0-10.0	39
N/A *(Thamnolia subuliformis)*	0.8	0.0-8.0	32

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (15), Subxeric (moderately dry) (12), Subhygric (moderately moist) (2), Submesic (moderately fresh) (1), Xeric (dry) (1)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (3), Permesotrophic (rich) (2)

Elevation (range): 2285 (1900-2580) M

Slope (%): 31 - 45.99 (7), 46 - 70.99 (7), 6 - 9.99 (6), 16 - 30.99 (5), 10 - 15.99 (2), 0.5 - 2.49 (2), 2.5 - 5.99 (2), 0 - 0.49 (1)

Aspect: Southerly (16), Westerly (9), Easterly (3), Northerly (1)

Topographic Position: Upper Slope (3), Crest (1)

Soil Variables

Soil Drainage: Well drained (17), Rapidly drained (7), Moderately well drained (2)

Soil Subgroup: ORTHIC REGOSOL (7), ORTHIC MELANIC BRUNISOL (7), ORTHIC HUMIC REGOSOL (4), ORTHIC EUTRIC BRUNISOL (4), GLEYED CUMULIC REGOSOL (1), ORTHIC HUMO-FERRIC PODZOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (24)

Parent Material: Rock (13), Morainal (12), Colluvial (10), Fluvial (3), Fluviolacustrine (1)

Soil Type:

Humus Form

d heather-grouseberry(mesic/middle zone) (n=327)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecological site represents communities dominated by ericaceous shrubs such as Cassiope and/or Phyllodoce and usually occurs in areas protected from wind where snow accumulates (Ogilvie 1969,Timoney 1999), with pink mountain heather (*Phyllodoce empetrifomis*) and white mountain heather (*Cassiope mertensiana*) found in areas of higher precipitation typical of the Main Ranges, and yellow heather (*P. glanduliflora*) and four-angled mountain heather (*C. tetragona*) in the drier habitats of the Front Ranges (Crack 1977). This ecosite occurs on mesic, level to steeply sloping sites of various aspects at elevations from 1700 to 2600 m. Soils are well to moderately well drained Eutric and Dystric Brunisols, Orthic Humo-Ferric Podzols, and Melanic and Sombric Brunisols developed on morainal and residual landforms.

Successional Relationships

This ecosite is successionally mature, but at lower elevation sites in the alpine Engelmann spruce, alpine larch and subalpine fir can occur as later successional plant community types.

Indicator Species

Tree

ENGELMANN SPRUCE
Picea engelmannii

SUBALPINE LARCH
Larix lyallii

SUBALPINE FIR
Abies lasiocarpa

Shrub

WHITE MOUNTAIN HEATHER
Cassiope mertensiana

FOUR-ANGLED MOUNTAIN HEATHER
Cassiope tetragona

ALPINE AZALEA
Loiseleuria procumbens

PARTRIDGEFOOT
Luetkea pectinata

PINK MOUNTAIN HEATHER
Phyllodoce empetriformis

YELLOW HEATHER
Phyllodoce glanduliflora

ARCTIC WILLOW
Salix arctica

NET-VEINED WILLOW
Salix reticulata

ROCK WILLOW
Salix vestita

GROUSEBERRY
Vaccinium scoparium

Environmental Variables

Moisture Regime: Mesic (fresh) (224), Subhygric (moderately moist) (19), Subxeric (moderately dry) (13), Submesic (moderately fresh) (6), Hygric (moist) (4), Subhydric (moderately wet) (3), Very Xeric (very dry) (1)

Nutrient Regime: Mesotrophic (medium) (17), Submesotrophic (poor) (11), Permesotrophic (rich) (5)

Elevation (range): 2160 (1770-2620) M

Slope (%): strong slope (103), moderate slope (69), very strong slope (52), steep slope (41), gentle slope (26), very gentle slope (23), level (4), nearly level (4), very steep slope (3)

Aspect: Easterly (85), Southerly (77), Westerly (77), Northerly (45), Level (33)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (99), Moderately well drained (37), Rapidly drained (13), Imperfectly drained (9)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (67), ORTHIC HUMO-FERRIC PODZOL (38), ORTHIC DYSTRIC BRUNISOL (35), ORTHIC EUTRIC BRUNISOL (35), ORTHIC MELANIC BRUNISOL (27), ELUVIATED EUTRIC BRUNISOL (25), ORTHIC SOMBRIC BRUNISOL (22), ORTHIC REGOSOL (8), CUMULIC REGOSOL (6), ORTHIC HUMIC REGOSOL (5), ORTHIC FERRO-HUMIC PODZOL (4), GLEYED EUTRIC BRUNISOL (4), GLEYED SOMBRIC BRUNISOL (3), GLEYED ELUVIATED DYSTRIC BRUNISOL (3), ELUVIATED MELANIC BRUNISOL (2), BRUNISOLIC GRAY LUVISOL (2), ORTHIC GLEYSOL (1), ORTHIC GRAY LUVISOL (1), GLEYED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), REGO STATIC CRYOSOL (1), SOMBRIC FERRO-HUMIC PODZOL (1)

Surface Texture: Silty clay loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (293)

Parent Material: Morainal (231), Rock (169), Eolian (59), Colluvial (54), Fluvial (5), Undifferentiated Mineral (2), Fluviolacustrine (1), Glaciolacustrine (1), Lacustrine (1)

Soil Type: Moist/Silty-Loamy (1)

Humus Form

d1 heather-grouseberry La (n=7)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)

Characteristic Species

Tree

[13.0] SUBALPINE LARCH*
Larix lyallii

[7.9] SUBALPINE FIR
Abies lasiocarpa

[2.3] ENGELMANN SPRUCE
Picea engelmannii

Shrub

[23.0] GROUSEBERRY
Vaccinium scoparium

[14.4] WHITE MOUNTAIN HEATHER
Cassiope mertensiana

[7.8] YELLOW HEATHER
Phyllodoce glanduliflora

[4.5] PINK MOUNTAIN HEATHER
Phyllodoce empetriformis

Forb

[8.0] WOOLLY PUSSYTOES
Antennaria lanata

[3.5] WANDERING DAISY
Erigeron peregrinus

[3.1] PASQUEFLOWER
Anemone occidentalis

[3.0] GLACIER LILY
Erythronium grandiflorum

[2.7] BROAD-LEAVED ARNICA
Arnica latifolia

[2.2] PRAIRIE SELAGINELLA
Selaginella densa

[2.1] WOOLLY HAWKWEED
Hieracium triste

[1.1] SITKA VALERIAN
Valeriana sitchensis

[1.0] BRACTED LOUSEWORT
Pedicularis bracteosa

Lichen

[2.8] UNDIFFERENTIATED CLADONIA
Cladonia

Moss and Liverwort

[4.0] LIVERWORT
Barbilophozia lycopodioides

[2.2] AWNED HAIR-CAP
Polytrichum piliferum

[1.8] BROOM MOSS
Dicranum scoparium

Graminoid

[1.8] SEDGE SPECIES
Carex

[1.4] PIPER'S WOOD-RUSH
Luzula piperi

[1.4] SPIKE TRISETUM
Trisetum spicatum

Environmental Variables

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime:

Elevation (range): 2210 (2110-2340) M

Slope (%): very strong slope (2), gentle slope (2), steep slope (1), moderate slope (1), very gentle slope (1)

Aspect: Southerly (2), Northerly (2), Level (1), Easterly (1), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (5), Moderately well drained (1)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (2), ORTHIC HUMO-FERRIC PODZOL (2), ORTHIC SOMBRIC BRUNISOL (2), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (7)

Parent Material: Morainal (7), Rock (3), Eolian (1)

Soil Type:

Humus Form

Ac2 White mountain heather-Yellow heather-Grouseberry (La) (n=7)

(Cassiope mertenisiana-Phyllodoce glanduliflora-Vaccinium scoparium (Larix lyalii))

This community type was described on lower alpine sites (2200 m), on gentle to steep slopes, with morainal and rock parent materials. The soils tended to be poorly developed Brunisols and Podzols. The understory is dominated by heath species (white mountain heather, yellow heather) and grouseberry. The overstory is dominated by a sparse cover of alpine larch. Archibald et al. (1996) suspected that subalpine fir was the expected climax species but succession is slow because of the harsh environmental conditions.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d1 heather-grouseberry La

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
SUBALPINE LARCH *(Larix lyallii)*	5.5	0.0-17.0	71
Understory Tree			
SUBALPINE LARCH *(Larix lyallii)*	7.5	1.0-9.0	100
ENGELMANN SPRUCE *(Picea engelmannii)*	2.3	0.0-5.0	72
Tall Shrub (2 to 5m)			
SUBALPINE FIR *(Abies lasiocarpa)*	4.4	1.0-6.0	100
Medium Shrub (0.5 to 2 m)			
GROUSEBERRY *(Vaccinium scoparium)*	23.0	0.0-47.0	86
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	14.4	0.0-55.0	43
YELLOW HEATHER *(Phyllodoce glanduliflora)*	7.8	0.0-38.0	43
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	4.5	0.0-15.0	43
Tall Forb (>= 30 cm)			
WANDERING DAISY *(Erigeron peregrinus)*	3.5	0.0-20.0	57
PASQUEFLOWER *(Anemone occidentalis)*	3.1	0.0-15.0	71
BROAD-LEAVED ARNICA *(Arnica latifolia)*	2.7	0.0-11.0	43
SITKA VALERIAN *(Valeriana sitchensis)*	1.1	0.0-4.0	57
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	8.0	0.0-45.0	57
GLACIER LILY *(Erythronium grandiflorum)*	3.0	0.0-12.0	43
PRAIRIE SELAGINELLA *(Selaginella densa)*	2.2	0.0-12.0	57
WOOLLY HAWKWEED *(Hieracium triste)*	2.1	0.0-10.0	86
Graminoid			
SEDGE SPECIES *(Carex)*	1.8	0.0-10.0	29
PIPER'S WOOD-RUSH *(Luzula piperi)*	1.4	0.0-3.0	57
SPIKE TRISETUM *(Trisetum spicatum)*	1.4	0.0-5.0	86
Moss			
LIVERWORT *(Barbilophozia lycopodioides)*	4.0	0.0-21.0	57
AWNED HAIR-CAP *(Polytrichum piliferum)*	2.2	0.0-16.0	14
BROOM MOSS *(Dicranum scoparium)*	1.8	0.0-12.0	29

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime:

Elevation (range): 2210 (2110-2340) M

Slope (%): 6 - 9.99 (2), 31 - 45.99 (2), 2.5 - 5.99 (1), 46 - 70.99 (1), 10 - 15.99 (1)

Aspect: Northerly (2), Southerly (2), Westerly (1), Easterly (1), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (5), Moderately well drained (1)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (2), ORTHIC HUMO-FERRIC PODZOL (2), ORTHIC SOMBRIC BRUNISOL (2), ELUVIATED DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (7)

Parent Material: Morainal (7), Rock (3), Eolian (1)

Soil Type:

Humus Form

d2 heather-grouseberry Fa-Se (n=80)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)

Characteristic Species

Tree

[18.7] SUBALPINE FIR*
Abies lasiocarpa

[5.9] ENGELMANN SPRUCE*
Picea engelmannii

Shrub

[23.6] WHITE MOUNTAIN HEATHER*
Cassiope mertensiana

[10.5] PINK MOUNTAIN HEATHER*
Phyllodoce empetriformis

[9.9] YELLOW HEATHER*
Phyllodoce glanduliflora

[9.2] GROUSEBERRY*
Vaccinium scoparium

[3.5] ROCK WILLOW*
Salix vestita

[1.8] FOUR-ANGLED MOUNTAIN HEATHER*
Cassiope tetragona

[1.3] TALL BILBERRY
Vaccinium membranaceum

Forb

[1.4] WOOLLY PUSSYTOES
Antennaria lanata

[1.1] SITKA VALERIAN
Valeriana sitchensis

Lichen

[1.8] UNDIFFERENTIATED CLADONIA
Cladonia

[1.0] STUDDED LEATHER LICHEN
Peltigera aphthosa

[0.5] N/A
Cladonia ecmocyna

Moss and Liverwort

[9.9] BROOM MOSS
Dicranum scoparium

[7.6] LIVERWORT
Barbilophozia lycopodioides

[2.0] SCHREBER'S MOSS
Pleurozium schreberi

[1.9] STAIR-STEP MOSS
Hylocomium splendens

[1.1] CUSHION MOSS
Dicranum brevifolium

Environmental Variables

Moisture Regime: Mesic (fresh) (60), Subhygric (moderately moist) (5), Subxeric (moderately dry) (3), Subhydric (moderately wet) (3)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 2043 (1770-2330) M

Slope (%): strong slope (26), very strong slope (16), moderate slope (15), steep slope (12), gentle slope (3), level (3), very gentle slope (3), nearly level (1), very steep slope (1)

Aspect: Easterly (22), Southerly (15), Westerly (15), Northerly (12), Level (11)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (30), Moderately well drained (11), Imperfectly drained (4), Rapidly drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (21), ELUVIATED EUTRIC BRUNISOL (15), ORTHIC EUTRIC BRUNISOL (10), ORTHIC HUMO-FERRIC PODZOL (10), ORTHIC DYSTRIC BRUNISOL (6), ORTHIC REGOSOL (4), ORTHIC MELANIC BRUNISOL (3), CUMULIC REGOSOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (2), GLEYED DYSTRIC BRUNISOL (1), GLEYED EUTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC FERRO-HUMIC PODZOL (1), BRUNISOLIC GRAY LUVISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (79)

Parent Material: Morainal (61), Rock (43), Eolian (21), Colluvial (16), Fluvial (2), Glaciolacustrine (1)

Soil Type:

Humus Form

Ac3 White mountain heather-Yellow heather-Grouseberry (Fa-Se) (n=72)

(Cassiope mertenisiana-Phyllodoce glanduliflora-Vaccinium scoparium (Abies lasiocarpa-Picea engelmaniii))

This community type was described on lower alpine sites (2200 m) and upper subalpine sites in the Subalpine Natural Subregion. It occurs on gentle to steep slopes, with morainal, rock, eolian and colluvial parent materials. The soils tended to be poorly developed Brunisols, Podzols and Regosols. The understory is dominated by heath species (white mountain heather, yellow heather) and grouseberry. The overstory has a sparse cover of Engelmann spruce and subalpine fir. Archibald et al. (1996) suspected that subalpine fir was the expected climax species but that succession is slow because of the harsh environmental conditions.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d2 heather-grouseberry Fa-Se

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	3.5	0.0-15.0	65
SUBALPINE FIR *(Abies lasiocarpa)*	2.1	0.0-13.0	54
Understory Tree			
SUBALPINE FIR *(Abies lasiocarpa)*	13.5	5.0-45.0	100
ENGELMANN SPRUCE *(Picea engelmannii)*	4.9	2.0-18.0	100
Medium Shrub (0.5 to 2 m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	19.9	0.0-80.0	75
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	13.5	0.0-65.0	58
GROUSEBERRY *(Vaccinium scoparium)*	5.9	0.0-60.0	58
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	3.7	0.0-65.0	31
ROCK WILLOW *(Salix vestita)*	2.6	0.0-55.0	28
ARCTIC WILLOW *(Salix arctica)*	1.0	0.0-8.0	26
SMOOTH WILLOW *(Salix glauca)*	1.0	0.0-45.0	25
TALL BILBERRY *(Vaccinium membranaceum)*	1.0	0.0-25.0	25
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.8	0.0-15.0	53
ALPINE WORMWOOD *(Artemisia norvegica)*	1.0	0.0-10.0	43
Moss			
BROOM MOSS *(Dicranum scoparium)*	6.0	0.0-40.0	67
SCHREBER'S MOSS *(Pleurozium schreberi)*	4.1	0.0-60.0	25
STAIR-STEP MOSS *(Hylocomium splendens)*	3.8	0.0-70.0	25
CUSHION MOSS *(Dicranum brevifolium)*	2.3	0.0-50.0	32
Lichen			
N/A *(Cladonia ecmocyna)*	1.0	0.0-10.0	51
UNDIFFERENTIATED CLADONIA *(Cladonia)*	1.0	0.0-20.0	26
N/A *(Cetraria islandica)*	0.7	0.0-8.0	47
STUDDED LEATHER LICHEN *(Peltigera aphthosa)*	0.7	0.0-5.0	51

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (54), Subhygric (moderately moist) (5), Subhydric (moderately wet) (3), Subxeric (moderately dry) (3)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 2079 (1770-2330) M

Slope (%): 16 - 30.99 (22), 31 - 45.99 (15), 10 - 15.99 (14), 46 - 70.99 (10), 0 - 0.49 (3), 2.5 - 5.99 (3), 6 - 9.99 (3), 0.5 - 2.49 (1), 71 - 100.99 (1)

Aspect: Easterly (18), Westerly (15), Southerly (12), Northerly (12), Level (10)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (26), Moderately well drained (11), Imperfectly drained (4), Rapidly drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (18), ELUVIATED EUTRIC BRUNISOL (14), ORTHIC HUMO-FERRIC PODZOL (10), ORTHIC EUTRIC BRUNISOL (9), ORTHIC DYSTRIC BRUNISOL (6), ORTHIC REGOSOL (3), ORTHIC MELANIC BRUNISOL (2), CUMULIC REGOSOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (2), GLEYED DYSTRIC BRUNISOL (1), BRUNISOLIC GRAY LUVISOL (1), GLEYED EUTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (71)

Parent Material: Morainal (55), Rock (38), Eolian (19), Colluvial (13), Fluvial (2), Glaciolacustrine (1)

Soil Type:

Humus Form

Ac3 – White mountain heather-Yellow heather-Grouseberry with sparse tree canopy is characteristic of the Ac3 community type (A.J. Gould)

Ac4 White mountain heather-Pink mountain heather-Grouseberry (Fa-Se) (n=8)

(Cassiope mertenisiana-Phyllodoce emptriformis-Vaccinium scoparium (Abies lasiocarpa-Picea engelmaniii))

This community type was described on lower alpine sites (2008 m) and upper subalpine sites in the Subalpine Natural Subregion. It occurs on steep slopes, with morainal, rock, eolian and colluvial parent materials. The soils tended to be poorly developed Brunisols, Podzols and Regosols. The understory is dominated by heath species (white mountain heather, pink mountain heather) and grouseberry. Crack (1977) felt that pink mountain heather was more typical of higher precipitation areas which may indicate this community type is slightly moister than the White mountain heather/Yellow heather (Ac3) dominated community type. The overstory is dominated by a sparse cover of Engelmann spruce and subalpine fir.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d2 heather-grouseberry Fa-Se

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
SUBALPINE FIR *(Abies lasiocarpa)*	3.5	0.0-10.0	50
ENGELMANN SPRUCE *(Picea engelmannii)*	1.0	0.0-5.0	50
Understory Tree			
SUBALPINE FIR *(Abies lasiocarpa)*	18.4	7.0-42.0	100
ENGELMANN SPRUCE *(Picea engelmannii)*	2.6	0.0-8.0	76
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	33.7	0.0-55.0	88
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	21.0	3.0-40.0	100
GROUSEBERRY *(Vaccinium scoparium)*	12.5	0.0-70.0	63
ROCK WILLOW *(Salix vestita)*	4.5	0.0-30.0	25
TALL BILBERRY *(Vaccinium membranaceum)*	1.7	0.0-7.0	50
PARTRIDGEFOOT *(Luetkea pectinata)*	1.2	0.0-5.0	25
Tall Forb (>= 30 cm)			
SITKA VALERIAN *(Valeriana sitchensis)*	2.2	0.0-7.0	63
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.0	0.0-5.0	38
Moss			
LIVERWORT *(Barbilophozia lycopodioides)*	15.2	1.0-40.0	100
BROOM MOSS *(Dicranum scoparium)*	13.8	1.0-55.0	100
LIVERWORT *(Barbilophozia hatcheri)*	1.5	0.0-10.0	25
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	2.6	0.0-20.0	25
STUDDED LEATHER LICHEN *(Peltigera aphthosa)*	1.3	0.0-6.0	50

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (6)

Nutrient Regime:

Elevation (range): 2008 (1890-2200) M

Slope (%): 16 - 30.99 (4), 46 - 70.99 (2), 31 - 45.99 (1), 10 - 15.99 (1)

Aspect: Easterly (4), Southerly (3), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (4)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (3), ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), ORTHIC FERRO-HUMIC PODZOL (1), ORTHIC MELANIC BRUNISOL (1), ORTHIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (8)

Parent Material: Morainal (6), Rock (5), Colluvial (3), Eolian (2)

Soil Type:

Humus Form

d3 heather shrubland (n=240)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)

Characteristic Species

Shrub

- [12.4] YELLOW HEATHER* *Phyllodoce glanduliflora*
- [7.7] WHITE MOUNTAIN HEATHER* *Cassiope mertensiana*
- [6.3] FOUR-ANGLED MOUNTAIN HEATHER* *Cassiope tetragona*
- [5.7] PINK MOUNTAIN HEATHER* *Phyllodoce empetriformis*
- [3.9] ARCTIC WILLOW* *Salix arctica*
- [2.8] WHITE MOUNTAIN AVENS *Dryas octopetala*
- [2.5] PARTRIDGEFOOT* *Luetkea pectinata*
- [2.4] ALPINE AZALEA* *Loiseleuria procumbens*
- [1.4] NET-VEINED WILLOW* *Salix reticulata*
- [1.2] CROWBERRY *Empetrum nigrum*

Forb

- [4.2] WOOLLY PUSSYTOES *Antennaria lanata*

Lichen

- [4.5] UNDIFFERENTIATED LICHENOTHELIA *Lichenothelia*
- [0.4] N/A *Cladonia ecmocyna*

Moss and Liverwort

- [2.3] UNDIFFERENTIATED MOSS - ALL GENERA *Moss*
- [1.5] BROOM MOSS *Dicranum scoparium*

Graminoid

- [1.1] RUSH-LIKE SEDGE *Carex scirpoidea*
- [0.5] PIPER'S WOOD-RUSH *Luzula piperi*

Environmental Variables

Moisture Regime: Mesic (fresh) (163), Subhygric (moderately moist) (14), Subxeric (moderately dry) (10), Submesic (moderately fresh) (6), Hygric (moist) (4), Very Xeric (very dry) (1)

Nutrient Regime: Mesotrophic (medium) (17), Submesotrophic (poor) (10), Permesotrophic (rich) (5)

Elevation (range): 2179 (1855-2620) M

Slope (%): strong slope (77), moderate slope (53), very strong slope (34), steep slope (28), gentle slope (21), very gentle slope (19), nearly level (3), very steep slope (2), level (1)

Aspect: Easterly (62), Westerly (61), Southerly (60), Northerly (31), Level (21)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (64), Moderately well drained (25), Rapidly drained (11), Imperfectly drained (5)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (45), ORTHIC DYSTRIC BRUNISOL (29), ORTHIC HUMO-FERRIC PODZOL (26), ORTHIC MELANIC BRUNISOL (24), ORTHIC EUTRIC BRUNISOL (23), ORTHIC SOMBRIC BRUNISOL (20), ELUVIATED EUTRIC BRUNISOL (10), ORTHIC HUMIC REGOSOL (5), CUMULIC REGOSOL (4), ORTHIC REGOSOL (4), GLEYED SOMBRIC BRUNISOL (3), GLEYED EUTRIC BRUNISOL (3), ORTHIC FERRO-HUMIC PODZOL (3), ELUVIATED MELANIC BRUNISOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), SOMBRIC FERRO-HUMIC PODZOL (1), ORTHIC GLEYSOL (1), BRUNISOLIC GRAY LUVISOL (1), ORTHIC GRAY LUVISOL (1), REGO STATIC CRYOSOL (1)

Surface Texture: Silty clay loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (207)

Parent Material: Morainal (163), Rock (123), Colluvial (38), Eolian (37), Fluvial (3), Undifferentiated Mineral (2), Lacustrine (1), Fluviolacustrine (1)

Soil Type: Moist/Silty-Loamy (1)

Humus Form

Ab10 Arctic willow-Yellow heather/Woolly pussytoes (n=29)

(Salix arctica-Phyllodoce glanduliflora/Antennaria lanata)

This community type was described on level to steep sites with predominantly mesic moisture regimes. Soils tend to be poorly developed Podzolic, Brunisolic and Regosolic soils with Colluvial and Rock parent material. This community type can be distinguished from the other heath dominated communities by the dominance of arctic willow, yellow heather and woolly everlasting. The presence of a high arctic willow and woolly everlasting cover in this community type appears to indicate more moisture caused by deeper snow accumulation (Hrapko and La Roi 1978).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	25.7	10.0-70.0	100
ARCTIC WILLOW *(Salix arctica)*	11.1	0.0-25.0	82
GROUSEBERRY *(Vaccinium scoparium)*	5.6	0.0-45.0	55
SMOOTH WILLOW *(Salix glauca)*	4.6	0.0-75.0	21
NET-VEINED WILLOW *(Salix reticulata)*	3.7	0.0-25.0	58
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	2.8	0.0-25.0	41
BARRATT'S WILLOW *(Salix barrattiana)*	1.6	0.0-40.0	14
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	1.3	0.0-10.0	38
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	1.0	0.0-3.0	69
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.2	0.0-12.0	83
WANDERING DAISY *(Erigeron peregrinus)*	1.0	0.0-5.0	59
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	10.7	0.0-50.0	83
Graminoid			
SEDGE SPECIES *(Carex)*	0.7	0.0-9.0	21
PIPER'S WOOD-RUSH *(Luzula piperi)*	0.6	0.0-3.0	48
Moss			
BROOM MOSS *(Dicranum scoparium)*	1.0	0.0-15.0	17
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	1.0	0.0-16.0	28
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	3.6	0.0-80.0	10

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (13), Subhygric (moderately moist) (2), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (1)

Elevation (range): 2281 (2010-2460) M

Slope (%): 10 - 15.99 (10), 46 - 70.99 (4), 2.5 - 5.99 (4), 6 - 9.99 (3), 16 - 30.99 (3), 31 - 45.99 (3), 0 - 0.49 (1), 0.5 - 2.49 (1)

Aspect: Easterly (8), Southerly (8), Westerly (6), Northerly (3), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (6), Imperfectly drained (2), Moderately well drained (1)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (5), ORTHIC HUMO-FERRIC PODZOL (5), ORTHIC DYSTRIC BRUNISOL (4), ORTHIC EUTRIC BRUNISOL (3), ORTHIC SOMBRIC BRUNISOL (3), ELUVIATED DYSTRIC BRUNISOL (2), ORTHIC HUMIC REGOSOL (1), ORTHIC GRAY LUVISOL (1), ELUVIATED EUTRIC BRUNISOL (1), REGO STATIC CRYOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (26)

Parent Material: Morainal (20), Rock (18), Colluvial (5), Eolian (3), Fluvial (2), Lacustrine (1)

Soil Type:

Humus Form

Ab11 Four-angled mountain heather-Yellow heather (n=8)

(Cassiope tetragona-Phyllodoce glanduliflora)

This community type was recognized by Kuchar (1975) and was thought to represent a transition from the drier Four-square mountain heather-White mountain avens (Cassiope tetragona-Dryas octopetala) community type to the moister Yellow heather-White mountain heather (Phyllodoce glanduliflora-Cassiope mertensiana) dominated community type.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	22.6	0.0-45.0	88
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	11.3	8.0-19.0	100
ARCTIC WILLOW *(Salix arctica)*	3.8	0.0-12.0	88
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	1.8	0.0-15.0	26
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	1.2	0.0-8.0	38
Tall Forb (>= 30 cm)			
BROAD-LEAVED FIREWEED *(Epilobium latifolium)*	1.2	0.0-10.0	13
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	2.6	0.0-15.0	75
ALPINE WORMWOOD *(Artemisia norvegica)*	1.8	0.0-10.0	50
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	5.0	0.0-30.0	25
BROOM MOSS *(Dicranum scoparium)*	1.7	0.0-5.0	75
Lichen			
N/A *(Rhizocarpon geographicum)*	1.3	0.0-10.0	25
REINDEER LICHEN *(Cladina mitis)*	1.2	0.0-5.0	50
N/A *(Cetraria islandica)*	1.1	0.0-5.0	50
N/A *(Cladonia ecmocyna)*	1.1	0.0-5.0	38

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (6), Subhygric (moderately moist) (1), Submesic (moderately fresh) (1)

Nutrient Regime: Mesotrophic (medium) (2)

Elevation (range): 2226 (2114-2360) M

Slope (%): 31 - 45.99 (3), 2.5 - 5.99 (2), 6 - 9.99 (1), 16 - 30.99 (1), 46 - 70.99 (1)

Aspect: Easterly (2), Southerly (2), Westerly (2), Level (1), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Rapidly drained (1), Well drained (1), Imperfectly drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), GLEYED EUTRIC BRUNISOL (1), ORTHIC FERRO-HUMIC PODZOL (1), ORTHIC HUMIC REGOSOL (1), ORTHIC SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (6)

Parent Material: Morainal (5), Eolian (3), Rock (3), Colluvial (1)

Soil Type:

Humus Form

Ab11 - Four angled heather-Yellow heather community (A.J. Gould)

Ab12 Pink mountain heather (n=5)

(Phyllodoce emptriformis)

This community type can be distinguished from the other heath dominated community types by the dominance of pink mountain heather and low cover of other heath species. In British Columbia this community type is common on water-shedding sites which are often affected by seepage from late-melting snowbanks (Klinkenberg 2017).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	1.4	0.0-6.0	40
Medium Shrub (0.5 to 2 m)			
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	37.0	10.0-65.0	100
YELLOW HEATHER *(Phyllodoce glanduliflora)*	7.0	0.0-20.0	40
GROUND JUNIPER *(Juniperus communis)*	4.6	0.0-22.0	40
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	4.2	0.0-20.0	40
ARCTIC WILLOW *(Salix arctica)*	2.6	0.0-10.0	40
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	1.0	0.0-5.0	20
Low Shrub (< 0.5m)			
CROWBERRY *(Empetrum nigrum)*	7.2	0.0-30.0	60
ALPINE AZALEA *(Loiseleuria procumbens)*	4.0	0.0-20.0	20
Tall Forb (>= 30 cm)			
PASQUEFLOWER *(Anemone occidentalis)*	1.0	0.0-5.0	20
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	1.6	0.0-5.0	60
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.0	0.0-5.0	20
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	2.0	0.0-10.0	20
Lichen			
DOG LICHEN *(Peltigera canina)*	1.0	0.0-5.0	20
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	4.0	0.0-20.0	20

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (2), Very Xeric (very dry) (1), Subxeric (moderately dry) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 2111 (1866-2360) M

Slope (%): 16 - 30.99 (2), 31 - 45.99 (1), 46 - 70.99 (1), 71 - 100.99 (1)

Aspect: Southerly (4), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Rapidly drained (1), Well drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (2), ORTHIC MELANIC BRUNISOL (2)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Rock (4), Colluvial (3), Morainal (1)

Soil Type:

Humus Form

Ab13 Yellow heather (n=36)

(Phyllodoce glanduliflora)

This community type was described at higher elevations (2300 m) on steep slopes with morainal and rock parent material and predominatly Brunisolic soils. This community type is similar to the White mountain heather-Yellow heather (Ab8), but this community lacks white mountain heather. Kuchar (1975) felt when yellow heather was dominant it was a transitional community between the White mountain heather-White mountain avens (Ab6) and White mountain heather- Yellow heather dominated community types, but he found no distinctive features that would split this community type. Timoney (1999), felt this community type can be distinguished from that of white mountain heather by the dominance of yellow heather and presence of sibbaldia and mountain cinquefoil.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	36.6	30.0-70.0	100
ARCTIC WILLOW *(Salix arctica)*	4.8	0.0-15.0	81
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	3.4	0.0-20.0	56
GROUSEBERRY *(Vaccinium scoparium)*	2.2	0.0-15.0	39
NET-VEINED WILLOW *(Salix reticulata)*	1.9	0.0-10.0	50
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	1.2	0.0-10.0	39
Tall Forb (>= 30 cm)			
WANDERING DAISY *(Erigeron peregrinus)*	1.2	0.0-8.0	56
PASQUEFLOWER *(Anemone occidentalis)*	1.0	0.0-30.0	14
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	6.6	0.0-30.0	89
PRAIRIE SELAGINELLA *(Selaginella densa)*	1.3	0.0-10.0	56
Graminoid			
PIPER'S WOOD-RUSH *(Luzula piperi)*	0.8	0.0-15.0	28
BLACK ALPINE SEDGE *(Carex nigricans)*	0.7	0.0-25.0	11
Moss			
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	1.6	0.0-25.0	28
BROOM MOSS *(Dicranum scoparium)*	1.0	0.0-20.0	22
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	1.5	0.0-20.0	28

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (25), Subhygric (moderately moist) (3), Subxeric (moderately dry) (2)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 2314 (2020-2620) M

Slope (%): 16 - 30.99 (19), 10 - 15.99 (6), 46 - 70.99 (4), 31 - 45.99 (3), 2.5 - 5.99 (2), 6 - 9.99 (1)

Aspect: Southerly (14), Westerly (9), Easterly (9), Northerly (3), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (8), Moderately well drained (6), Rapidly drained (3)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (8), ORTHIC DYSTRIC BRUNISOL (6), ELUVIATED DYSTRIC BRUNISOL (5), ORTHIC MELANIC BRUNISOL (5), ORTHIC HUMO-FERRIC PODZOL (3), ELUVIATED EUTRIC BRUNISOL (3), GLEYED SOMBRIC BRUNISOL (2), ORTHIC SOMBRIC BRUNISOL (1), ORTHIC HUMIC REGOSOL (1), CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (35)

Parent Material: Morainal (27), Rock (19), Colluvial (8), Eolian (3), Undifferentiated Mineral (2), Fluviolacustrine (1), Fluvial (1)

Soil Type:

Humus Form

Ab13 – Yellow heather community (A.J. Gould)

Ab23 Alpine azalea (n=1)

(Loiseleuria procumbens)

This community type can be distinguished from the other heath dominated community types by the dominance of alpine azalea and low cover of other heath species. Alpine azalea is a small shrub that forms cushiony mounds about 4 inches tall. It is a rare plant in Alberta and is found on mesic to dry sites in the alpine primarily on soils that are acidic in nature (Gould 2007).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
ROCKY MOUNTAIN ALPINE FIR *(Abies bifolia)*	1.0	1.0-1.0	100
Low Shrub (< 0.5m)			
ALPINE AZALEA *(Loiseleuria procumbens)*	20.0	20.0-20.0	100
CROWBERRY *(Empetrum nigrum)*	5.0	5.0-5.0	100
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	0.1	0.1-0.1	100
PARTRIDGEFOOT *(Luetkea pectinata)*	0.1	0.1-0.1	100
DWARF BRAMBLE *(Rubus pedatus)*	0.1	0.1-0.1	100
NET-VEINED WILLOW *(Salix reticulata)*	0.1	0.1-0.1	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	0.1	0.1-0.1	100
Tall Forb (>= 30 cm)			
BROAD SPINULOSE SHIELD FERN *(Dryopteris assimilis)*	0.1	0.1-0.1	100
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	0.1	0.1-0.1	100
PALE GENTIAN *(Gentiana glauca)*	0.1	0.1-0.1	100
RUSTY SAXIFRAGE *(Saxifraga ferruginea)*	0.1	0.1-0.1	100
MOSS CAMPION *(Silene acaulis)*	0.1	0.1-0.1	100
Graminoid			
LONG-BRACTED SEDGE *(Carex athrostachya)*	0.1	0.1-0.1	100
ALPINE SWEET GRASS *(Hierochloe alpina)*	0.1	0.1-0.1	100
ALPINE WOOD-RUSH *(Luzula arcuata)*	0.1	0.1-0.1	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	5.0	5.0-5.0	100
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	30.0	30.0-30.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 1983 (1983-1983) M

Slope (%): 6 - 9.99 (1)

Aspect: Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Ab3 Partridgefoot/Woolly pussytoes (n=5)

(Luetkea pectinata/Antennaria lanata)

Kuchar (1975) found that the partridgefoot (Luetkea) dominated plant community occupies the deepest-snowpack portion of the heath ecosite phase. He found the substrate to be moist throughout the growing season.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
PARTRIDGEFOOT *(Luetkea pectinata)*	22.6	10.0-50.0	100
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	1.8	0.0-5.0	80
Tall Forb (>= 30 cm)			
PASQUEFLOWER *(Anemone occidentalis)*	2.0	0.0-10.0	40
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	10.4	0.0-34.0	60
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	3.0	0.0-10.0	40
WOOLLY HAWKWEED *(Hieracium triste)*	1.6	0.0-8.0	20
PALE GENTIAN *(Gentiana glauca)*	1.0	0.0-3.0	40
Graminoid			
RUSH-LIKE SEDGE *(Carex scirpoidea)*	11.0	0.0-55.0	20
DRUMMOND'S RUSH *(Juncus drummondii)*	2.8	0.0-9.0	60
PIPER'S WOOD-RUSH *(Luzula piperi)*	2.2	0.0-8.0	80
MOUNTAIN HAIR GRASS *(Vahlodea atropurpurea)*	1.4	0.0-6.0	40
BLACK ALPINE SEDGE *(Carex nigricans)*	0.8	0.0-4.0	40
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	5.6	0.0-20.0	60
BROOM MOSS *(Dicranum scoparium)*	4.0	0.0-20.0	20
AWNED HAIR-CAP *(Polytrichum piliferum)*	4.0	0.0-20.0	20
Lichen			
N/A *(Cladonia ecmocyna)*	2.0	0.0-10.0	20
N/A *(Cetraria ericetorum)*	0.2	0.0-1.0	20
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	4.0	0.0-20.0	60

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (3), Subhygric (moderately moist) (1), Subxeric (moderately dry) (1)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (1)

Elevation (range): 2112 (1913-2268) M

Slope (%): 31 - 45.99 (2), 6 - 9.99 (1), 10 - 15.99 (1), 16 - 30.99 (1)

Aspect: Northerly (2), Southerly (2), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Moderately well drained (1)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (2)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Morainal (2), Eolian (1), Rock (1)

Soil Type:

Humus Form

Ab6 Four-angled mountain heather-Yellow heather-White mountain avens (n=26)

(Cassiope tetragona-Phyllodoce glandulifolia-Dryas octopetala)

Communities dominated by four-angled mountain heather are often found in association with white mountain avens and/or net veined willow and typically occur at high elevation on north-facing slopes where snow accumulates (Beder 1967; Kuchar 1975; Crack 1977; Hrapko and La Roi 1978; Mortimer 1978; Corns and Achuff 1982). The soils are Brunisolic, Podzolic and Regosolic and they have seepage and solifluction (Corns and Achuff 1982). Kuchar (1975) in Jasper described this community on slightly raised portions, generally 0.5 m above the Phyllodoce-Cassiope mertensiana dominated community types.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	27.4	0.0-65.0	92
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	13.3	0.0-30.0	92
YELLOW HEATHER *(Phyllodoce glanduliflora)*	5.1	0.0-40.0	54
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	3.0	0.0-41.0	12
ARCTIC WILLOW *(Salix arctica)*	2.2	0.0-10.0	61
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	2.0	0.0-50.0	8
NET-VEINED WILLOW *(Salix reticulata)*	1.7	0.0-10.0	77
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	0.7	0.0-5.0	62
Low Forb (< 30 cm)			
MOSS CAMPION *(Silene acaulis)*	1.2	0.0-8.0	62
ALPINE BISTORT *(Polygonum viviparum)*	0.6	0.0-5.0	69
Graminoid			
RUSH-LIKE SEDGE *(Carex scirpoidea)*	0.6	0.0-10.0	23
NARD SEDGE *(Carex nardina)*	0.5	0.0-7.0	12
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	1.7	0.0-10.0	23
STAIR-STEP MOSS *(Hylocomium splendens)*	1.1	0.0-15.0	12
Lichen			
N/A *(Cetraria tilesii)*	1.1	0.0-26.0	15
N/A *(Cetraria cucullata)*	0.7	0.0-15.0	19
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	3.8	0.0-30.0	23

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (15), Submesic (moderately fresh) (3), Subxeric (moderately dry) (3)

Nutrient Regime: Permesotrophic (rich) (3), Mesotrophic (medium) (3)

Elevation (range): 2221 (1971-2460) M

Slope (%): 16 - 30.99 (8), 10 - 15.99 (6), 46 - 70.99 (4), 31 - 45.99 (3), 6 - 9.99 (3), 0.5 - 2.49 (1), 2.5 - 5.99 (1)

Aspect: Easterly (10), Westerly (6), Southerly (4), Northerly (4), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (9), Moderately well drained (3)

Soil Subgroup: ORTHIC EUTRIC BRUNISOL (5), ORTHIC MELANIC BRUNISOL (4), ORTHIC SOMBRIC BRUNISOL (3), ORTHIC REGOSOL (2), ORTHIC HUMO-FERRIC PODZOL (2), ELUVIATED MELANIC BRUNISOL (1), ORTHIC FERRO-HUMIC PODZOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (20)

Parent Material: Morainal (14), Rock (13), Colluvial (6), Eolian (3)

Soil Type:

Humus Form

Ab7 Net-veined willow-Arctic willow-Four-angled mountain heather-Yellow heather (n=19)

(Salix reticulata-Salix arctica-Cassiope tetragona-Phyllodoce glandulifolia)

This community type was described on shallow to steep sites with predominantly mesic moisture regimes. Soils tend to be poorly developed Podzolic, Brunisolic and Regosolic soils with Colluvial and Rock parent material. This community type can be distinguished from the other heath dominated communities by the dominance of arctic willow, net veined willow and four-square mountain heather. The presence of a high arctic and net veined willow cover in this community type appears to indicate more moisture perhaps caused by deeper snow accumulation.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	24.6	0.0-55.0	95
ARCTIC WILLOW *(Salix arctica)*	9.8	0.0-30.0	87
YELLOW HEATHER *(Phyllodoce glanduliflora)*	6.4	0.0-35.0	42
NET-VEINED WILLOW *(Salix reticulata)*	6.2	0.0-30.0	68
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	4.7	0.0-30.0	58
ROCK WILLOW *(Salix vestita)*	2.3	0.0-45.0	5
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	2.0	0.0-15.0	26
SMOOTH WILLOW *(Salix glauca)*	1.7	0.0-18.0	16
YELLOW MOUNTAIN AVENS *(Dryas drummondii)*	1.6	0.0-26.0	11
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.9	0.0-10.0	48
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	2.4	0.0-25.0	63
ALPINE WORMWOOD *(Artemisia norvegica)*	0.6	0.0-5.0	53
Moss			
STAIR-STEP MOSS *(Hylocomium splendens)*	3.2	0.0-35.0	21
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	2.8	0.0-30.0	21
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	2.4	0.0-25.0	16
AWNED HAIR-CAP *(Polytrichum piliferum)*	1.6	0.0-25.0	21
Lichen			
UNDIFFERENTIATED CLADONIA *(Cladonia)*	1.1	0.0-9.0	26

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (10), Submesic (moderately fresh) (2), Subxeric (moderately dry) (1)

Nutrient Regime: Mesotrophic (medium) (2), Submesotrophic (poor) (2)

Elevation (range): 2232 (2030-2380) M

Slope (%): 10 - 15.99 (8), 16 - 30.99 (6), 31 - 45.99 (2), 46 - 70.99 (2), 2.5 - 5.99 (1)

Aspect: Westerly (6), Northerly (5), Easterly (3), Southerly (2), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (6), Rapidly drained (1), Moderately well drained (1)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (3), ELUVIATED DYSTRIC BRUNISOL (2), ORTHIC SOMBRIC BRUNISOL (2), ORTHIC EUTRIC BRUNISOL (2), ORTHIC HUMO-FERRIC PODZOL (1), ORTHIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1), CUMULIC REGOSOL (1), ORTHIC REGOSOL (1), ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture: Silty clay loam (1)

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (15)

Parent Material: Morainal (11), Rock (9), Eolian (3), Colluvial (2)

Soil Type: Moist/Silty-Loamy (1)

Humus Form

Ab7 – Net veined willow-Arctic willow-Four angled mountain heather-Yellow heather community near Jasper (A.J. Gould)

Ab8 White mountain heather-Yellow heather (n=88)

(Cassiope mertensiana-Phyllodoce glanduliflora)

This community type occurs on north and east facing slopes (Gould 2007), and on some west and south facing slopes which have a deep snow cover. The soils are Brunisolic, Podzolic and Regosolic with Morainal, Rock and Colluvial parent materials (Corns and Achuff 1982). This community type is distinguishable from the yellow heather (Ab13) dominated community type by the co-dominance of yellow heather and white mountain heather. Kuchar (1975) found that grouseberry and pink mountain heather dominated community types become more prevalent as one approaches treeline. Hrapko and La Roi (1978) described white mountain heather on terrace bases with more moisture and four-square mountain heather occurred on the drier upper part of the terraces and in depressions in the terrace tops.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	30.8	0.0-85.0	94
YELLOW HEATHER *(Phyllodoce glanduliflora)*	20.1	0.0-55.0	91
ARCTIC WILLOW *(Salix arctica)*	3.5	0.0-30.0	65
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	1.3	0.0-15.0	23
PARTRIDGEFOOT *(Luetkea pectinata)*	0.8	0.0-10.0	34
NET-VEINED WILLOW *(Salix reticulata)*	0.6	0.0-5.0	24
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.4	0.0-3.0	51
Tall Forb (>= 30 cm)			
WANDERING DAISY *(Erigeron peregrinus)*	0.9	0.0-10.0	42
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	3.7	0.0-35.0	80
ALPINE WORMWOOD *(Artemisia norvegica)*	1.1	0.0-10.0	56
Graminoid			
PIPER'S WOOD-RUSH *(Luzula piperi)*	0.5	0.0-10.0	48
Moss			
BROOM MOSS *(Dicranum scoparium)*	2.8	0.0-30.0	44
LIVERWORT *(Barbilophozia lycopodioides)*	1.7	0.0-40.0	32
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	1.6	0.0-50.0	13
Lichen			
N/A *(Cladonia ecmocyna)*	0.5	0.0-7.0	38

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (66), Subhygric (moderately moist) (7), Hygric (moist) (4), Subxeric (moderately dry) (1)

Nutrient Regime: Mesotrophic (medium) (6), Submesotrophic (poor) (3), Permesotrophic (rich) (2)

Elevation (range): 2184 (1855-2430) M

Slope (%): 16 - 30.99 (24), 10 - 15.99 (19), 31 - 45.99 (13), 46 - 70.99 (11), 6 - 9.99 (10), 2.5 - 5.99 (8), 0.5 - 2.49 (1), 71 - 100.99 (1)

Aspect: Easterly (26), Westerly (21), Southerly (17), Level (11), Northerly (11)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (22), Moderately well drained (10), Rapidly drained (3), Imperfectly drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (17), ORTHIC DYSTRIC BRUNISOL (13), ORTHIC HUMO-FERRIC PODZOL (13), ORTHIC SOMBRIC BRUNISOL (9), ORTHIC MELANIC BRUNISOL (6), ORTHIC EUTRIC BRUNISOL (4), ELUVIATED EUTRIC BRUNISOL (4), GLEYED EUTRIC BRUNISOL (2), ORTHIC HUMIC REGOSOL (1), ELUVIATED MELANIC BRUNISOL (1), ORTHIC FERRO-HUMIC PODZOL (1), ORTHIC GLEYSOL (1), BRUNISOLIC GRAY LUVISOL (1), CUMULIC REGOSOL (1), ORTHIC REGOSOL (1), GLEYED SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (76)

Parent Material: Morainal (64), Rock (41), Eolian (20), Colluvial (10)

Soil Type:

Humus Form

Ab8 - White mountain heather-Yellow heather dominated communities are the most extensively sampled community types in the heather ecological site (A.J. Gould)

Ab9 White mountain heather-Pink mountain heather (n=23)

(Cassiope mertensiana-Phyllodoce empetriformis)

This community type occurs on gentle to steep slopes at mid elevations (2100 m) in the alpine. The soils are Brunisolic, Podzolic and Regosolic with Morainal, Rock and Colluvial parent materials (Corns and Achuff 1982). Near treeline pink mountain heather tends to become more dominant than yellow heather (Kuchar 1975).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: d heather-grouseberry(mesic/middle zone)
Ecosite Phase: d3 heather shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	40.2	0.0-85.0	91
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	13.4	0.0-30.0	91
ARCTIC WILLOW *(Salix arctica)*	2.0	0.0-20.0	44
SUBALPINE FIR *(Abies lasiocarpa)*	1.9	0.0-15.0	30
PARTRIDGEFOOT *(Luetkea pectinata)*	1.6	0.0-10.0	48
YELLOW HEATHER *(Phyllodoce glanduliflora)*	1.0	0.0-10.0	17
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	0.6	0.0-10.0	9
Tall Forb (>= 30 cm)			
PASQUEFLOWER *(Anemone occidentalis)*	1.3	0.0-15.0	39
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	5.5	0.0-20.0	83
ALPINE WORMWOOD *(Artemisia norvegica)*	1.2	0.0-10.0	44
Graminoid			
PIPER'S WOOD-RUSH *(Luzula piperi)*	1.0	0.0-5.0	61
Moss			
BROOM MOSS *(Dicranum scoparium)*	4.5	0.0-30.0	61
LIVERWORT *(Barbilophozia lycopodioides)*	3.6	0.0-65.0	44
THIN-LEAF CURVED-TAIL MOSS *(Dicranum muehlenbeckii)*	2.1	0.0-45.0	13
JUNIPER HAIR-CAP *(Polytrichum juniperinum)*	2.1	0.0-25.0	44
Lichen			
N/A *(Cladonia ecmocyna)*	1.1	0.0-13.0	52

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (22)

Nutrient Regime:

Elevation (range): 2128 (1900-2340) M

Slope (%): 16 - 30.99 (13), 31 - 45.99 (4), 10 - 15.99 (3), 2.5 - 5.99 (1), 6 - 9.99 (1), 46 - 70.99 (1)

Aspect: Westerly (9), Southerly (6), Easterly (4), Level (2), Northerly (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (11), Moderately well drained (3), Rapidly drained (2)

Soil Subgroup: ELUVIATED DYSTRIC BRUNISOL (13), ORTHIC HUMO-FERRIC PODZOL (2), ORTHIC MELANIC BRUNISOL (1), CUMULIC REGOSOL (1), ORTHIC SOMBRIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), SOMBRIC FERRO-HUMIC PODZOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (23)

Parent Material: Morainal (19), Rock (15), Colluvial (3), Eolian (1)

Soil Type:

Humus Form

Ab9 - White mountain heather - Pink mountain heather community (A.J. Gould)

e black alpine sedge-arctic willow (mesic subhygric/middle zone) (n=49)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecosite occupies well to imperfectly drained sites with mesic to subhygric moisture regimes at higher elevations (2200 m). It occurs on a variety of slopes and aspects. Soils vary from Humic Regosols, Dystric Brunisols, Gleysols, Sombric Brunisols and Humo-Ferric Podzols and occupy morainal and fluvial landforms. This ecosite occurs in deep snow accumulation areas (Ogilvie 1969) with snow release occurring in late June and early July (Kuchar 1975). This ecological site has the shortest snow-free period of all ecological sites in the alpine (Douglas and Bliss 1977).

Successional Relationships

This ecosite is successionally mature. At treeline both Engelmann spruce and subalpine fir can be evident in the overstory.

Indicator Species

Shrub

ARCTIC WILLOW
Salix arctica

NET-VEINED WILLOW
Salix reticulata

Forb

WOOLLY PUSSYTOES
Antennaria lanata

MOUNTAIN CINQUEFOIL
Potentilla diversifolia

Graminoid

BLACK ALPINE SEDGE
Carex nigricans

TUFTED HAIR GRASS
Deschampsia cespitosa

SMALL-FLOWERED WOOD-RUSH
Luzula parviflora

Environmental Variables

Moisture Regime: Mesic (fresh) (17), Subhygric (moderately moist) (16), Submesic (moderately fresh) (5), Subhydric (moderately wet) (4), Hygric (moist) (3), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (14), Permesotrophic (rich) (7), Submesotrophic (poor) (2)

Elevation (range): 2213 (1759-2610) M

Slope (%): moderate slope (11), strong slope (10), gentle slope (7), nearly level (6), very gentle slope (5), steep slope (4), very strong slope (3), level (2)

Aspect: Southerly (15), Westerly (13), Northerly (10), Easterly (7), Level (5)

Topographic Position:Crest (3), Depression (1), Level (1), Upper Slope (1)

Soil Variables

Soil Drainage: Well drained (6), Rapidly drained (6), Moderately well drained (4), Poorly drained (2), Very poorly drained (1)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (3), ORTHIC SOMBRIC BRUNISOL (3), ORTHIC REGOSOL (2), GLEYED DYSTRIC BRUNISOL (2), ORTHIC HUMIC GLEYSOL (2), ORTHIC HUMO-FERRIC PODZOL (2), CUMULIC REGOSOL (2), ELUVIATED DYSTRIC BRUNISOL (2), ORTHIC DYSTRIC BRUNISOL (2), ORTHIC EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1), ORTHIC GRAY LUVISOL (1), ELUVIATED EUTRIC BRUNISOL (1), FERA GRAY LUVISOL (1), GLEYED CUMULIC REGOSOL (1), REGO GLEYSOL (1), CUMULIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (29)

Parent Material: Morainal (16), Rock (7), Fluvial (7), Colluvial (5), Eolian (4), Fluviolacustrine (3), Undifferentiated Mineral (2), Glaciolacustrine (1), Fen (1)

Soil Type:

Humus Form

e1 black alpine sedge-willow Fa-Se (n=2)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)

Characteristic Species

Tree

[9.0] SUBALPINE FIR
Abies lasiocarpa

[6.5] ENGELMANN X WHITE SPRUCE
Picea engelmannii x glauca

Shrub

[13.5] ARCTIC WILLOW*
Salix arctica

[12.5] COMMON LABRADOR TEA
Ledum groenlandicum

[5.0] NET-VEINED WILLOW*
Salix reticulata

[2.5] ROCK WILLOW
Salix vestita

[2.5] RED BEARBERRY
Arctostaphylos rubra

[2.0] TWINFLOWER
Linnaea borealis

[2.0] CROWBERRY
Empetrum nigrum

[2.0] FOUR-ANGLED MOUNTAIN HEATHER
Cassiope tetragona

Forb

[15.5] MOUNTAIN CINQUEFOIL*
Potentilla diversifolia

[7.0] CREEPING SIBBALDIA
Sibbaldia procumbens

[5.0] BROOK RAGWORT
Senecio triangularis

[3.0] ALPINE SPEEDWELL
Veronica alpina

[2.0] ALPINE BISTORT
Polygonum viviparum

[1.0] WOOLLY PUSSYTOES
Antennaria lanata

Graminoid

[9.5] BLACK ALPINE SEDGE*
Carex nigricans

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime:

Elevation (range): 2120 (2040-2200) M

Slope (%): nearly level (1), very gentle slope (1)

Aspect: Easterly (1), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (1), GLEYED CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Undifferentiated Mineral (1), Morainal (1), Fluviolacustrine (1), Fluvial (1)

Soil Type:

Humus Form

Ac5 Arctic willow/Black alpine sedge (Fa-Se) (n=2)

(Salix arctica/Carex nigricans (Abies lasiocarpa-Picea engelmannii))

This is a predominantly dwarf shrub community which occurs in areas of deep snow accumulation at or near treeline which allows the establishment of Engelmann spruce and subalpine fir. Soils on this community type appear to receive seepage for much of the growing season (Corns and Achuff 1982).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)
Ecosite Phase: e1 black alpine sedge-willow Fa-Se

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Overstory Tree			
SUBALPINE FIR *(Abies lasiocarpa)*	1.0	0.0-2.0	50
ENGELMANN X WHITE SPRUCE *(Picea engelmannii x glauca)*	1.0	0.0-2.0	50
Understory Tree			
ENGELMANN X WHITE SPRUCE *(Picea engelmannii x glauca)*	5.5	5.0-6.0	100
Tall Shrub (2 to 5m)			
SUBALPINE FIR *(Abies lasiocarpa)*	8.0	1.0-15.0	100
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	13.5	7.0-20.0	100
COMMON LABRADOR TEA *(Ledum groenlandicum)*	12.5	0.0-25.0	50
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	7.0	1.0-13.0	100
NET-VEINED WILLOW *(Salix reticulata)*	5.0	0.0-10.0	50
RED BEARBERRY *(Arctostaphylos rubra)*	2.5	0.0-5.0	50
ROCK WILLOW *(Salix vestita)*	2.5	2.0-3.0	100
FOUR-ANGLED MOUNTAIN HEATHER *(Cassiope tetragona)*	2.0	0.0-4.0	50
CROWBERRY *(Empetrum nigrum)*	2.0	0.0-4.0	50
TWINFLOWER *(Linnaea borealis)*	2.0	0.0-4.0	50
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	15.5	1.0-30.0	100
BROOK RAGWORT *(Senecio triangularis)*	5.0	0.0-10.0	50
Low Forb (< 30 cm)			
ALPINE SPEEDWELL *(Veronica alpina)*	3.0	1.0-5.0	100
ALPINE BISTORT *(Polygonum viviparum)*	2.0	1.0-3.0	100
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.0	0.0-2.0	50
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	9.5	4.0-15.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime:

Elevation (range): 2120 (2040-2200) M

Slope (%): 0.5 - 2.49 (1), 2.5 - 5.99 (1)

Aspect: Easterly (1), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (1), GLEYED CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (2)

Parent Material: Undifferentiated Mineral (1), Fluvial (1), Fluviolacustrine (1), Morainal (1)

Soil Type:

Humus Form

e2 black alpine sedge-willow shrubland (n=22)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)

Characteristic Species

Shrub

[23.1] ARCTIC WILLOW
Salix arctica

[8.9] NET-VEINED WILLOW
Salix reticulata

[1.3] WHITE MOUNTAIN AVENS
Dryas octopetala

Forb

[7.7] WOOLLY PUSSYTOES*
Antennaria lanata

[5.7] ALPINE WORMWOOD
Artemisia norvegica

[1.5] MOUNTAIN CINQUEFOIL
Potentilla diversifolia

[1.4] ALPINE BISTORT
Polygonum viviparum

[1.2] PRAIRIE SELAGINELLA
Selaginella densa

[0.8] GLOBEFLOWER
Trollius albiflorus

[0.7] WANDERING DAISY
Erigeron peregrinus

Moss and Liverwort

[1.8] GOLDEN MOSS
Tomenthypnum nitens

[1.2] BROWN MOSS
Drepanocladus uncinatus

[1.0] PURPLE HORN-TOOTHED MOSS
Ceratodon purpureus

Graminoid

[3.6] BLACK ALPINE SEDGE
Carex nigricans

[1.0] SEDGE SPECIES
Carex

Environmental Variables

Moisture Regime: Mesic (fresh) (10), Subhygric (moderately moist) (4), Submesic (moderately fresh) (4), Subhydric (moderately wet) (2)

Nutrient Regime: Mesotrophic (medium) (5), Permesotrophic (rich) (3), Submesotrophic (poor) (1)

Elevation (range): 2179 (2020-2610) M

Slope (%): strong slope (5), moderate slope (4), nearly level (3), steep slope (3), very strong slope (2), gentle slope (2), level (1), very gentle slope (1)

Aspect: Southerly (7), Westerly (6), Northerly (4), Easterly (3), Level (1)

Topographic Position:Depression (1)

Soil Variables

Soil Drainage: Well drained (4), Moderately well drained (3), Very poorly drained (1), Rapidly drained (1), Poorly drained (1)

Soil Subgroup: CUMULIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1), ORTHIC GRAY LUVISOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC HUMO-FERRIC PODZOL (1), ORTHIC MELANIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (13)

Parent Material: Colluvial (4), Morainal (4), Rock (4), Fluvial (3), Fluviolacustrine (2), Glaciolacustrine (1), Eolian (1)

Soil Type:

Humus Form

Ab14 Arctic willow-Net veined willow/Alpine wormwood-Woolly pussytoes (n=22)

(Salix arctica-Salix reticulata/Artemisia norvegica-Antennaria lanata)

This dwarf shrub community occurs in areas of deep snow accumulation, on soils which receive seepage for much of the growing season (Corns and Achuff 1982). Ogilvie (1969), found that there was a rich herb layer of sedges (black alpine sedge) and forbs (woolly pussytoes, alpine wormwood) and an abundant dwarf shrub layer (arctic willow, net veined willow). This community is similar to the black alpine sedge community previously described, but it appears snow melt occurs earlier in this community type (Corns and Achuff 1982). Hrapko and La Roi (1978) described Net veined willow-Woolly pussytoes and Arctic willow-Woolly pussytoes community types on Signal Mountain in Jasper National Park in high snow accumulation areas on northeast slopes. Soils on the Signal Mountain community type were Turbic Gleysols and Eutric Brunisols. They split these community types based on the higher pH of the net veined willow (pH 5.4 to 6.5 vs 4.5) dominated community type.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)
Ecosite Phase: e2 black alpine sedge-willow shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	23.1	0.0-60.0	95
NET-VEINED WILLOW *(Salix reticulata)*	8.9	0.0-70.0	64
Low Shrub (< 0.5m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	1.3	0.0-20.0	36
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.5	0.0-9.4	59
GLOBEFLOWER *(Trollius albiflorus)*	0.8	0.0-10.0	14
WANDERING DAISY *(Erigeron peregrinus)*	0.7	0.0-8.0	27
Low Forb (< 30 cm)			
WOOLLY PUSSYTOES *(Antennaria lanata)*	7.7	0.0-50.0	55
ALPINE WORMWOOD *(Artemisia norvegica)*	5.7	0.0-20.0	68
ALPINE BISTORT *(Polygonum viviparum)*	1.4	0.0-10.0	73
PRAIRIE SELAGINELLA *(Selaginella densa)*	1.2	0.0-15.0	27
ALPINE SPEEDWELL *(Veronica alpina)*	0.4	0.0-4.0	36
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	3.6	0.0-40.0	18
SEDGE SPECIES *(Carex)*	1.0	0.0-17.0	18
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	7.2	0.0-72.4	41
GOLDEN MOSS *(Tomenthypnum nitens)*	1.8	0.0-40.0	5
BROWN MOSS *(Drepanocladus uncinatus)*	1.2	0.0-20.0	14
PURPLE HORN-TOOTHED MOSS *(Ceratodon purpureus)*	1.0	0.0-19.0	18
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	6.0	0.0-60.0	32

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (10), Submesic (moderately fresh) (4), Subhygric (moderately moist) (4), Subhydric (moderately wet) (2)

Nutrient Regime: Mesotrophic (medium) (5), Permesotrophic (rich) (3), Submesotrophic (poor) (1)

Elevation (range): 2179 (2020-2610) M

Slope (%): 16 - 30.99 (5), 10 - 15.99 (4), 46 - 70.99 (3), 0.5 - 2.49 (3), 31 - 45.99 (2), 6 - 9.99 (2), 0 - 0.49 (1), 2.5 - 5.99 (1)

Aspect: Southerly (7), Westerly (6), Northerly (4), Easterly (3), Level (1)

Topographic Position: Depression (1)

Soil Variables

Soil Drainage: Well drained (4), Moderately well drained (3), Rapidly drained (1), Poorly drained (1), Very poorly drained (1)

Soil Subgroup: CUMULIC REGOSOL (2), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), ORTHIC GLEYSOL (1), ORTHIC GRAY LUVISOL (1), ORTHIC HUMO-FERRIC PODZOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1), ORTHIC SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (13)

Parent Material: Rock (4), Morainal (4), Colluvial (4), Fluvial (3), Fluviolacustrine (2), Eolian (1), Glaciolacustrine (1)

Soil Type:

Humus Form

Ab14 – Late snow melt with very moist soils throughout the growing season is characterisitic of the Arctic willow-Net veined willow/Black alpine sedge community (A.J. Gould)

e3 black alpine sedge graminoid (n=25)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)

Characteristic Species

Shrub

[1.4] PARTRIDGEFOOT
Luetkea pectinata

Forb

[5.4] MOUNTAIN CINQUEFOIL
Potentilla diversifolia

[2.0] WHITE MARSH MARIGOLD
Caltha leptosepala

[2.0] CREEPING SIBBALDIA
Sibbaldia procumbens

[1.9] WOOLLY PUSSYTOES
Antennaria lanata

[1.4] BROOK RAGWORT
Senecio triangularis

[1.2] LONG-LEAVED STARWORT
Stellaria longifolia

[1.1] GLOBEFLOWER
Trollius albiflorus

[1.1] MOSS CAMPION
Silene acaulis

[0.6] SITKA VALERIAN
Valeriana sitchensis

Moss and Liverwort

[2.0] TUFTED MOSS
Aulacomnium palustre

Graminoid

[23.8] BLACK ALPINE SEDGE*
Carex nigricans

[7.6] TUFTED HAIR GRASS*
Deschampsia cespitosa

[3.8] PAYSON'S SEDGE
Carex paysonis

[3.4] SPIKE TRISETUM
Trisetum spicatum

[3.3] MOUNTAIN TIMOTHY
Phleum commutatum

[2.5] SMALL-FLOWERED WOOD-RUSH*
Luzula parviflora

[1.2] ROCKY MOUNTAIN FESCUE
Festuca saximontana

[1.0] SPIKED WOOD-RUSH
Luzula spicata

[0.8] THICK-HEADED SEDGE
Carex macloviana

[0.8] DRUMMOND'S RUSH
Juncus drummondii

[0.7] MOUNTAIN HAIR GRASS
Vahlodea atropurpurea

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (10), Mesic (fresh) (7), Hygric (moist) (3), Subhydric (moderately wet) (2), Submesic (moderately fresh) (1), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (9), Permesotrophic (rich) (4), Submesotrophic (poor) (1)

Elevation (range): 2276.5 (1759-2510) M

Slope (%): moderate slope (7), gentle slope (5), strong slope (5), very gentle slope (3), nearly level (2), steep slope (1), level (1), very strong slope (1)

Aspect: Southerly (8), Northerly (6), Westerly (6), Level (4), Easterly (3)

Topographic Position:Crest (3), Upper Slope (1), Level (1)

Soil Variables

Soil Drainage: Rapidly drained (5), Well drained (1), Poorly drained (1), Moderately well drained (1)

Soil Subgroup: GLEYED DYSTRIC BRUNISOL (2), ORTHIC HUMIC GLEYSOL (2), ORTHIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (2), ORTHIC HUMO-FERRIC PODZOL (1), ORTHIC MELANIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), REGO GLEYSOL (1), FERA GRAY LUVISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (14)

Parent Material: Morainal (11), Rock (3), Fluvial (3), Eolian (3), Undifferentiated Mineral (1), Fen (1), Colluvial (1)

Soil Type:

Humus Form

Aa6 Tufted hairgrass-Sedge (n=3)

(Deschampsia cespitosa-Carex spp.)

This community type appears to be rare in the alpine and was described at only two sites in the Savannah Creek allotment west of Claresholm and one site north of Jasper. Tufted hairgrass dominated meadows are quite common in the valley bottoms on subhygric rich sites throughout the Subalpine Natural Subregion. This community type appears to transitional to the subalpine.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)
Ecosite Phase: e3 black alpine sedge graminoid

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Low Shrub (< 0.5m)			
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	0.5	0.0-1.7	33
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	10.8	3.0-20.9	100
GLOBEFLOWER *(Trollius albiflorus)*	1.0	0.0-3.0	33
Low Forb (< 30 cm)			
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	3.3	0.0-10.0	33
LONG-LEAVED STARWORT *(Stellaria longifolia)*	2.4	0.0-5.0	67
MOSS CAMPION *(Silene acaulis)*	2.2	0.0-4.8	67
YELLOW FALSE DANDELION *(Agoseris glauca)*	1.1	0.0-3.5	33
LANCE-LEAVED STONECROP *(Sedum lanceolatum)*	0.6	0.0-1.2	67
Graminoid			
TUFTED HAIR GRASS *(Deschampsia cespitosa)*	14.0	10.7-20.0	100
PAYSON'S SEDGE *(Carex paysonis)*	7.7	0.0-18.5	67
SPIKE TRISETUM *(Trisetum spicatum)*	6.8	0.1-20.0	100
MOUNTAIN TIMOTHY *(Phleum commutatum)*	6.6	0.0-20.0	33
SMALL-FLOWERED WOOD-RUSH *(Luzula parviflora)*	5.0	0.0-15.0	33
ROCKY MOUNTAIN FESCUE *(Festuca saximontana)*	2.5	0.0-6.1	67
SPIKED WOOD-RUSH *(Luzula spicata)*	2.1	0.0-4.1	67
ALPINE BLUEGRASS *(Poa alpina)*	1.7	0.0-3.2	67
THICK-HEADED SEDGE *(Carex macloviana)*	1.6	0.0-5.0	33
GLAUCOUS BLUEGRASS *(Poa glauca)*	1.5	0.0-4.6	33

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (1), Submesic (moderately fresh) (1)

Nutrient Regime: Submesotrophic (poor) (1), Permesotrophic (rich) (1), Mesotrophic (medium) (1)

Elevation (range): 2344 (2168-2469) M

Slope (%): 0 - 0.49 (1), 6 - 9.99 (1)

Aspect: Level (1), Northerly (1), Southerly (1)

Topographic Position: Level (1), Crest (1)

Soil Variables

Soil Drainage: Rapidly drained (2)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Aa7 Black alpine sedge (n=22)

(Carex nigricans)

This is a snowpatch community occurring in small channels and depressions where there is very deep snow accumulation (Ogilvie 1969). The soils are predominantly Brunisols, Podzols and Regosols and are moist and free of snow for only a brief period of time (Corns and Achuff 1982). Ogilvie (1969) found these community types to have an abundant herb layer of sedges, grasses and forbs, with only a minor occurrence of dwarf shrubs and mosses. Hrapko and La Roi (1978) found this community type to retain snow well into July and was more common on northeast slopes in Jasper National Park.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: e black alpine sedge-arctic willow (mesic subhygric/middle zone)
Ecosite Phase: e3 black alpine sedge graminoid

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
YELLOW HEATHER *(Phyllodoce glanduliflora)*	1.4	0.0-4.0	23
ARCTIC WILLOW *(Salix arctica)*	1.2	0.0-10.0	45
Low Shrub (< 0.5m)			
PARTRIDGEFOOT *(Luetkea pectinata)*	2.8	0.0-30.0	46
Tall Forb (>= 30 cm)			
BROOK RAGWORT *(Senecio triangularis)*	2.8	0.0-20.0	50
GLOBEFLOWER *(Trollius albiflorus)*	1.2	0.0-20.0	14
SITKA VALERIAN *(Valeriana sitchensis)*	1.2	0.0-20.0	18
WANDERING DAISY *(Erigeron peregrinus)*	1.1	0.0-12.0	27
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	0.7	0.0-10.0	18
Low Forb (< 30 cm)			
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	4.1	0.0-40.0	50
WOOLLY PUSSYTOES *(Antennaria lanata)*	3.8	0.0-40.0	68
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.8	0.0-5.0	64
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	47.7	10.0-99.0	100
DRUMMOND'S RUSH *(Juncus drummondii)*	1.7	0.0-25.0	64
MOUNTAIN HAIR GRASS *(Vahlodea atropurpurea)*	1.4	0.0-15.0	32
TUFTED HAIR GRASS *(Deschampsia cespitosa)*	1.3	0.0-30.0	5
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	5.2	0.0-30.0	36
TUFTED MOSS *(Aulacomnium palustre)*	4.1	0.0-80.0	18
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	1.6	0.0-30.0	32

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (9), Mesic (fresh) (7), Hygric (moist) (3), Subhydric (moderately wet) (2), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (8), Permesotrophic (rich) (3)

Elevation (range): 2209 (1759-2510) M

Slope (%): 10 - 15.99 (7), 16 - 30.99 (5), 6 - 9.99 (4), 2.5 - 5.99 (3), 0.5 - 2.49 (2), 31 - 45.99 (1), 46 - 70.99 (1)

Aspect: Southerly (7), Westerly (6), Northerly (5), Easterly (3), Level (3)

Topographic Position: Crest (2), Upper Slope (1)

Soil Variables

Soil Drainage: Rapidly drained (3), Well drained (1), Moderately well drained (1), Poorly drained (1)

Soil Subgroup: ORTHIC HUMIC GLEYSOL (2), ORTHIC REGOSOL (2), ORTHIC SOMBRIC BRUNISOL (2), GLEYED DYSTRIC BRUNISOL (2), ORTHIC DYSTRIC BRUNISOL (1), REGO GLEYSOL (1), FERA GRAY LUVISOL (1), ORTHIC HUMO-FERRIC PODZOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC MELANIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (14)

Parent Material: Morainal (11), Eolian (3), Fluvial (3), Rock (3), Undifferentiated Mineral (1), Colluvial (1), Fen (1)

Soil Type:

Humus Form

Aa7 - Black alpine sedge community (A.J. Gould)

f globeflower-willow (mesic hygric/lower zone) (n=123)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecological site occurs at lower elevation (2100 m) on mostly well drained sites from below timberline up into the alpine. Globeflower and mountain valerian are significant indicators of this ecological site, but other common forbs include western anemone and Wandering fleabane. Snow melts out early in the growing season but remains moist for most of the growing season fed by snowbank meltwater which often dissects this ecological site with ephemeral streams (Kuchar 1975). The communities in this ecological site can be subject to accumulation of fine alluvial sediment. These sites are never large but the duration of vascular plant growth can be up to 3 months (Kuchar 1975).

Successional Relationships

As one moves down in elevation Salix barrattiana often replaces Salix arctica and Salix reticulata in this ecological site. At timberline stands of Engelmann spruce and subalpine fir can form.

Indicator Species

Tree

SUBALPINE FIR
Abies lasiocarpa

Shrub

ARCTIC WILLOW
Salix arctica

BARRATT'S WILLOW
Salix barrattiana

SMOOTH WILLOW
Salix glauca

NET-VEINED WILLOW
Salix reticulata

ROCK WILLOW
Salix vestita

Forb

BROOK RAGWORT
Senecio triangularis

GLOBEFLOWER
Trollius albiflorus

SITKA VALERIAN
Valeriana sitchensis

PASQUEFLOWER
Anemone occidentalis

ALPINE WORMWOOD
Artemisia norvegica

BROAD-LEAVED FIREWEED
Epilobium latifolium

WANDERING DAISY
Erigeron peregrinus

ICELAND PURSLANE
Koenigia islandica

LEATHER-LEAVED SAXIFRAGE
Leptarrhena pyrolifolia

Graminoid

ENANDER'S SEDGE
Carex enanderi

Environmental Variables

Moisture Regime: Mesic (fresh) (39), Subhygric (moderately moist) (33), Hygric (moist) (13), Subhydric (moderately wet) (6), Hydric (wet) (1)

Nutrient Regime: Permesotrophic (rich) (6), Submesotrophic (poor) (4), Mesotrophic (medium) (3)

Elevation (range): 2004.11 (1635-2470) M

Slope (%): strong slope (34), moderate slope (20), steep slope (19), very strong slope (16), gentle slope (14), very gentle slope (12), level (3), nearly level (1)

Aspect: Easterly (37), Westerly (31), Southerly (30), Northerly (13), Level (9)

Topographic Position:Upper Slope (2)

Soil Variables

Soil Drainage: Well drained (37), Imperfectly drained (21), Moderately well drained (12), Poorly drained (8), Rapidly drained (3)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (11), CUMULIC HUMIC REGOSOL (10), ORTHIC MELANIC BRUNISOL (8), ORTHIC REGOSOL (8), CUMULIC REGOSOL (7), ORTHIC EUTRIC BRUNISOL (7), ORTHIC GLEYSOL (7), ORTHIC SOMBRIC BRUNISOL (6), REGO GLEYSOL (5), ORTHIC HUMIC GLEYSOL (5), ELUVIATED DYSTRIC BRUNISOL (5), ELUVIATED EUTRIC BRUNISOL (5), GLEYED SOMBRIC BRUNISOL (4), GLEYED CUMULIC REGOSOL (3), GRAY FERRO-HUMIC PODZOL (2), ORTHIC HUMO-FERRIC PODZOL (2), REGO HUMIC GLEYSOL (2), SOMBRIC HUMO-FERRIC PODZOL (2), Unknown MELANIC BRUNISOL (1), REGO STATIC CRYOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), ORTHIC HUMIC REGOSOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), GRAY DYSTRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), GLEYED EUTRIC BRUNISOL (1), GLEYED HUMIC REGOSOL (1)

Surface Texture: Sandy loam (1), Silt loam (1)

Effective Texture: Sandy loam (1), Silt loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (113)

Parent Material: Morainal (67), Rock (44), Fluvial (33), Colluvial (30), Glaciofluvial (3), Glaciolacustrine (2), Eolian (2), Fluviolacustrine (1)

Soil Type: Moist/Silty-Loamy (1), Very Dry/Coarse (1)

Humus Form FIBRIMOR (1)

f1 globeflower-willow Fa-Se (n=26)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)

Characteristic Species

Tree

[19.8] SUBALPINE FIR*
Abies lasiocarpa

[6.9] ENGELMANN SPRUCE*
Picea engelmannii

Shrub

[2.5] GROUSEBERRY
Vaccinium scoparium

[2.5] WHITE MOUNTAIN HEATHER
Cassiope mertensiana

[1.2] ROCK WILLOW*
Salix vestita

[1.0] SALIX SPECIES
Salix

[1.0] PINK MOUNTAIN HEATHER
Phyllodoce empetriformis

Forb

[7.6] SITKA VALERIAN*
Valeriana sitchensis

[6.4] GLOBEFLOWER*
Trollius albiflorus

[5.9] WANDERING DAISY
Erigeron peregrinus

[5.6] ALPINE WORMWOOD
Artemisia norvegica

[3.8] BRACTED LOUSEWORT
Pedicularis bracteosa

[3.2] PASQUEFLOWER
Anemone occidentalis

[1.6] BROOK RAGWORT
Senecio triangularis

[1.5] WOOLLY PUSSYTOES
Antennaria lanata

[1.1] GREEN FALSE HELLEBORE
Veratrum eschscholtzii

Moss and Liverwort

[7.0] BROWN MOSS
Drepanocladus uncinatus

[3.6] LIVERWORT
Barbilophozia lycopodioides

[3.5] MOSS
Pseudoleskea atricha

[3.1] N/A
Brachythecium groenlandicum

[1.6] BROOM MOSS
Dicranum scoparium

Environmental Variables

Moisture Regime: Mesic (fresh) (11), Subhygric (moderately moist) (8), Subhydric (moderately wet) (2)

Nutrient Regime: Permesotrophic (rich) (2)

Elevation (range): 2043 (1860-2310) M

Slope (%): strong slope (6), moderate slope (6), steep slope (6), very strong slope (5), gentle slope (2), very gentle slope (1)

Aspect: Westerly (8), Easterly (8), Northerly (4), Level (3), Southerly (3)

Topographic Position:Upper Slope (2)

Soil Variables

Soil Drainage: Well drained (12), Imperfectly drained (5), Rapidly drained (3), Moderately well drained (3), Poorly drained (2)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (4), ELUVIATED EUTRIC BRUNISOL (4), ORTHIC EUTRIC BRUNISOL (4), ORTHIC HUMIC GLEYSOL (3), CUMULIC HUMIC REGOSOL (3), ORTHIC MELANIC BRUNISOL (2), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), GRAY DYSTRIC BRUNISOL (1), GLEYED CUMULIC REGOSOL (1), REGO STATIC CRYOSOL (1), ORTHIC GLEYSOL (1), REGO GLEYSOL (1)

Surface Texture: Sandy loam (1), Silt loam (1)

Effective Texture: Sandy loam (1), Silt loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (26)

Parent Material: Morainal (19), Rock (14), Colluvial (5), Fluvial (4), Glaciolacustrine (1)

Soil Type: Very Dry/Coarse (1), Moist/Silty-Loamy (1)

Humus Form FIBRIMOR (1)

Ac6 Globeflower-Sitka valerian (Fa-Se) (n=26)

(Trollius albiflorus-Valeriana sitchensis (Abies lasiocarpa-Picea engelmannii))

This community type occurs in the lower alpine and upper subalpine subregion on moist drainages near timberline. Variable cover of globeflower, Sitka valerian, western anemone and wandering fleabane are all distinctive forbs that indicative of this plant community type. Low growing willow and Barratt's willow can also co-dominate the vegetation of the plant communities of this ecological site.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f1 globeflower-willow Fa-Se

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Overstory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	3.7	0.0-15.0	54
Understory Tree			
ENGELMANN SPRUCE *(Picea engelmannii)*	3.2	1.0-10.0	100
Tall Shrub (2 to 5m)			
SUBALPINE FIR *(Abies lasiocarpa)*	19.8	5.0-45.0	100
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	2.5	0.0-15.0	39
GROUSEBERRY *(Vaccinium scoparium)*	2.5	0.0-23.0	27
ROCK WILLOW *(Salix vestita)*	1.2	0.0-10.0	23
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	1.0	0.0-8.0	27
SALIX SPECIES *(Salix)*	1.0	0.0-20.0	12
Tall Forb (>= 30 cm)			
SITKA VALERIAN *(Valeriana sitchensis)*	7.6	0.0-23.0	81
GLOBEFLOWER *(Trollius albiflorus)*	6.4	0.0-25.0	73
WANDERING DAISY *(Erigeron peregrinus)*	5.9	0.0-18.0	81
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	3.8	0.0-15.0	85
PASQUEFLOWER *(Anemone occidentalis)*	3.2	0.0-30.0	54
BROOK RAGWORT *(Senecio triangularis)*	1.6	0.0-22.0	35
GREEN FALSE HELLEBORE *(Veratrum eschscholtzii)*	1.1	0.0-10.0	39
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	5.6	0.0-30.0	69
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.5	0.0-15.0	39
Graminoid			
MOUNTAIN TIMOTHY *(Phleum commutatum)*	0.9	0.0-15.0	19
Moss			
BROWN MOSS *(Drepanocladus uncinatus)*	7.0	0.0-80.0	39
LIVERWORT *(Barbilophozia lycopodioides)*	3.6	0.0-30.0	54
BROOM MOSS *(Dicranum scoparium)*	1.6	0.0-15.0	39
Lichen			
MOSS *(Pseudoleskea atricha)*	3.5	0.0-30.0	35

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (11), Subhygric (moderately moist) (8), Subhydric (moderately wet) (2)

Nutrient Regime: Permesotrophic (rich) (2)

Elevation (range): 2043 (1860-2310) M

Slope (%): 10 - 15.99 (6), 16 - 30.99 (6), 46 - 70.99 (6), 31 - 45.99 (5), 6 - 9.99 (2), 2.5 - 5.99 (1)

Aspect: Westerly (8), Easterly (8), Northerly (4), Southerly (3), Level (3)

Topographic Position: Upper Slope (2)

Soil Variables

Soil Drainage: Well drained (12), Imperfectly drained (5), Moderately well drained (3), Rapidly drained (3), Poorly drained (2)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (4), ELUVIATED EUTRIC BRUNISOL (4), ORTHIC EUTRIC BRUNISOL (4), ORTHIC HUMIC GLEYSOL (3), CUMULIC HUMIC REGOSOL (3), ORTHIC MELANIC BRUNISOL (2), GLEYED CUMULIC REGOSOL (1), REGO STATIC CRYOSOL (1), GRAY DYSTRIC BRUNISOL (1), GLEYED ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC GLEYSOL (1), REGO GLEYSOL (1)

Surface Texture: Silt loam (1), Sandy loam (1)

Effective Texture: Silt loam (1), Sandy loam (1)

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (26)

Parent Material: Morainal (19), Rock (14), Colluvial (5), Fluvial (4), Glaciolacustrine (1)

Soil Type: Very Dry/Coarse (1), Moist/Silty-Loamy (1)

Humus Form FIBRIMOR (1)

Ac6- Globeflower and Sitka valerian are common species under a sparse tree canopy in the Ac6 community (A.J. Gould)

f2 globeflower-willow shrubland (n=38)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)

Characteristic Species

Shrub

- [15.6] BARRATT'S WILLOW* *Salix barrattiana*
- [12.1] ARCTIC WILLOW* *Salix arctica*
- [5.7] SMOOTH WILLOW* *Salix glauca*
- [2.0] NET-VEINED WILLOW* *Salix reticulata*
- [1.8] WHITE MOUNTAIN AVENS *Dryas octopetala*
- [1.5] BOG BIRCH *Betula glandulosa*

Forb

- [5.6] GLOBEFLOWER *Trollius albiflorus*
- [4.2] WANDERING DAISY *Erigeron peregrinus*
- [3.9] WOOLLY PUSSYTOES *Antennaria lanata*
- [3.3] ALPINE WORMWOOD *Artemisia norvegica*
- [2.6] WILD STRAWBERRY *Fragaria virginiana*
- [2.3] SITKA VALERIAN *Valeriana sitchensis*
- [1.8] MOUNTAIN CINQUEFOIL *Potentilla diversifolia*
- [1.6] BROOK RAGWORT *Senecio triangularis*
- [1.4] WESTERN PAINTBRUSH *Castilleja occidentalis*
- [0.7] ALPINE BISTORT *Polygonum viviparum*

Moss and Liverwort

- [3.5] TUFTED MOSS *Aulacomnium palustre*
- [1.8] UNDIFFERENTIATED MOSS - ALL GENERA *Moss*
- [0.7] N/A *Tortula norvegica*

Graminoid

- [0.7] MOUNTAIN TIMOTHY *Phleum commutatum*

Environmental Variables

Moisture Regime: Mesic (fresh) (10), Subhygric (moderately moist) (9), Hygric (moist) (2), Subhydric (moderately wet) (2), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (2)

Elevation (range): 2184 (1930-2470) M

Slope (%): strong slope (11), moderate slope (7), gentle slope (6), very gentle slope (5), steep slope (3), level (3), very strong slope (2)

Aspect: Easterly (13), Southerly (9), Westerly (9), Northerly (3), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (7), Imperfectly drained (6), Moderately well drained (5), Poorly drained (4)

Soil Subgroup: CUMULIC REGOSOL (5), ORTHIC MELANIC BRUNISOL (4), CUMULIC HUMIC REGOSOL (3), ORTHIC REGOSOL (3), ORTHIC DYSTRIC BRUNISOL (2), ORTHIC GLEYSOL (2), REGO GLEYSOL (2), ORTHIC HUMIC GLEYSOL (2), REGO HUMIC GLEYSOL (1), ELUVIATED EUTRIC BRUNISOL (1), GLEYED EUTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), GRAY FERRO-HUMIC PODZOL (1), ELUVIATED DYSTRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), GLEYED SOMBRIC BRUNISOL (1), ORTHIC SOMBRIC BRUNISOL (1), GLEYED HUMIC REGOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (37)

Parent Material: Morainal (18), Fluvial (17), Colluvial (9), Rock (9), Glaciolacustrine (1), Glaciofluvial (1)

Soil Type:

Humus Form

Ab15 Arctic willow-Net-veined willow/Globeflower-Mountain cinquefoil (n=16)

(Salix arctica-Salix reticulata/Trollius albiflorus-Potentilla diversifolia)

This dwarf shrub community occurs in areas of deep snow accumulation, on soils which receive seepage for much of the growing season (Corns and Achuff 1982). This community type tends to be found at lower elevations than the dwarf shrub dominated community types described in the black alpine sedge-willow ecological site. This community is similar to the black alpine sedge community previously described, but it appears snow melt out occurs earlier in this community type (Corns and Achuff 1982)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f2 globeflower-willow shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	24.3	0.0-50.0	94
SALIX SPECIES *(Salix)*	5.9	0.0-95.0	6
BARRATT'S WILLOW *(Salix barrattiana)*	3.2	0.0-35.0	38
NET-VEINED WILLOW *(Salix reticulata)*	2.6	0.0-15.0	50
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	1.0	0.0-7.0	50
Tall Forb (>= 30 cm)			
WANDERING DAISY *(Erigeron peregrinus)*	3.3	0.0-20.0	63
WESTERN PAINTBRUSH *(Castilleja occidentalis)*	2.8	0.0-20.0	63
GLOBEFLOWER *(Trollius albiflorus)*	2.2	0.0-12.0	63
BROOK RAGWORT *(Senecio triangularis)*	1.7	0.0-10.0	38
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.5	0.0-5.0	94
SMALL BLACK-TIPPED RAGWORT *(Senecio lugens)*	1.1	0.0-15.0	19
PASQUEFLOWER *(Anemone occidentalis)*	1.0	0.0-12.0	38
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	4.2	0.0-40.0	44
WOOLLY PUSSYTOES *(Antennaria lanata)*	4.1	0.0-25.0	75
GOLDEN FLEABANE *(Erigeron aureus)*	1.7	0.0-25.0	25
ALPINE BISTORT *(Polygonum viviparum)*	1.4	0.0-8.0	56
Graminoid			
MOUNTAIN TIMOTHY *(Phleum commutatum)*	1.4	0.0-6.0	38
BLACK ALPINE SEDGE *(Carex nigricans)*	0.6	0.0-7.0	31
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	3.7	0.0-60.0	6
N/A *(Tortula norvegica)*	1.4	0.0-15.0	25
BROOM MOSS *(Dicranum scoparium)*	0.7	0.0-10.0	19

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (7), Subhygric (moderately moist) (3)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 2213 (1980-2470) M

Slope (%): 16 - 30.99 (6), 6 - 9.99 (3), 10 - 15.99 (3), 46 - 70.99 (2), 0 - 0.49 (1), 2.5 - 5.99 (1)

Aspect: Easterly (6), Westerly (5), Level (2), Southerly (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (3), Imperfectly drained (2), Moderately well drained (1)

Soil Subgroup: CUMULIC REGOSOL (3), ORTHIC DYSTRIC BRUNISOL (2), ELUVIATED EUTRIC BRUNISOL (1), GLEYED EUTRIC BRUNISOL (1), GRAY FERRO-HUMIC PODZOL (1), REGO GLEYSOL (1), CUMULIC HUMIC REGOSOL (1), ORTHIC MELANIC BRUNISOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ORTHIC REGOSOL (1), ORTHIC SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (15)

Parent Material: Morainal (8), Fluvial (6), Rock (4), Colluvial (4)

Soil Type:

Humus Form

Ab16 Barratt's willow-Smooth willow/Globeflower-Sitka valerian (n=22)

(Salix barratiana-Salix glauca/Trollius albiflorus-Valeriana sitchensis)

These sites are at higher elevations just above treeline and tend to be dominated by willow and various forb species. The forb species tend to woolly pussytoes, western anemone, alpine wormwood, globeflower and Sitka valerian. Globeflower and Sitka valerian tend to have the highest constancy at 73 and 50% respectively. Beder (1967), Ogilvie (1969), Trottier (1972) and Kuchar (1975) described Barratt's willow (*Salix barrattiana*) associations as occurring along valley bottoms in areas with high water table and periodic sediment deposition. (Knapik et al. 1973) and Crack (1977) described Barratt's willow (*Salix barrattiana*) in wet areas with deep snow cover.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f2 globeflower-willow shrubland

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
BARRATT'S WILLOW *(Salix barrattiana)*	28.1	0.0-75.0	86
SMOOTH WILLOW *(Salix glauca)*	11.4	0.0-40.0	73
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	3.7	0.0-35.0	18
BOG BIRCH *(Betula glandulosa)*	3.1	0.0-50.0	18
BARCLAY'S WILLOW *(Salix barclayi)*	1.8	0.0-35.0	9
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1.6	0.0-20.0	14
YELLOW HEATHER *(Phyllodoce glanduliflora)*	1.5	0.0-15.0	32
NET-VEINED WILLOW *(Salix reticulata)*	1.5	0.0-10.0	36
Tall Forb (>= 30 cm)			
GLOBEFLOWER *(Trollius albiflorus)*	9.1	0.0-50.0	73
WANDERING DAISY *(Erigeron peregrinus)*	5.1	0.0-15.0	91
SITKA VALERIAN *(Valeriana sitchensis)*	4.7	0.0-40.0	50
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	2.2	0.0-10.0	91
BROOK RAGWORT *(Senecio triangularis)*	1.6	0.0-15.0	41
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	1.4	0.0-15.0	64
COMMON FIREWEED *(Epilobium angustifolium)*	1.3	0.0-15.0	23
YELLOW HEDYSARUM *(Hedysarum sulphurescens)*	1.2	0.0-10.0	27
Low Forb (< 30 cm)			
WILD STRAWBERRY *(Fragaria virginiana)*	5.2	0.0-35.0	50
WOOLLY PUSSYTOES *(Antennaria lanata)*	3.7	0.0-60.0	36
ALPINE WORMWOOD *(Artemisia norvegica)*	2.5	0.0-15.0	32
DWARF SCOURING-RUSH *(Equisetum scirpoides)*	1.5	0.0-15.0	36
Moss			
TUFTED MOSS *(Aulacomnium palustre)*	7.0	0.0-70.0	23

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (6), Mesic (fresh) (3), Subhydric (moderately wet) (2), Hygric (moist) (2), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 2155 (1930-2380) M

Slope (%): 16 - 30.99 (5), 2.5 - 5.99 (4), 10 - 15.99 (4), 6 - 9.99 (3), 0 - 0.49 (2), 31 - 45.99 (2), 46 - 70.99 (1)

Aspect: Easterly (7), Southerly (7), Westerly (4), Northerly (3)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (4), Moderately well drained (4), Imperfectly drained (4), Poorly drained (4)

Soil Subgroup: ORTHIC MELANIC BRUNISOL (3), ORTHIC GLEYSOL (2), ORTHIC HUMIC GLEYSOL (2), CUMULIC HUMIC REGOSOL (2), CUMULIC REGOSOL (2), ORTHIC REGOSOL (2), GLEYED SOMBRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), GLEYED ELUVIATED EUTRIC BRUNISOL (1), ORTHIC EUTRIC BRUNISOL (1), GLEYED HUMIC REGOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), REGO HUMIC GLEYSOL (1), REGO GLEYSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (22)

Parent Material: Fluvial (11), Morainal (10), Colluvial (5), Rock (5), Glaciofluvial (1), Glaciolacustrine (1)

Soil Type:

Humus Form

Ab16 – Moist soils with deep snow accumulations are characteristic of Barratt's willow-Smooth willow/Globeflower-Sitka valerian community (A.J. Gould)

f3 globeflower forb (n=55)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)

Characteristic Species

Shrub

[0.9] GROUSEBERRY
Vaccinium scoparium

[0.7] ARCTIC WILLOW
Salix arctica

Forb

[10.0] MOUNTAIN CINQUEFOIL
Potentilla diversifolia

[5.0] TALL LUNGWORT
Mertensia paniculata

[5.0] ALPINE FORGET-ME-NOT
Myosotis alpestris

[4.4] GLOBEFLOWER*
Trollius albiflorus

[4.3] SITKA VALERIAN*
Valeriana sitchensis

[3.8] PASQUEFLOWER*
Anemone occidentalis

[3.6] WANDERING DAISY*
Erigeron peregrinus

[2.9] ALPINE WORMWOOD*
Artemisia norvegica

[2.7] WOOLLY PUSSYTOES*
Antennaria lanata

[1.6] BROOK RAGWORT*
Senecio triangularis

[0.5] GREEN FALSE HELLEBORE
Veratrum eschscholtzii

Moss and Liverwort

[2.5] N/A
Thuidium abietinum

[1.3] BROWN MOSS
Drepanocladus uncinatus

[1.1] MOSS
Pseudoleskea atricha

[1.0] BROOM MOSS
Dicranum scoparium

Graminoid

[20.0] HAIRY WILD RYE
Elymus innovatus

[5.0] MEADOW SEDGE
Carex praticola

[1.0] MOUNTAIN HAIR GRASS
Vahlodea atropurpurea

Environmental Variables

Moisture Regime: Mesic (fresh) (18), Subhygric (moderately moist) (15), Hygric (moist) (10)

Nutrient Regime: Submesotrophic (poor) (3), Permesotrophic (rich) (2)

Elevation (range): 2092 (1635-2400) M

Slope (%): strong slope (17), steep slope (10), very strong slope (9), very gentle slope (6), gentle slope (6), moderate slope (6), nearly level (1)

Aspect: Southerly (18), Easterly (16), Westerly (14), Level (4), Northerly (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (18), Imperfectly drained (10), Moderately well drained (4), Poorly drained (2)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (5), ORTHIC REGOSOL (5), ORTHIC SOMBRIC BRUNISOL (5), CUMULIC HUMIC REGOSOL (4), ORTHIC GLEYSOL (4), ELUVIATED DYSTRIC BRUNISOL (4), GLEYED SOMBRIC BRUNISOL (3), CUMULIC REGOSOL (2), GLEYED CUMULIC REGOSOL (2), REGO GLEYSOL (2), ORTHIC EUTRIC BRUNISOL (2), ORTHIC HUMO-FERRIC PODZOL (2), SOMBRIC HUMO-FERRIC PODZOL (2), ORTHIC MELANIC BRUNISOL (2), Unknown MELANIC BRUNISOL (1), GRAY FERRO-HUMIC PODZOL (1), REGO HUMIC GLEYSOL (1), ORTHIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (50)

Parent Material: Morainal (30), Rock (21), Colluvial (16), Fluvial (12), Eolian (2), Glaciofluvial (2), Fluviolacustrine (1)

Soil Type:

Humus Form

Aa12 Mountain cinquefoil/Hairy wildrye-Meadow sedge (n=1)

(Potentilla diversifolia/Elymus innovatus-Carex praticola)

This community type was described on a moist well drained site. It is similar to other hairy wildrye dominated sites described in the alpine, but the presence of meadow sedge indicates higher moisture and seepage occurring throughout the growing season.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f3 globeflower forb

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Forb (>= 30 cm)			
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	20.0	20.0-20.0	100
TALL LUNGWORT *(Mertensia paniculata)*	10.0	10.0-10.0	100
NORTHERN HEDYSARUM *(Hedysarum boreale)*	1.0	1.0-1.0	100
GREEN SORREL *(Rumex acetosa)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
ALPINE FORGET-ME-NOT *(Myosotis alpestris)*	10.0	10.0-10.0	100
SWEET-FLOWERED ANDROSACE *(Androsace chamaejasme)*	1.0	1.0-1.0	100
ROSY PUSSYTOES *(Antennaria rosea)*	1.0	1.0-1.0	100
FIELD MOUSE-EAR CHICKWEED *(Cerastium arvense)*	1.0	1.0-1.0	100
WILD STRAWBERRY *(Fragaria virginiana)*	1.0	1.0-1.0	100
SLENDER BLUE BEARDTONGUE *(Penstemon procerus)*	1.0	1.0-1.0	100
Graminoid			
HAIRY WILD RYE *(Elymus innovatus)*	40.0	40.0-40.0	100
MEADOW SEDGE *(Carex praticola)*	10.0	10.0-10.0	100
MOUNTAIN HAIR GRASS *(Vahlodea atropurpurea)*	2.0	2.0-2.0	100
Moss			
N/A *(Thuidium abietinum)*	5.0	5.0-5.0	100
HAIRY SCREW MOSS *(Tortula ruralis)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime:

Elevation (range): 2110 (2110-2110) M

Slope (%): 6 - 9.99 (1)

Aspect: Southerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: CUMULIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Fluvial (1)

Soil Type:

Humus Form

Aa8 Globeflower-Wandering fleabane-Sitka valerian-Western anemone (n=54)

(Trollius albiflorus-Erigeron peregrinus-Valeriana sitchensis-Anemone occidentalis)

This community type occurs in the lower alpine and upper subalpine on moist drainages. Variable cover of globeflower, Sitka valerian, western anemone and wandering fleabane are all distinctive forbs that indicative of this plant community type. Low growing willow and Barratt's willow can also co-dominate the vegetation of the plant communities of this ecological site. At lower elevations near treeline Engelmann spruce and subalpine fir can dominate the overstory.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f3 globeflower forb

Plant Composition	Canopy Cover (%)		
	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
GROUSEBERRY *(Vaccinium scoparium)*	1.8	0.0-30.0	26
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	1.7	0.0-15.0	36
ARCTIC WILLOW *(Salix arctica)*	1.5	0.0-15.0	41
YELLOW HEATHER *(Phyllodoce glanduliflora)*	1.3	0.0-25.0	28
Tall Forb (>= 30 cm)			
GLOBEFLOWER *(Trollius albiflorus)*	8.9	0.0-80.0	69
SITKA VALERIAN *(Valeriana sitchensis)*	8.7	0.0-60.0	76
PASQUEFLOWER *(Anemone occidentalis)*	7.6	0.0-35.0	69
WANDERING DAISY *(Erigeron peregrinus)*	7.2	0.0-30.0	80
BROOK RAGWORT *(Senecio triangularis)*	3.3	0.0-15.0	70
COMMON FIREWEED *(Epilobium angustifolium)*	1.1	0.0-10.0	28
GREEN FALSE HELLEBORE *(Veratrum eschscholtzii)*	1.1	0.0-12.0	43
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	5.8	0.0-40.0	52
WOOLLY PUSSYTOES *(Antennaria lanata)*	5.4	0.0-35.0	56
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	0.6	0.0-10.0	24
Moss			
BROWN MOSS *(Drepanocladus uncinatus)*	2.7	0.0-70.0	15
BROOM MOSS *(Dicranum scoparium)*	2.1	0.0-30.0	20
Lichen			
MOSS *(Pseudoleskea atricha)*	2.3	0.0-30.0	50

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Mesic (fresh) (17), Subhygric (moderately moist) (15), Hygric (moist) (10)

Nutrient Regime: Submesotrophic (poor) (3), Permesotrophic (rich) (2)

Elevation (range): 2074 (1635-2400) M

Slope (%): 16 - 30.99 (17), 46 - 70.99 (10), 31 - 45.99 (9), 2.5 - 5.99 (6), 10 - 15.99 (6), 6 - 9.99 (5), 0.5 - 2.49 (1)

Aspect: Southerly (17), Easterly (16), Westerly (14), Level (4), Northerly (2)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (17), Imperfectly drained (10), Moderately well drained (4), Poorly drained (2)

Soil Subgroup: ORTHIC DYSTRIC BRUNISOL (5), ORTHIC SOMBRIC BRUNISOL (5), ORTHIC REGOSOL (5), ELUVIATED DYSTRIC BRUNISOL (4), ORTHIC GLEYSOL (4), CUMULIC HUMIC REGOSOL (3), GLEYED SOMBRIC BRUNISOL (3), ORTHIC EUTRIC BRUNISOL (2), ORTHIC MELANIC BRUNISOL (2), CUMULIC REGOSOL (2), GLEYED CUMULIC REGOSOL (2), REGO GLEYSOL (2), ORTHIC HUMO-FERRIC PODZOL (2), SOMBRIC HUMO-FERRIC PODZOL (2), REGO HUMIC GLEYSOL (1), ORTHIC HUMIC REGOSOL (1), Unknown MELANIC BRUNISOL (1), GRAY FERRO-HUMIC PODZOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (49)

Parent Material: Morainal (30), Rock (21), Colluvial (16), Fluvial (11), Glaciofluvial (2), Eolian (2), Fluviolacustrine (1)

Soil Type:

Humus Form

Aa8 - Globeflower-Wandering fleabane-Sitka valerian-Western anemone community (A.J. Gould)

f4 fluvial streambanks (n=4)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)

Characteristic Species

Shrub

[7.5] ARCTIC WILLOW
Salix arctica

[3.7] FARR'S WILLOW
Salix farriae

[3.7] BARCLAY'S WILLOW
Salix barclayi

[2.5] NET-VEINED WILLOW
Salix reticulata

[0.2] DRUMMOND'S WILLOW
Salix drummondiana

Forb

[5.2] BROAD-LEAVED FIREWEED*
Epilobium latifolium

[2.5] LEATHER-LEAVED SAXIFRAGE*
Leptarrhena pyrolifolia

[2.5] ICELAND PURSLANE*
Koenigia islandica

[0.7] RED-STEMMED SAXIFRAGE
Saxifraga lyallii

[0.2] MOUNTAIN BUTTERCUP
Ranunculus eschscholtzii

[0.2] LARGE-FLOWERED LOUSEWORT
Pedicularis capitata

[0.2] FRINGED GRASS-OF-PARNASSUS
Parnassia fimbriata

[0.2] VARIEGATED HORSETAIL
Equisetum variegatum

[0.2] COMMON HORSETAIL
Equisetum arvense

[0.2] ALPINE WILLOWHERB
Epilobium anagallidifolium

[0.2] SMALL-FLOWERED ANEMONE
Anemone parviflora

Lichen

[5.0] UNDIFFERENTIATED LICHENOTHELIA
Lichenothelia

Moss and Liverwort

[0.2] UNDIFFERENTIATED MOSS - ALL GENERA
Moss

Graminoid

[2.5] ENANDER'S SEDGE*
Carex enanderi

[0.2] MOUNTAIN BENTGRASS
Agrostis variabilis

[0.2] TWO-GLUMED RUSH
Juncus biglumis

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (2), Subhygric (moderately moist) (1), Hygric (moist) (1)

Nutrient Regime: Permesotrophic (rich) (2), Submesotrophic (poor) (1), Mesotrophic (medium) (1)

Elevation (range): 1860.5 (1730-2117) M

Slope (%): moderate slope (1)

Aspect: Northerly (4)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (0)

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

There are a number of community types associated with fluvial streambanks in the Alpine subregion (A.J. Gould)

Aa16 Broad-leaved fireweed (n=1)

(Epilobium latifolium)

This community type represents gravelly streambanks next to small streams throughout the alpine and subalpine (Gould 2007). In British Columbia broad-leaved fireweed is common along intermittent streams; often on exposed mineral soil in early-seral communities from the Montane to the Alpine (Klinkenberg 2017). It is very similar to the Arctic willow-Barclay's willow/Broad- leaved fireweed (Ab24) but this community type lacks the willow cover. This community type is successionally younger than the willow dominated community and in the absence of disturbance willow cover will expand into this community type.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f4 fluvial streambanks

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Shrub (2 to 5m)			
DRUMMOND'S WILLOW *(Salix drummondiana)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
BROAD-LEAVED FIREWEED *(Epilobium latifolium)*	10.0	10.0-10.0	100
Graminoid			
MOUNTAIN BENTGRASS *(Agrostis variabilis)*	1.0	1.0-1.0	100
SPIKED WOOD-RUSH *(Luzula spicata)*	1.0	1.0-1.0	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Mesotrophic (medium) (1)

Elevation (range): 1743 (1743-1743) M

Slope (%):

Aspect: Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (0)

Soil Subgroup:

Surface Texture:

Effective Texture:

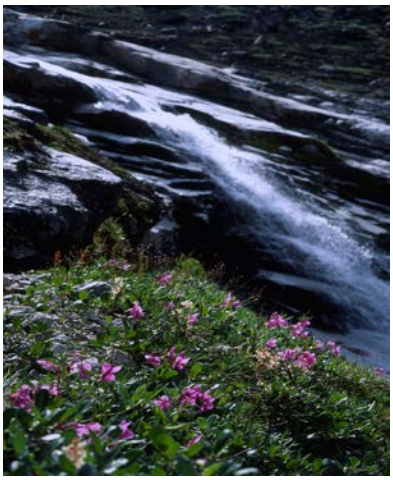
Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form



Aa16 - Broad leaved fireweed community (A.J. Gould)

Aa17 Iceland purslane (n=1)

(Koenigia islandica)

This community type represents moist to wet gravelly seepage sites next to small streams throughout the alpine and subalpine. This plant community is not common in Alpine Natural Subregion and was described at only one site north of Jasper (Gould 2007).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f4 fluvial streambanks

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Shrub (2 to 5m)			
BARCLAY'S WILLOW *(Salix barclayi)*	0.1	0.1-0.1	100
Medium Shrub (0.5 to 2 m)			
FARR'S WILLOW *(Salix farriae)*	0.1	0.1-0.1	100
Low Shrub (< 0.5m)			
ARCTIC WILLOW *(Salix arctica)*	0.1	0.1-0.1	100
Tall Forb (>= 30 cm)			
BROAD-LEAVED FIREWEED *(Epilobium latifolium)*	1.0	1.0-1.0	100
COMMON HORSETAIL *(Equisetum arvense)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
ICELAND PURSLANE *(Koenigia islandica)*	10.0	10.0-10.0	100
SNOW PEARLWORT *(Sagina nivalis)*	0.1	0.1-0.1	100
Graminoid			
TWO-GLUMED RUSH *(Juncus biglumis)*	1.0	1.0-1.0	100
MOUNTAIN BENTGRASS *(Agrostis variabilis)*	0.1	0.1-0.1	100
GOLDEN SEDGE *(Carex aurea)*	0.1	0.1-0.1	100
ENANDER'S SEDGE *(Carex enanderi)*	0.1	0.1-0.1	100
TUFTED HAIR GRASS *(Deschampsia cespitosa)*	0.1	0.1-0.1	100
SCHEUCHZER'S COTTON-GRASS *(Eriophorum scheuchzeri)*	0.1	0.1-0.1	100
CHESTNUT RUSH *(Juncus castaneus)*	0.1	0.1-0.1	100
DRUMMOND'S RUSH *(Juncus drummondii)*	0.1	0.1-0.1	100
MOUNTAIN TIMOTHY *(Phleum commutatum)*	0.1	0.1-0.1	100
ALPINE BLUEGRASS *(Poa alpina)*	0.1	0.1-0.1	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 1730 (1730-1730) M

Slope (%):

Aspect: Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Aa17 – Iceland purslane (low growing with white flowers) community (A.J. Gould)

Ab24 Arctic willow-Barclay's willow/Broad-leaved fireweed (n=1)

(Salix arctica-Salix barclayi/Epilobium latifolium)

This community type represents gravelly streambanks next to small streams throughout the alpine (Gould 2007). Sites tend to be dominated by willow and are fairly wet and nutrient rich at higher elevations just above treeline.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f4 fluvial streambanks

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Shrub (2 to 5m)			
BARCLAY'S WILLOW *(Salix barclayi)*	15.0	15.0-15.0	100
Medium Shrub (0.5 to 2 m)			
FARR'S WILLOW *(Salix farriae)*	15.0	15.0-15.0	100
Low Shrub (< 0.5m)			
ARCTIC WILLOW *(Salix arctica)*	30.0	30.0-30.0	100
Tall Forb (>= 30 cm)			
BROAD-LEAVED FIREWEED *(Epilobium latifolium)*	10.0	10.0-10.0	100
VARIEGATED HORSETAIL *(Equisetum variegatum)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
RED-STEMMED SAXIFRAGE *(Saxifraga lyallii)*	3.0	3.0-3.0	100
SMALL-FLOWERED ANEMONE *(Anemone parviflora)*	1.0	1.0-1.0	100
SMALL-LEAVED PUSSYTOES *(Antennaria parvifolia)*	1.0	1.0-1.0	100
FRINGED GRASS-OF-PARNASSUS *(Parnassia fimbriata)*	1.0	1.0-1.0	100
LARGE-FLOWERED LOUSEWORT *(Pedicularis capitata)*	1.0	1.0-1.0	100
MOUNTAIN BUTTERCUP *(Ranunculus eschscholtzii)*	1.0	1.0-1.0	100
MOSS CAMPION *(Silene acaulis)*	0.1	0.1-0.1	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhydric (moderately wet) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 2117 (2117-2117) M

Slope (%): 10 - 15.99 (1)

Aspect: Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Ab25 Net veined willow/Leatherleaf saxifrage/Enander's sedge (n=1)

(Salix reticulata/Leptarrhena pyrolifolia/Carex enanderi)

This community type represents moist streambanks next to small streams throughout the lower alpine and upper subalpine (Gould 2007). Leatherleaf saxifrage is a shade-intolerant plant, which occurs in alpine tundra and subalpine boreal climates on very moist to wet, nitrogen-medium soils (Klinkenberg 2017). Common in non-forested, semi-terrestrial (stream-edge, spring, and intermittent stream), and meadow-like communities on water-receiving (flooded) sites. In British Columbia leatherleaf saxifrage is usually associated with *Caltha leptosepala, Petasites frigidus*, and *Philonotis Fontana* (Klinkenberg 2017).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: f globeflower-willow (mesic hygric/lower zone)
Ecosite Phase: f4 fluvial streambanks

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Low Shrub (< 0.5m)			
NET-VEINED WILLOW *(Salix reticulata)*	10.0	10.0-10.0	100
Low Forb (< 30 cm)			
LEATHER-LEAVED SAXIFRAGE *(Leptarrhena pyrolifolia)*	10.0	10.0-10.0	100
ALPINE WILLOWHERB *(Epilobium anagallidifolium)*	1.0	1.0-1.0	100
ICELAND PURSLANE *(Koenigia islandica)*	0.1	0.1-0.1	100
MOUNTAIN SORREL *(Oxyria digyna)*	0.1	0.1-0.1	100
ALPINE BISTORT *(Polygonum viviparum)*	0.1	0.1-0.1	100
MOUNTAIN BUTTERCUP *(Ranunculus eschscholtzii)*	0.1	0.1-0.1	100
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.1	0.1-0.1	100
Graminoid			
ENANDER'S SEDGE *(Carex enanderi)*	10.0	10.0-10.0	100
LAKESHORE SEDGE *(Carex lacustris)*	0.1	0.1-0.1	100
TWO-GLUMED RUSH *(Juncus biglumis)*	0.1	0.1-0.1	100
DRUMMOND'S RUSH *(Juncus drummondii)*	0.1	0.1-0.1	100
PIPER'S WOOD-RUSH *(Luzula piperi)*	0.1	0.1-0.1	100
SPIKE TRISETUM *(Trisetum spicatum)*	0.1	0.1-0.1	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	0.1	0.1-0.1	100
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	20.0	20.0-20.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Hygric (moist) (1)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 1852 (1852-1852) M

Slope (%):

Aspect: Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

g mountain marigold (subhygric subhydric/lower zone) (n=25)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This ecological site is found at lower elevations (2100 m) on imperfectly to poorly drained sites from below timberline up into the alpine. Mountain marigold is a significant indicator of this ecological site, but other common wetland forbs include variegated horsetail and brook ragwort. Snow melts out early in the growing season but the site remains wet for most of the growing season fed by snowbank meltwater and ephemeral streams (Kuchar 1975). These sites are never large and are often found on the wetter areas within the globeflower-willow ecological site.

Successional Relationships

This ecological site is successionally mature. Stands of Engelmann spruce and subalpine fir can form at treeline.

Indicator Species

Tree

SUBALPINE FIR
Abies lasiocarpa

ENGELMANN SPRUCE
Picea engelmannii

Shrub

ARCTIC WILLOW
Salix arctica

NET-VEINED WILLOW
Salix reticulata

Forb

BROOK RAGWORT
Senecio triangularis

GLOBEFLOWER
Trollius albiflorus

SITKA VALERIAN
Valeriana sitchensis

WHITE MARSH MARIGOLD
Caltha leptosepala

VARIEGATED HORSETAIL
Equisetum variegatum

MOUNTAIN BUTTERCUP
Ranunculus eschscholtzii

Environmental Variables

Moisture Regime: Hygric (moist) (7), Subhydric (moderately wet) (6), Subhygric (moderately moist) (6), Mesic (fresh) (3), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (2), Permesotrophic (rich) (1), Submesotrophic (poor) (1)

Elevation (range): 2112 (1880-2370) M

Slope (%): moderate slope (10), very gentle slope (7), gentle slope (2), level (1), very strong slope (1), nearly level (1), steep slope (1), strong slope (1)

Aspect: Easterly (11), Westerly (7), Level (2), Northerly (2), Southerly (2)

Topographic Position:

Soil Variables

Soil Drainage: Imperfectly drained (4), Poorly drained (4), Well drained (2), Moderately well drained (1)

Soil Subgroup: ORTHIC GLEYSOL (5), REGO GLEYSOL (5), ORTHIC HUMIC GLEYSOL (3), ORTHIC MELANIC BRUNISOL (1), ORTHIC REGOSOL (1), ELUVIATED DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), GLEYED SOMBRIC BRUNISOL (1), GRAY DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (21)

Parent Material: Morainal (17), Fluvial (13), Fluviolacustrine (2), Rock (2), Eolian (2)

Soil Type:

Humus Form

g1 mountain marigold Fa-Se (n=1)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)

Characteristic Species

Tree

[12.0] SUBALPINE FIR*
Abies lasiocarpa

[8.0] ENGELMANN SPRUCE*
Picea engelmannii

Shrub

[10.0] WHITE MOUNTAIN HEATHER
Cassiope mertensiana

[6.0] PINK MOUNTAIN HEATHER
Phyllodoce empetriformis

[2.0] PARTRIDGEFOOT
Luetkea pectinata

Forb

[7.0] SITKA VALERIAN*
Valeriana sitchensis

[7.0] GLOBEFLOWER*
Trollius albiflorus

[6.0] BRACTED LOUSEWORT
Pedicularis bracteosa

[6.0] PASQUEFLOWER
Anemone occidentalis

[5.0] WANDERING DAISY
Erigeron peregrinus

[5.0] WHITE MARSH MARIGOLD*
Caltha leptosepala

[5.0] ALPINE WORMWOOD
Artemisia norvegica

[3.0] WOOLLY PUSSYTOES
Antennaria lanata

[2.0] NOOTKA LUPINE
Lupinus nootkatensis

[2.0] MOUNTAIN BUTTERCUP*
Ranunculus eschscholtzii

Lichen

[1.0] N/A
Cladonia ecmocyna

Moss and Liverwort

[35.0] BROOM MOSS
Dicranum scoparium

[10.0] TUFTED MOSS
Aulacomnium palustre

[5.0] BROWN MOSS
Drepanocladus uncinatus

Environmental Variables

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime:

Elevation (range): 2040 (2040-2040) M

Slope (%): gentle slope (1)

Aspect: Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: ORTHIC GLEYSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Morainal (1), Eolian (1)

Soil Type:

Humus Form

Mountain heather with patches of White marsh (mountain) marigold and woolly pussytoes can be extensive in the understory of the g1 ecosite phase

Ac7 White marsh (Mountain) marigold-Globeflower (Fa-Se) (n=1)

(Caltha leptosepala-Trollius albiflorus (Abies lasiocarpa-Picea engelmannii))

This community type is not common in the alpine and was described on only one site in Jasper National Park (Corns and Achuff 1982). This is a treeline community type found on poorly to imperfectly drained sites with Gleysolic soils.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)
Ecosite Phase: g1 mountain marigold Fa-Se

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Tall Shrub (2 to 5m)			
SUBALPINE FIR *(Abies lasiocarpa)*	6.0	6.0-6.0	100
Medium Shrub (0.5 to 2 m)			
WHITE MOUNTAIN HEATHER *(Cassiope mertensiana)*	10.0	10.0-10.0	100
ENGELMANN SPRUCE *(Picea engelmannii)*	8.0	8.0-8.0	100
SUBALPINE FIR *(Abies lasiocarpa)*	6.0	6.0-6.0	100
PINK MOUNTAIN HEATHER *(Phyllodoce empetriformis)*	6.0	6.0-6.0	100
PARTRIDGEFOOT *(Luetkea pectinata)*	2.0	2.0-2.0	100
Tall Forb (>= 30 cm)			
GLOBEFLOWER *(Trollius albiflorus)*	7.0	7.0-7.0	100
SITKA VALERIAN *(Valeriana sitchensis)*	7.0	7.0-7.0	100
PASQUEFLOWER *(Anemone occidentalis)*	6.0	6.0-6.0	100
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	6.0	6.0-6.0	100
WANDERING DAISY *(Erigeron peregrinus)*	5.0	5.0-5.0	100
NOOTKA LUPINE *(Lupinus nootkatensis)*	2.0	2.0-2.0	100
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	5.0	5.0-5.0	100
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	5.0	5.0-5.0	100
WOOLLY PUSSYTOES *(Antennaria lanata)*	3.0	3.0-3.0	100
MOUNTAIN BUTTERCUP *(Ranunculus eschscholtzii)*	2.0	2.0-2.0	100
Moss			
BROOM MOSS *(Dicranum scoparium)*	35.0	35.0-35.0	100
TUFTED MOSS *(Aulacomnium palustre)*	10.0	10.0-10.0	100
BROWN MOSS *(Drepanocladus uncinatus)*	5.0	5.0-5.0	100
Lichen			
N/A *(Cladonia ecmocyna)*	1.0	1.0-1.0	100

Environmental Variables

Ecological Status Score: 25

Moisture Regime: Mesic (fresh) (1)

Nutrient Regime:

Elevation (range): 2040 (2040-2040) M

Slope (%): 6 - 9.99 (1)

Aspect: Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: ORTHIC GLEYSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Eolian (1), Morainal (1)

Soil Type:

Humus Form

g2 mountain marigold shrubland (n=8)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)

Characteristic Species

Shrub

[26.5] ARCTIC WILLOW*
Salix arctica

[4.3] NET-VEINED WILLOW*
Salix reticulata

Forb

[7.0] VARIEGATED HORSETAIL*
Equisetum variegatum

[5.5] WHITE MARSH MARIGOLD
Caltha leptosepala

[2.7] ALPINE BISTORT
Polygonum viviparum

[1.6] WOOLLY PUSSYTOES
Antennaria lanata

[1.5] GLOBEFLOWER
Trollius albiflorus

[1.5] WANDERING DAISY
Erigeron peregrinus

[1.2] ALPINE WORMWOOD
Artemisia norvegica

[1.2] CREEPING SIBBALDIA
Sibbaldia procumbens

[1.0] WESTERN PAINTBRUSH
Castilleja occidentalis

[1.0] MOUNTAIN BUTTERCUP
Ranunculus eschscholtzii

Moss and Liverwort

[20.6] UNDIFFERENTIATED MOSS - ALL GENERA
Moss

[8.5] TUFTED MOSS
Aulacomnium palustre

[6.3] N/A
Campylium stellatum

Graminoid

[0.8] BLACK ALPINE SEDGE
Carex nigricans

Environmental Variables

Moisture Regime: Subhydric (moderately wet) (2), Subhygric (moderately moist) (2), Hygric (moist) (1), Hydric (wet) (1)

Nutrient Regime: Mesotrophic (medium) (2), Permesotrophic (rich) (1)

Elevation (range): 2208 (2000-2370) M

Slope (%): very gentle slope (3), moderate slope (2), nearly level (1), level (1)

Aspect: Easterly (4), Northerly (2), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: REGO GLEYSOL (2), ORTHIC MELANIC BRUNISOL (1), ORTHIC REGOSOL (1), GLEYED SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (5)

Parent Material: Fluvial (3), Fluviolacustrine (2), Morainal (2)

Soil Type:

Humus Form

Moist soils throughout the growing season with a predominance of White marsh (mountain) marigold and low growing arctic willow are characteristic of the g2 ecosite phase

Ab17 Arctic willow/White marsh (Mountain) marigold-Variegated horsetail (n=8)

(Salix arctica/Caltha leptosepala-Equisetum variegatum)

This community type is found at lower elevations (2200 m) on imperfectly to poorly drained sites from below treeline up into the alpine. Arctic willow and white marsh marigold co-dominate this community type Snow melts out early in the growing season but the site remains wet for most of the growing season fed by snowbank meltwater and ephemeral streams (Kuchar 1975). These sites are never large. In British Columba white marsh marigold is characteristic of subalpine communities along streams fed by melting snowbanks (Klinkenberg 2017).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)
Ecosite Phase: g2 mountain marigold shrubland

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	12.8	0.0-32.0	63
NET-VEINED WILLOW *(Salix reticulata)*	4.3	0.0-30.0	25
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	1.2	0.0-8.0	51
Low Shrub (< 0.5m)			
ARCTIC WILLOW *(Salix arctica)*	13.7	0.0-50.0	38
Tall Forb (>= 30 cm)			
VARIEGATED HORSETAIL *(Equisetum variegatum)*	7.0	0.0-30.0	50
WANDERING DAISY *(Erigeron peregrinus)*	1.5	0.0-8.0	75
GLOBEFLOWER *(Trollius albiflorus)*	1.5	0.0-9.0	38
WESTERN PAINTBRUSH *(Castilleja occidentalis)*	1.0	0.0-3.0	75
Low Forb (< 30 cm)			
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	5.5	0.0-12.0	63
ALPINE BISTORT *(Polygonum viviparum)*	2.7	0.0-15.0	88
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.6	0.0-6.0	63
ALPINE WORMWOOD *(Artemisia norvegica)*	1.2	0.0-7.0	38
MOUNTAIN BUTTERCUP *(Ranunculus eschscholtzii)*	1.0	0.0-4.0	50
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	0.8	0.0-3.0	50
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	20.6	0.0-85.0	38
TUFTED MOSS *(Aulacomnium palustre)*	8.5	0.0-60.0	38
N/A *(Campylium stellatum)*	6.3	0.0-30.0	38

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (2), Subhydric (moderately wet) (2), Hydric (wet) (1), Hygric (moist) (1)

Nutrient Regime: Mesotrophic (medium) (2), Permesotrophic (rich) (1)

Elevation (range): 2208 (2000-2370) M

Slope (%): 2.5 - 5.99 (3), 10 - 15.99 (2), 0 - 0.49 (1), 0.5 - 2.49 (1)

Aspect: Easterly (4), Northerly (2), Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Well drained (1)

Soil Subgroup: REGO GLEYSOL (2), ORTHIC MELANIC BRUNISOL (1), ORTHIC REGOSOL (1), GLEYED SOMBRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (5)

Parent Material: Fluvial (3), Morainal (2), Fluviolacustrine (2)

Soil Type:

Humus Form

g3 mountain marigold forb (n=16)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)

Characteristic Species

Shrub

[2.5] TALL BILBERRY
Vaccinium membranaceum

[2.1] ARCTIC WILLOW
Salix arctica

[1.5] WHITE MOUNTAIN HEATHER
Cassiope mertensiana

Forb

[16.5] GLOBEFLOWER
Trollius albiflorus

[10.9] WHITE MARSH MARIGOLD
Caltha leptosepala

[4.8] WANDERING DAISY
Erigeron peregrinus

[4.2] BROOK RAGWORT*
Senecio triangularis

[3.6] ALPINE WORMWOOD
Artemisia norvegica

[3.0] SITKA VALERIAN
Valeriana sitchensis

[2.6] ALPINE BISTORT
Polygonum viviparum

[1.3] WOOLLY PUSSYTOES
Antennaria lanata

[1.3] BROAD-LEAVED ARNICA
Arnica latifolia

[1.1] BRACTED LOUSEWORT
Pedicularis bracteosa

[1.0] PASQUEFLOWER
Anemone occidentalis

Lichen

[0.6] N/A
Cladonia ecmocyna

Moss and Liverwort

[15.6] TUFTED MOSS
Aulacomnium palustre

[7.0] BROWN MOSS
Drepanocladus uncinatus

[4.3] COMMON HAIR-CAP
Polytrichum commune

[3.9] N/A
Campylium stellatum

[3.6] BROOM MOSS
Dicranum scoparium

[3.5] LIVERWORT
Barbilophozia lycopodioides

[2.5] GOLDEN MOSS
Tomenthypnum nitens

[2.5] SCHREBER'S MOSS
Pleurozium schreberi

Graminoid

[4.6] BLACK ALPINE SEDGE
Carex nigricans

[1.1] MERTEN'S RUSH
Juncus mertensianus

Environmental Variables

Moisture Regime: Hygric (moist) (6), Subhydric (moderately wet) (4), Subhygric (moderately moist) (4), Mesic (fresh) (2)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 2090 (1880-2350) M

Slope (%): moderate slope (8), very gentle slope (4), steep slope (1), gentle slope (1), very strong slope (1), strong slope (1)

Aspect: Easterly (7), Westerly (5), Southerly (2), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Imperfectly drained (4), Poorly drained (3), Well drained (1), Moderately well drained (1)

Soil Subgroup: ORTHIC GLEYSOL (4), REGO GLEYSOL (3), ORTHIC HUMIC GLEYSOL (3), ELUVIATED DYSTRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), GRAY DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (15)

Parent Material: Morainal (14), Fluvial (10), Rock (2), Eolian (1)

Soil Type:

Humus Form

Aa9 White marsh (Mountain) marigold-Globeflower-Brook ragwort (n=16)

(Caltha leptosepala-Trollius albiflorus-Senecio triangularis)

This community type is found at lower elevations (2090 m) on imperfectly to poorly drained sites from below timberline up into the alpine. White marsh marigold is a significant indicator of this community type, but other common wetland forbs include variegated horsetail and brook ragwort. Snow melts out early in the growing season but the site remains wet for most of the growing season fed by snowbank meltwater and ephemeral streams (Kuchar 1975). These sites are never large and are often found on the wetter areas within globeflower-willow dominated community types.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: g mountain marigold (subhygric subhydric/lower zone)
Ecosite Phase: g3 mountain marigold forb

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
TALL BILBERRY *(Vaccinium membranaceum)*	2.5	0.0-40.0	13
ARCTIC WILLOW *(Salix arctica)*	2.1	0.0-15.0	44
Tall Forb (>= 30 cm)			
GLOBEFLOWER *(Trollius albiflorus)*	16.5	0.0-45.0	75
WANDERING DAISY *(Erigeron peregrinus)*	4.8	0.0-15.0	81
BROOK RAGWORT *(Senecio triangularis)*	4.2	0.0-15.0	81
SITKA VALERIAN *(Valeriana sitchensis)*	3.0	0.0-15.0	44
BROAD-LEAVED ARNICA *(Arnica latifolia)*	1.3	0.0-16.0	19
BRACTED LOUSEWORT *(Pedicularis bracteosa)*	1.1	0.0-3.0	75
PASQUEFLOWER *(Anemone occidentalis)*	1.0	0.0-8.0	25
Low Forb (< 30 cm)			
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	10.9	0.0-23.0	88
ALPINE WORMWOOD *(Artemisia norvegica)*	3.6	0.0-15.0	50
ALPINE BISTORT *(Polygonum viviparum)*	2.6	0.0-20.0	63
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.3	0.0-8.0	50
Graminoid			
BLACK ALPINE SEDGE *(Carex nigricans)*	4.6	0.0-30.0	69
MERTEN'S RUSH *(Juncus mertensianus)*	1.1	0.0-15.0	19
Moss			
TUFTED MOSS *(Aulacomnium palustre)*	15.6	0.0-60.0	63
BROWN MOSS *(Drepanocladus uncinatus)*	7.0	0.0-65.0	38
COMMON HAIR-CAP *(Polytrichum commune)*	4.3	0.0-70.0	6
N/A *(Campylium stellatum)*	3.9	0.0-20.0	44
BROOM MOSS *(Dicranum scoparium)*	3.6	0.0-20.0	31
LIVERWORT *(Barbilophozia lycopodioides)*	3.5	0.0-15.0	31
SCHREBER'S MOSS *(Pleurozium schreberi)*	2.5	0.0-40.0	6
GOLDEN MOSS *(Tomenthypnum nitens)*	2.5	0.0-40.0	6
Lichen			
N/A *(Cladonia ecmocyna)*	0.6	0.0-10.0	13

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Hygric (moist) (6), Subhygric (moderately moist) (4), Subhydric (moderately wet) (4), Mesic (fresh) (2)

Nutrient Regime: Submesotrophic (poor) (1)

Elevation (range): 2090 (1880-2350) M

Slope (%): 10 - 15.99 (8), 2.5 - 5.99 (4), 16 - 30.99 (1), 31 - 45.99 (1), 46 - 70.99 (1), 6 - 9.99 (1)

Aspect: Easterly (7), Westerly (5), Southerly (2), Level (2)

Topographic Position:

Soil Variables

Soil Drainage: Imperfectly drained (4), Poorly drained (3), Well drained (1), Moderately well drained (1)

Soil Subgroup: ORTHIC GLEYSOL (4), REGO GLEYSOL (3), ORTHIC HUMIC GLEYSOL (3), ELUVIATED DYSTRIC BRUNISOL (1), GRAY DYSTRIC BRUNISOL (1), GLEYED DYSTRIC BRUNISOL (1), ORTHIC DYSTRIC BRUNISOL (1), ELUVIATED EUTRIC BRUNISOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (15)

Parent Material: Morainal (14), Fluvial (10), Rock (2), Eolian (1)

Soil Type:

Humus Form

Aa9 - White marsh (Mountain) marigold community (A.J. Gould)

h wet meadows (hygric hydric/lower zone) (n=15)

Natural Subregion: Alpine

Ecosection: A Alpine

General Description

This is the wettest ecological site in the alpine and usually has standing water throughout the growing season. The site tends to be found in lower slope positions with fluvial parent materials and Gleysolic and Organic soils. This ecological site tends to be dominated by willows, horsetail, sedges, golden moss and tufted moss species.

Environmental Variables

Moisture Regime: Hygric (moist) (5), Subhygric (moderately moist) (5), Hydric (wet) (1), Subhydric (moderately wet) (1)

Nutrient Regime: Mesotrophic (medium) (3), Permesotrophic (rich) (2), Submesotrophic (poor) (2)

Elevation (range): 2074 (1762-2350) M

Slope (%): very gentle slope (4), nearly level (3), strong slope (1), level (1), moderate slope (1), very strong slope (1)

Aspect: Level (5), Northerly (4), Southerly (3), Westerly (3)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (6), Imperfectly drained (1)

Soil Subgroup: REGO GLEYSOL (3), REGO HUMIC GLEYSOL (1), TERRIC MESISOL (1), CUMULIC REGOSOL (1), GLEYED STATIC CRYOSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (8)

Parent Material: Fluvial (5), Morainal (4), Fluviolacustrine (2)

Soil Type:

Humus Form

Successional Relationships

This ecological site is successionally mature. The higher elevations and wet conditions tend to limit tree growth in this ecological site.

Indicator Species

Shrub

ARCTIC WILLOW
Salix arctica

SMOOTH WILLOW
Salix glauca

NET-VEINED WILLOW
Salix reticulata

BOG BIRCH
Betula glandulosa

Forb

ARCTIC SWEET COLTSFOOT
Petasites frigidus

COMMON HORSETAIL
Equisetum arvense

Graminoid

WATER SEDGE
Carex aquatilis

HAIR-LIKE SEDGE
Carex capillaris

LAKESHORE SEDGE
Carex lacustris

SHOWY SEDGE
Carex spectabilis

SIMPLE BOG-SEDGE
Kobresia simpliciuscula

h1 sedge/horsetail (n=10)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)

Characteristic Species

Shrub

- [3.7] ARCTIC WILLOW *Salix arctica*
- [3.4] BARRATT'S WILLOW *Salix barrattiana*
- [2.0] BOG BIRCH *Betula glandulosa*
- [1.1] SHRUBBY CINQUEFOIL *Potentilla fruticosa*

Forb

- [5.0] COMMON HORSETAIL* *Equisetum arvense*
- [5.0] ARCTIC SWEET COLTSFOOT* *Petasites frigidus*
- [1.4] BROOK RAGWORT *Senecio triangularis*
- [1.2] HORNEMANN'S WILLOWHERB *Epilobium hornemannii*
- [0.8] ALPINE WORMWOOD *Artemisia norvegica*
- [0.7] MOUNTAIN BUTTERCUP *Ranunculus eschscholtzii*
- [0.4] WHITE MARSH MARIGOLD *Caltha leptosepala*

Moss and Liverwort

- [3.5] BROWN MOSS *Drepanocladus revolvens*
- [1.9] N/A *Campylium stellatum*
- [0.6] BROOM MOSS *Dicranum scoparium*
- [0.3] GOLDEN MOSS* *Tomenthypnum nitens*

Graminoid

- [16.6] SHOWY SEDGE* *Carex spectabilis*
- [9.3] SIMPLE BOG-SEDGE* *Kobresia simpliciuscula*
- [5.1] ALPINE BLUEGRASS *Poa alpina*
- [2.8] LAKESHORE SEDGE* *Carex lacustris*
- [1.2] RUSH-LIKE SEDGE *Carex scirpoidea*
- [1.0] TUFTED HAIR GRASS* *Deschampsia cespitosa*
- [0.9] WATER SEDGE *Carex aquatilis*

Environmental Variables

Moisture Regime: Hygric (moist) (5), Subhygric (moderately moist) (3)

Nutrient Regime: Mesotrophic (medium) (3), Submesotrophic (poor) (2), Permesotrophic (rich) (1)

Elevation (range): 2071 (1762-2230) M

Slope (%): very gentle slope (4), nearly level (3)

Aspect: Northerly (3), Southerly (3), Westerly (3), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (3)

Soil Subgroup: REGO GLEYSOL (2), TERRIC MESISOL (1), CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Fluvial (3), Morainal (2), Fluviolacustrine (1)

Soil Type:

Humus Form

Numerous wetland communities dominated by various sedge species are associated with wet areas near ponds and lakes (A.J. Gould)

Aa10 Simple bog sedge (n=4)

(Kobresia simpliuscula)

Simple bog sedge is typical of boggy areas at higher elevations. This community type was described on a poorly drained, level sites at higher elevations. It is likely found in association with the willow and sedge dominated community types found in the valley bottoms of the lower alpine and upper subalpine. In British Columbia simple bog sedge is found in bogs, wet meadows and shallow ponds from the montane to subalpine zone (Klinkenberg 2017).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h1 sedge/horsetail

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
BARRATT'S WILLOW *(Salix barrattiana)*	13.7	0.0-30.0	75
BOG BIRCH *(Betula glandulosa)*	8.0	0.0-15.0	75
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	4.7	1.0-15.0	100
YELLOW HEATHER *(Phyllodoce glanduliflora)*	2.5	0.0-10.0	25
Tall Forb (>= 30 cm)			
GLOBEFLOWER *(Trollius albiflorus)*	1.7	0.0-5.0	50
Low Forb (< 30 cm)			
ALPINE BISTORT *(Polygonum viviparum)*	1.2	0.0-2.0	75
YELLOW MOUNTAIN SAXIFRAGE *(Saxifraga aizoides)*	1.2	0.0-5.0	25
SMALL-FLOWERED ANEMONE *(Anemone parviflora)*	1.0	0.0-2.0	75
Graminoid			
SIMPLE BOG-SEDGE *(Kobresia simpliciuscula)*	37.5	20.0-80.0	100
RUSH-LIKE SEDGE *(Carex scirpoidea)*	5.0	0.0-20.0	25
TUFTED HAIR GRASS *(Deschampsia cespitosa)*	4.2	0.0-15.0	75
WATER SEDGE *(Carex aquatilis)*	3.7	0.0-15.0	25
HAIR-LIKE SEDGE *(Carex capillaris)*	1.2	0.0-5.0	25
NORTHERN WHITE RUSH *(Juncus albescens)*	1.2	0.0-5.0	25
TUFTED BULRUSH *(Scirpus cespitosus)*	1.2	0.0-5.0	25
Moss			
BROWN MOSS *(Drepanocladus revolvens)*	14.0	0.0-55.0	50
N/A *(Campylium stellatum)*	7.7	0.0-30.0	50
BROOM MOSS *(Dicranum scoparium)*	2.5	0.0-10.0	25
GOLDEN MOSS *(Tomenthypnum nitens)*	1.2	0.0-5.0	25

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Hygric (moist) (3)

Nutrient Regime:

Elevation (range): 2110 (1900-2230) M

Slope (%): 0.5 - 2.49 (2), 2.5 - 5.99 (2)

Aspect: Southerly (3), Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (3)

Soil Subgroup: REGO GLEYSOL (2), TERRIC MESISOL (1), CUMULIC REGOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Fluvial (3), Morainal (2), Fluviolacustrine (1)

Soil Type:

Humus Form

Aa13 Showy sedge (n=3)

(Carex spectabilis)

Showy sedge community occurs on sites where soils are not well drained and snow duration is into the growing season (Douglas 1972). Gould (2007) described the three sample locations from the Main Ranges in Jasper National and Willmore Wilderness Parks on slight north-facing slopes at high elevation.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h1 sedge/horsetail

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Forb (>= 30 cm)			
BROOK RAGWORT *(Senecio triangularis)*	5.6	0.0-10.0	67
SITKA VALERIAN *(Valeriana sitchensis)*	1.6	0.0-5.0	33
WANDERING DAISY *(Erigeron peregrinus)*	1.0	0.0-3.0	67
GREEN SORREL *(Rumex acetosa)*	1.0	0.0-3.0	67
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	3.3	0.0-10.0	67
WHITE MARSH MARIGOLD *(Caltha leptosepala)*	1.7	0.0-5.0	67
ALPINE WILLOWHERB *(Epilobium anagallidifolium)*	1.0	0.0-3.0	33
Graminoid			
SHOWY SEDGE *(Carex spectabilis)*	66.6	50.0-80.0	100
MOUNTAIN TIMOTHY *(Phleum commutatum)*	1.0	0.0-3.0	33
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	6.7	0.0-20.0	67

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (2)

Nutrient Regime: Submesotrophic (poor) (2), Mesotrophic (medium) (1)

Elevation (range): 1953 (1762-2126) M

Slope (%): 2.5 - 5.99 (2)

Aspect: Westerly (2), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Aa13 - Showy sedge Lakeshore community (A.J. Gould)

Aa14 Lakeshore sedge (n=2)

(Carex lacustris)

The lakeshore sedge community occurs on sites where soils are imperfectly to very poorly drained. Standing water maybe present at the site. Gould (2007) described the two sample locations from the Main Ranges in Jasper National Park and Willmore Wilderness Park on slight north-facing slopes at high elevation (2148 m). Both sites had lakeshore sedge present but one site was also dominated by arctic willow.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h1 sedge/horsetail

Plant Composition

	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Tall Shrub (2 to 5m)			
BARCLAY'S WILLOW *(Salix barclayi)*	0.5	0.0-1.0	50
Low Shrub (< 0.5m)			
ARCTIC WILLOW *(Salix arctica)*	15.0	0.1-30.0	100
Low Forb (< 30 cm)			
ALPINE WORMWOOD *(Artemisia norvegica)*	0.1	0.1-0.1	100
ARCTIC SWEET COLTSFOOT *(Petasites frigidus)*	0.1	0.1-0.1	100
CREEPING SIBBALDIA *(Sibbaldia procumbens)*	0.1	0.1-0.1	100
Graminoid			
LAKESHORE SEDGE *(Carex lacustris)*	11.5	3.0-20.0	100
SCHEUCHZER'S COTTON-GRASS *(Eriophorum scheuchzeri)*	1.5	0.0-3.0	50
ALPINE BLUEGRASS *(Poa alpina)*	0.5	0.1-1.0	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	35.0	30.0-40.0	100
Not Applicable			
UNDIFFERENTIATED LICHENOTHELIA *(Lichenothelia)*	7.5	5.0-10.0	100

Environmental Variables

Ecological Status Score: 0

Moisture Regime: Hygric (moist) (2)

Nutrient Regime: Mesotrophic (medium) (2)

Elevation (range): 2184 (2184-2184) M

Slope (%):

Aspect: Northerly (2)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

Aa18 Horsetail-Arctic sweet coltsfoot (n=1)

(Equisetum arvense-Petasites frigidus)

The presence of both horsetail and coltsfoot in this community type indicate very wet conditions (Gould 2007). Horsetail dominated community types are not common in the Alpine Natural Subregion. This community type likely represents a transition to the horsetail dominated plant communities found in the northern ecosection of the Subalpine Natural Subregion (Willoughby et al. 2020).

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h1 sedge/horsetail

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Tall Shrub (2 to 5m)			
BOOTH'S WILLOW *(Salix boothii)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
COMMON HORSETAIL *(Equisetum arvense)*	20.0	20.0-20.0	100
HORNEMANN'S WILLOWHERB *(Epilobium hornemannii)*	5.0	5.0-5.0	100
GREEN SORREL *(Rumex acetosa)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
ARCTIC SWEET COLTSFOOT *(Petasites frigidus)*	20.0	20.0-20.0	100
MOUNTAIN BUTTERCUP *(Ranunculus eschscholtzii)*	3.0	3.0-3.0	100
HEART-LEAVED ARNICA *(Arnica cordifolia)*	1.0	1.0-1.0	100
Graminoid			
ALPINE BLUEGRASS *(Poa alpina)*	20.0	20.0-20.0	100
CHESTNUT RUSH *(Juncus castaneus)*	1.0	1.0-1.0	100
SMALL-FLOWERED WOOD-RUSH *(Luzula parviflora)*	1.0	1.0-1.0	100
Moss			
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	20.0	20.0-20.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 2037 (2037-2037) M

Slope (%): 0.5 - 2.49 (1)

Aspect: Westerly (1)

Topographic Position:

Soil Variables

Soil Drainage:

Soil Subgroup:

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness:

Parent Material:

Soil Type:

Humus Form

h2 willow (n=5)

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)

Characteristic Species

Shrub

[16.0] ARCTIC WILLOW*
Salix arctica

[12.5] ENTIRE-LEAVED MOUNTAIN AVENS
Dryas integrifolia

[7.5] SMOOTH WILLOW*
Salix glauca

[1.8] NET-VEINED WILLOW*
Salix reticulata

[1.2] WHITE MOUNTAIN AVENS
Dryas octopetala

Forb

[1.7] VARIEGATED HORSETAIL
Equisetum variegatum

[1.5] ALPINE BISTORT
Polygonum viviparum

[1.0] DWARF SCOURING-RUSH
Equisetum scirpoides

[1.0] YELLOW MOUNTAIN SAXIFRAGE
Saxifraga aizoides

[0.7] LARGE-FLOWERED LOUSEWORT
Pedicularis capitata

Lichen

[1.2] N/A
Cladonia pyxidata

Moss and Liverwort

[7.5] GOLDEN MOSS
Tomenthypnum nitens

[5.0] N/A
Bryum caespiticium

[3.7] TUFTED MOSS
Aulacomnium palustre

[3.7] UNDIFFERENTIATED MOSS - ALL GENERA
Moss

[1.6] STAIR-STEP MOSS
Hylocomium splendens

Graminoid

[17.5] HAIR-LIKE SEDGE*
Carex capillaris

[3.7] WATER SEDGE
Carex aquatilis

[0.5] RUSH-LIKE SEDGE
Carex scirpoidea

Environmental Variables

Moisture Regime: Subhygric (moderately moist) (2), Subhydric (moderately wet) (1), Hydric (wet) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 2082 (1970-2350) M

Slope (%): moderate slope (1), level (1), very strong slope (1), strong slope (1)

Aspect: Level (4), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (3), Imperfectly drained (1)

Soil Subgroup: REGO GLEYSOL (1), REGO HUMIC GLEYSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), GLEYED STATIC CRYOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (4)

Parent Material: Fluvial (2), Morainal (2), Fluviolacustrine (1)

Soil Type:

Humus Form

Ab18 Arctic willow-Net-veined willow/Golden moss-Tufted moss (n=4)

(Salix arctic-Salix reticulata/Tomethypnum nitens-Aulacomnium palustre)

Kuchar (1975) described this community type on the edges of treeline ponds in Jasper. Sphagnum russowii was often associated with this community type in Kuchar's study. Hrapko and La Roi (1978) described a similar community with golden moss, sphagnum, arctic willow and reed polar grass (Arctagrostis arundinacea) on Signal Mountain in Jasper National Park.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h2 willow

Plant Composition

Canopy Cover (%)

	Mean	Range	Const.
Medium Shrub (0.5 to 2 m)			
ARCTIC WILLOW *(Salix arctica)*	32.0	20.0-45.0	100
NET-VEINED WILLOW *(Salix reticulata)*	3.7	0.0-15.0	25
WHITE MOUNTAIN AVENS *(Dryas octopetala)*	2.5	0.0-10.0	25
Tall Forb (>= 30 cm)			
VARIEGATED HORSETAIL *(Equisetum variegatum)*	2.5	0.0-10.0	25
MOUNTAIN CINQUEFOIL *(Potentilla diversifolia)*	1.0	0.0-3.0	50
Low Forb (< 30 cm)			
DWARF SCOURING-RUSH *(Equisetum scirpoides)*	2.0	0.0-6.0	50
ALPINE BISTORT *(Polygonum viviparum)*	2.0	0.0-5.0	75
LARGE-FLOWERED LOUSEWORT *(Pedicularis capitata)*	1.5	0.0-4.0	75
ALPINE WORMWOOD *(Artemisia norvegica)*	1.0	0.0-4.0	25
Graminoid			
WATER SEDGE *(Carex aquatilis)*	7.5	0.0-30.0	25
Moss			
GOLDEN MOSS *(Tomenthypnum nitens)*	15.0	0.0-40.0	75
TUFTED MOSS *(Aulacomnium palustre)*	7.5	0.0-20.0	50
UNDIFFERENTIATED MOSS - ALL GENERA *(Moss)*	7.5	0.0-30.0	25
STAIR-STEP MOSS *(Hylocomium splendens)*	3.2	0.0-10.0	50
N/A *(Campylium stellatum)*	1.2	0.0-5.0	25
Lichen			
N/A *(Cladonia pyxidata)*	2.5	0.0-7.0	75
DOG LICHEN *(Peltigera canina)*	1.0	0.0-2.0	75
N/A *(Stereocaulon alpinum)*	1.0	0.0-3.0	50

Environmental Variables

Ecological Status Score: 40

Moisture Regime: Subhygric (moderately moist) (2), Subhydric (moderately wet) (1), Hydric (wet) (1)

Nutrient Regime: Permesotrophic (rich) (1)

Elevation (range): 2194 (2058-2350) M

Slope (%): 10 - 15.99 (1), 16 - 30.99 (1), 31 - 45.99 (1)

Aspect: Level (3), Northerly (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (2), Imperfectly drained (1)

Soil Subgroup: REGO HUMIC GLEYSOL (1), GLEYED CUMULIC HUMIC REGOSOL (1), GLEYED STATIC CRYOSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (3)

Parent Material: Morainal (2), Fluvial (2)

Soil Type:

Humus Form

Ab18 – Arctic willow-Net veined willow/Golden moss-Tufted moss community on very wet site that accumulates water (A.J. Gould)

Ab21 Smooth willow-Entire-leaved mountain avens/Hair-like sedge (n=1)

(Salix glauca-Dryas integrifolia/Carex capillaris)

This community type is not common in the Alpine subregion and occurs on hummocky ground where water accumulates in the Upper Subalpine and Lower Alpine. Entire-leaved white mountain avens tends to grow on the top of the drier hummocks and hair-like sedge is found in the wet troughs (Gould 2007). Porsild (1959) described Carex capillaris on steep snowbed slopes near Lake Louise.

Natural Subregion: Alpine
Ecosection: A Alpine

Ecosite: h wet meadows (hygric hydric/lower zone)
Ecosite Phase: h2 willow

Plant Composition	Canopy Cover (%)		
	Mean	**Range**	**Const.**
Medium Shrub (0.5 to 2 m)			
ENTIRE-LEAVED MOUNTAIN AVENS *(Dryas integrifolia)*	25.0	25.0-25.0	100
SMOOTH WILLOW *(Salix glauca)*	15.0	15.0-15.0	100
RED BEARBERRY *(Arctostaphylos rubra)*	1.0	1.0-1.0	100
BOG BIRCH *(Betula glandulosa)*	1.0	1.0-1.0	100
Tall Forb (>= 30 cm)			
LINDLEY'S ASTER *(Aster ciliolatus)*	1.0	1.0-1.0	100
WESTERN PAINTBRUSH *(Castilleja occidentalis)*	1.0	1.0-1.0	100
BROAD-LEAVED FIREWEED *(Epilobium latifolium)*	1.0	1.0-1.0	100
VARIEGATED HORSETAIL *(Equisetum variegatum)*	1.0	1.0-1.0	100
TALL WHITE BOG ORCHID *(Habenaria dilatata)*	1.0	1.0-1.0	100
Low Forb (< 30 cm)			
YELLOW MOUNTAIN SAXIFRAGE *(Saxifraga aizoides)*	2.0	2.0-2.0	100
SMALL-FLOWERED ANEMONE *(Anemone parviflora)*	1.0	1.0-1.0	100
WOOLLY PUSSYTOES *(Antennaria lanata)*	1.0	1.0-1.0	100
FLAME-COLORED LOUSEWORT *(Pedicularis flammea)*	1.0	1.0-1.0	100
COMMON BUTTERWORT *(Pinguicula vulgaris)*	1.0	1.0-1.0	100
ALPINE BISTORT *(Polygonum viviparum)*	1.0	1.0-1.0	100
LOW SPIKEMOSS *(Selaginella selaginoides)*	1.0	1.0-1.0	100
Graminoid			
HAIR-LIKE SEDGE *(Carex capillaris)*	35.0	35.0-35.0	100
RUSH-LIKE SEDGE *(Carex scirpoidea)*	1.0	1.0-1.0	100
Moss			
N/A *(Bryum caespiticium)*	10.0	10.0-10.0	100

Environmental Variables

Ecological Status Score: 40

Moisture Regime:

Nutrient Regime:

Elevation (range): 1970 (1970-1970) M

Slope (%): 0 - 0.49 (1)

Aspect: Level (1)

Topographic Position:

Soil Variables

Soil Drainage: Poorly drained (1)

Soil Subgroup: REGO GLEYSOL (1)

Surface Texture:

Effective Texture:

Depth to Mottles/Gley:

Organic Thickness: 0 - 5 cm (1)

Parent Material: Fluviolacustrine (1)

Soil Type:

Humus Form

Literature Cited

Achuff, P.L. 1994. Natural Regions, Subregions and Natural History Themes of Alberta: A Classification for Protected Areas Management. Prepared for Parks Services, Alberta Environmental Protection, Edmonton, AB.

Achuff, P.L., R.L. McNeil, M.L. Coleman, C. Wallis and C. Wershler. 2002. Ecological land classification of Waterton Lakes National Park, Alberta. Vol 1: Integrated resource description. Parks Canada, Waterton Park. Alberta, 226pp.

ACIMS. 2017. Tracked Elements in Alberta by Natural Subregion. (accessed May 11, 2020).

Adams, B.W., G.Ehlert, C.Stone, M. Alexander, D. Lawrence, M. Willoughby, D. Moisey, C. Hincz and A. Bogen. 2009. Range Health Assessement for Grassland, Forest and Tame Pasture. Public Lands Division, Alberta Sustainable Resource Development. Pub. No. T/044 105 pp.

Aiken S.G., M.J. Dallwitz, L.L. Consaul, C.L. McJannet, R.L. Boles, G.W. Argus, J.M. Gillett, P.J. Scott, R. Elven, M.C. LeBlanc, L.J. Gillespie, A.K. Brysting, H. Solstad, and J.G. Harris. 2011. Flora of the Canadian Arctic Archipelago. Skr. Naturhist.-Selsk. 4, 2: 171. 1798.

Amo, S.F. and R.P. Hammerly. 1984. Timberline Mountain and Arctic Forest Frontiers. The Mountaineers, Seatle. WA.

Archibald, J.H., G. Klappstein and I.G.W. Corns. 1996. Field guide to ecosites of Southwestern Alberta. Nat. Resour. Can., Can. For. Serv. Northwest Reg., North. For. Cent., Edmonton, AB. Spec rep. no. 8.

Beckingham, J., I.G.W. Corns and J.H. Archibald. 1996. Field guide to Ecosites of West-Central Alberta. Nat. Resour. Can., Can. For. Serv. Northwest Reg., North. For. Cent., Edmonton, AB. Spec rep. no. 9.

Beckingham, J. and J.H. Archibald. 1996. Field guide to ecosites of Northern Alberta. Nat. Resour. Can., Can. For. Serv. Northwest Reg., North. For. Cent., Edmonton, AB. Spec rep. no. 5.

Beder, K. 1967. Ecology of the alpine vegetation of Snow Creek Valley, Banff National Park, Alberta. MSc thesis, University of Calgary. 228 pp.

Billings, W. D. 1974. Adaptations and origins of alpine plants. Arctic and Alpine Research 6(2):129-142.

Corns, I.G.W. and P. Achuff. 1982. In Ecological (Biophysical) Land Classification of Banff and Jasper National Parks. Vol II: Soil and Vegetation Resources. Edited by Holland, W.D. and G.M. Coen. Environment Canada and Alberta Institute of Pedology, University of Alberta. Pub. no. SS-82-44. 540pp.

Canadensys. 2020. VASCAN: Database of Vascular Plants of Canada. https://data.canadensys.net/vascan/about

Corns, I.G.W. and R.M. Annas. 1986. Field guide to forest ecosystems of West-Central Alberta. Northern Forestry Center, Canadian Forestry Service, Edmonton, Alta. 251pp.

Crack, S. 1977. Flora and vegetation of Wilcox Pass Jasper National Park. Unpublished MSc thesis, Department of Biology, University of Calgary. 284 pp.

Daubenmire, R. G. 1943. Vegetation zonation in the Rocky Mountains. Botanical Review 9:325-393.

Daubenmire, R. 1952. Forest vegetation of Northern Idaho and adjacent Washington and its bearing on concepts of vegetation classification. Ecol. Mongr. 22: 301-330.

Department of Environmental Protection. 1994. Natural Regions of Alberta. Alberta Environmental Protection. Edmonton, Alta. Pub. no.: I/531. 18pp.

Douglas, G.W. 1972. Subalpine plant communities of the western North Cascades, Washington. Arctic and Alpine Research 4(2):147-166.

Douglas, G.W. and L.C. Bliss. 1977. Alpine and high subalpine plant communities of North Cascades Range, Washington and British Columbia. Ecological Monographs 47(2):15-22.

Ecological Land Survey Site Description Manual (2nd Edition).Resource Data Branch, Strategic Corporate Services Division, Alberta Sustainable Resource Development. 2003. 112pp

Gauch, H.G. 1982. Multivariate analysis in community ecology. Cambridge University Press, Cambridge, 298pp.

Glew, K.A. 1998. Distribution and diversity of alpine lichens: biotic and abiotic factors influencing alpine lichen communities in the northeast Olympic and North Cascade Mountains. Thesis Phd, University of Washington. 210pp.

Gould, A.J. 2007. A habitat-based approach to rare vascular plant conservation in the Northern Rocky Mountains of Alberta. Phd thesis. University of Alberta. Edmonton. 336pp.

Hestmark, G. O.Skoqesal and O. Skullerud. 2007. Early recruitment equals long-term relative abundance in an alpine saxicoulous lichen guild. Mycologia. 99(2), 207-14.

Hettinger, L.R. 1975. Vegetation of the Vine Creek basin, Jasper National Park. PhD thesis, University of Alberta. 276pp.

Holland, W.D. and G.M. Coen. 1982. Ecological (Biophysical) Land Classification of Banff and Jasper National Parks. Vol II: Soil and Vegetation Resources. Environment Canada and Alberta Institute of Pedology, University of Alberta. Pub. no. SS-82-44. 540pp.

Hrapko, J.O. and G.H. LaRoi. 1978. The alpine tundra vegetation of Signal Mountain, Jasper National Park. Can. J. Bot. 56: 309-332.

Jaques, D.R. 1976. Winter alpine-subalpine wildlife habitat in the southern Rocky Mountains of Alberta. Kananaskis Center for Environmental Research, University of Calgary. Calgary, Alta. 113pp.

Klinkenberg, Brian. (Editor) 2017. *E-Flora BC: Electronic Atlas of the Plants of British Columbia* [eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver.

Knapik, L.J., G.W. Scotter and W.W. Pettapiece. 1973. Alpine soil and plant community relationships of the Suncshine area, Banff National Park. Arctic and Alpine Research 5: A161-A170.

Körner, C. 1999. Alpine Plant Life: Functional Plant Ecology of High Mountain Systems. Springer. New York. 338 pp.

Kuchar, P. 1975. Alpine tundra communities and Dryas octopetala ssp hookeriana in the Bald Hills, Jasper National Park. Phd thesis, University of Alberta. 351 pp.

Marshall, I.B., Smith, C.A.S., Selby, C.J. 1996. A national framework for monitoring and reporting on environmental sustainability in Canada. Environmental Monitoring and Assessment 39: 25-38.

Meidinger, D. and J. Pojar (compilers and editors). 1991. Ecosystems of British Columbia. BC Min. For. Special Report Series 6. Victoria, BC. 330 pp.

Morgantini, L. E. and W.B. Russell. 1983. An assessement of three selected elk winter ranges in the Rocky Mountains Region. Alberta Fish and Wildlife Division. Edmonton. AB. 264pp.

Mortimer, P.R. 1978. The alpine vascular flora and vegetation of Prospect Mountain, Front Range, Rocky Mountains Alberta. MSc thesis. University of Alberta. 238 pp.

Moss, E.H. 1955. The vegetation of Alberta. Bontany Review XXI(9):493-568.

Ogilvie, R.T. 1969. The Mountain Forest and Alpine Zones of Alberta. In, Vegetation, Soils and Wildlife. edited by J.G. Nelson and M.J. Chambers. Methuen Publications, Toronto. pg 24-44.

Packer, J. G. 1974. Differentiation and dispersal in alpine floras. Arctic and Alpine Research 6(2):117-128.

Porsild, A.E. 1959. Botanical excursion to Jasper and Banff National Parks, Alberta: Alpine and Subalpine flora. National Museum of Canada, , Dept. of Indian and Noarthern Affairs and National Resources, Ottawa, Ontario. 38pp.

Scoggan, H.J. 1978. The Flora of Canada. National Museum of Natural Sciences, Publications in Botany, Ottawa, Canada. No. 7(2).

Stringer, P.W.1973. An ecological study of grasslands in Banff, Jasper and Waterton National Parks. Can. J. Bot. Vol. 51. 383-411.

Strong, W.L. 1992. Ecoregions and ecodistricts of Alberta. Vol 1. Alberta Forestry Lands and Wildlife, Land Information Services Division, Resource Information Branch, Edmonton, Alta. T/244. 77pp.

Strong, W.L. and H.G. Anderson. 1980. Ecological land classification and evaluation reference manual. Resource Evaluation reference manual. Resource Evaluation Branch, Energy and Natural Resources. Edmonton, Alta. 160pp.

Strong, W.L. and J.M. Thompson. 1995. Ecodistricts of Alberta: Summary of Biophysical Attributes. Alberta Environmental Protection, Resource Data Division. Edmonton, Alta. Pub. no. T/319. 91pp.

Strong, W.L. and K.R. Leggat. 1992. Ecoregions of Alberta. Alberta Forestry, Lands and Wildlife, Resource Information Branch, Edmonton, Alta. T/245. 77pp.

Task Group on Unity in Concept and Terminology. 1995. New concepts for assessment of rangeland condition. J. Range Manage. 48:271-225.

Timoney, K.P. 1999. Limber Pine, Whitebark Pine, Alpine Heath and Terricolous Alpine Lichen Vegetation Alliances in Alberta (Compilation of Information on Selected Alberta Plant Community Types 1998-1999). Resource Data Divison, Alberta Environmental Protection. 62 pp.

Trottier, G.C. 1972. Ecology of the alpine vegetation of Highwood Pass, Alberta. MSc thesis, University of Calgary, 229 pp.

Willoughby, M.G., A.J. Gould, J.H. Archibald, G.D. Klappstein, I.G.W. Corns and J.D. Beckingham. 2020. Ecological sites of the Subalpine subregion. Alberta Government, Edmonton. https://open.alberta.ca/publications/9781460147061

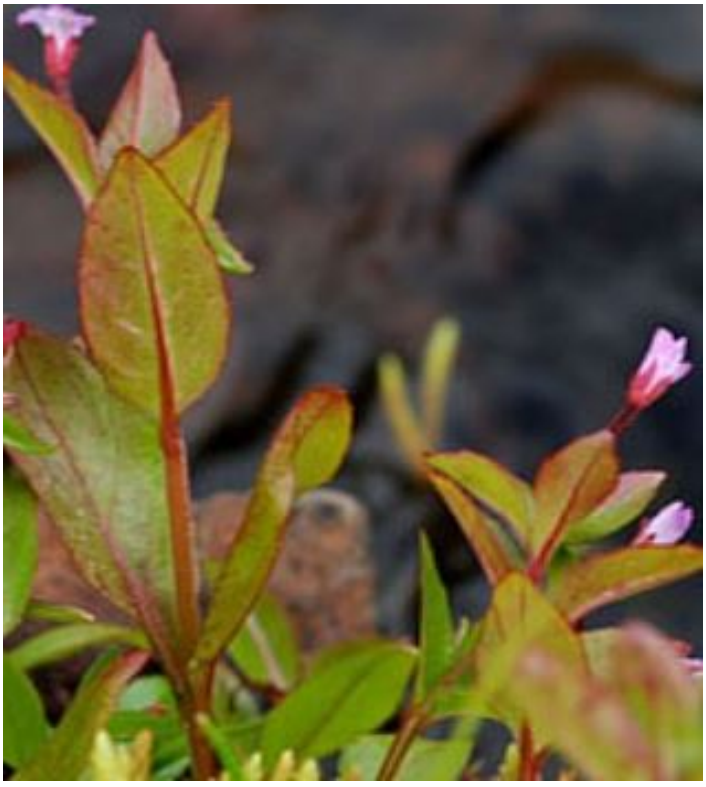
Appendix 1: Indicator species for the various ecological sites in the Alpine subregion

a1 ecosite phase - Moss campion (*Silene acaulis*)

a1 ecosite phase - Michaux's wormwood (*Artemisia michauxiana*)

a1 ecosite phase - Sticky Jacob's-ladder (*Polemonium viscosum*)

a2 ecosite phase - False saxifrage (*Telesonix heucheriformis*)



a2 ecosite phase - Hornemann's willow herb (*Epilobium hornemannii*)

b3 ecosite phase - Arctic willow (*Salix arctica*)

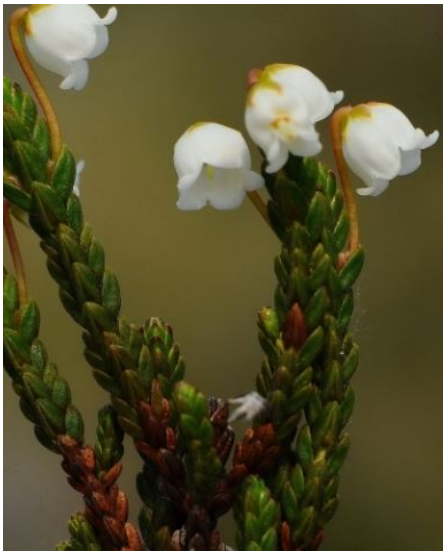
b3 ecosite phase - Net veined willow (*Salix reticulata*)

b3 ecosite phase - White mountain avens (*Dryas octopetala*)

c4 ecosite phase - Bog sedge (*Kobresia myosuroides*)

d2 ecosite phase - Grouseberry (*Vaccinium scoparium*)

d3 ecosite phase - Alpine azalea (*Loiseleuria procumbens*)



d3 ecosite phase - Four-angled mountain heather (*Cassiope tetragona*)

d3 ecosite phase - Partridgefoot (*Luetkea pectinate*)

d3 ecosite phase - Pink mountain heather (*Phyllodoce empetriformis*)

d3 ecosite phase - White mountain heather (*Cassiope mertensiana*)

d3 ecosite phase - Yellow heather (*Phyllodoce glanduliflora*)

e2 ecosite phase - Alpine wormwood (*Artemisia norvegica*)

e2 ecosite phase - Woolly pussytoes (*Antennaria lanata*)

e3 ecosite phase - Black alpine sedge (*Carex nigricans*)

f3 ecosite phase - Wandering fleabane (*Erigeron peregrinus*)

f3 ecosite phase – Pasqueflower (Western anemone) (*Anemone occidentalis*)

f3 ecosite phase - Globeflower (*Trollius albiflorus*)

f4 ecosite phase - Iceland purslane (*Koenigia islandica*)

g3 ecosite phase - Brook ragwort (*Senecio triangularis*)

Appendix 2: Recent updates to the scientific names in this guide from the database of Vascular Plants of Canada (VASCAN) https://data.canadensys.net/vascan/search

Scientific Name in Guide	Scientific Name in VASCAN
Abies lasiocarpa (Hooker) Nuttall	Abies bifolia A. Murray
Agropyron spicatum (Pursh) Scribner & J.G. Smith	Pseudoroegneria spicata (Pursh) Á. Löve
Anemone occidentalis S. Watson	Pulsatilla occidentalis (S. Watson) Freyn
Arctagrostis arundinacea (Trinius) Beal	Arctagrostis latifolia subsp. arundinacea (Trinius) Tzelev
Arctostaphylos rubra (Rehder & E.H. Wilson) Fernald	Arctous rubra (Rehder & E.H. Wilson) Nakai
Aster ciliolatus Lindley	Symphyotrichum ciliolatum (Lindley) Á. Löve & D. Löve
Campanula rotundifolia L.	Campanula alaskana (A. Gray) Wight ex J.P. Anderson
Dryas octopetala L.	Dryas hookeriana Juzepczuk
Elymus innovatus Beal	Leymus innovatus (Beal) Pilger subsp. innovatus
Epilobium angustifolium L.	Chamaenerion angustifolium (Linnaeus) Scopoli subsp. angustifolium
Epilobium latifolium L.	Chamaenerion latifolium (Linnaeus) Sweet
Erigeron peregrinus (Banks ex Pursh) Greene	Erigeron glacialis (Nuttall) A. Nelson
Habenaria dilatata (Pursh) Hooker	Platanthera dilatata (Pursh) Lindley ex L.C. Beck var. dilatata
Hieracium triste Willdenow ex Sprengel	Pilosella tristis (Willdenow ex Sprengel) F.W. Schultz & Schultz Bipontinus
Juncus albescens (Lange) Fernald	Juncus triglumis subsp. albescens (Lange) Hultén
Kobresia myosuroides (Villars) Fiori	Carex myosuroides Villars
Ledum groenlandicum Oeder	Rhododendron groenlandicum (Oeder) Kron & Judd
Loiseleuria procumbens (Linnaeus) Desvaux	Kalmia procumbens (Linnaeus) Gift, Kron & P.F. Stevens ex Galasso, Banfi & F. Conti
Minuartia austromontana S.J. Wolf & J.G. Packer	Sabulina austromontana (S.J. Wolf & J.G. Packer) Dillenberger & Kadereit
Minuartia obtusiloba (Rydberg) House	Cherleria obtusiloba (Rydberg) A.J. Moore & Dillenberger
Minuartia rubella (Wahlenberg) Hiern	Sabulina rubella (Wahlenberg) Dillenberger & Kadereit
Myosotis alpestris auct. non F.W. Schmidt	Myosotis asiatica (Vestergren ex Hultén) Schischkin & Sergievskja

Phleum commutatum Gaudin	Phleum alpinum Linnaeus
Polygonum viviparum L.	Bistorta vivipara (Linnaeus) Delarbre
	Potentilla glaucophylla Lehmann var. glaucophylla
Potentilla fruticosa L.	Dasiphora fruticosa (Linnaeus) Rydberg
Potentilla uniflora Ledebour	Potentilla subgorodkovii Jurtzev
Saxifraga lyallii Engler	Micranthes lyallii (Engler) Small
Scirpus cespitosus Linnaeus	Trichophorum cespitosum (Linnaeus) Hartman
Veratrum eschscholtzii A. Gray	Veratrum viride var. eschscholzianum (Roemer & Schultes) Breitung