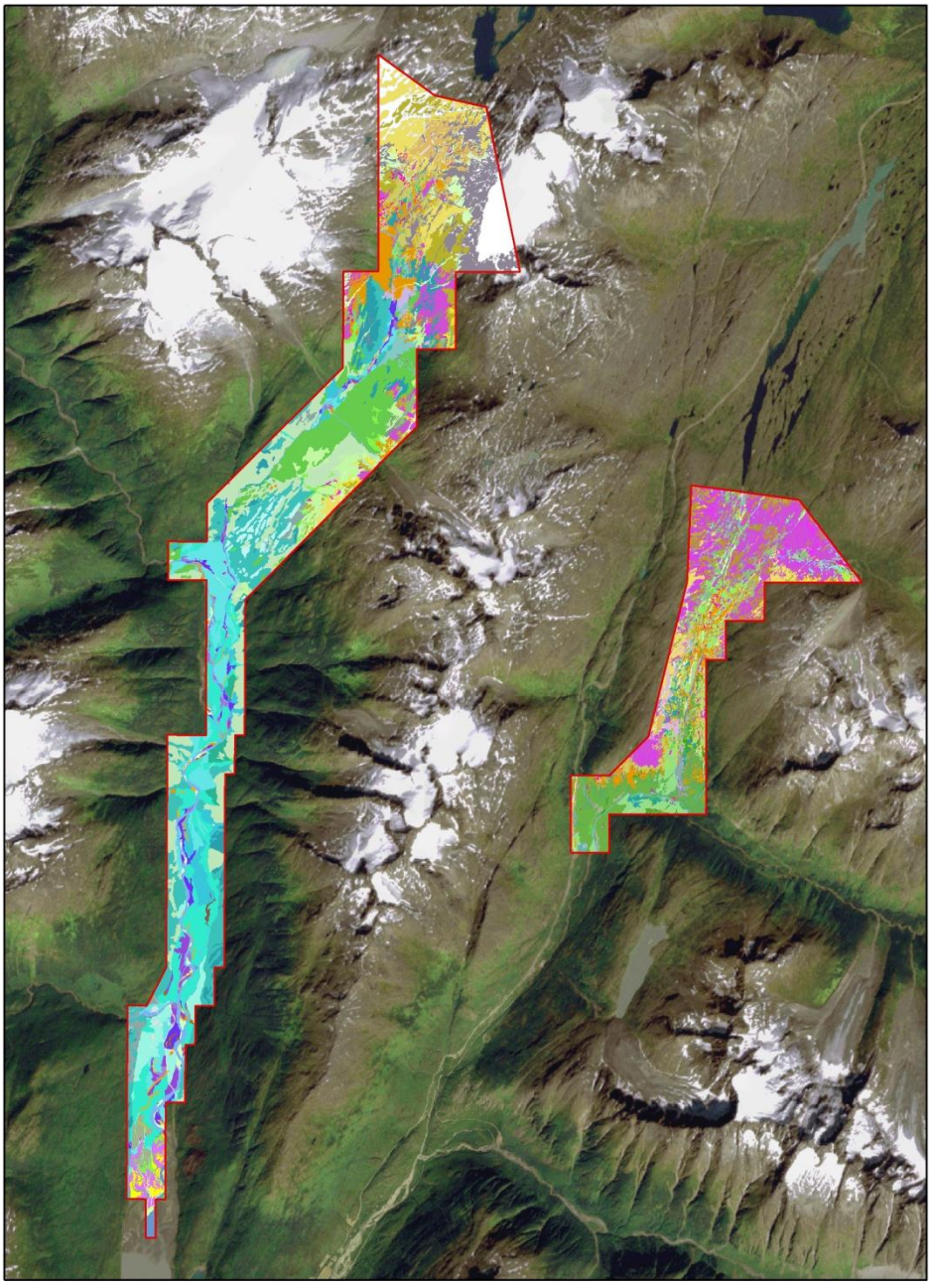
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Natural Resource Stewardship and Science

Klondike Gold Rush National Historical Park

Landcover Classes and Plant Associations

Natural Resource Report NPS/KLGO/NRR—2015/917





ON THIS PAGE
Mosaic of subalpine vegetation types in the White Pass Unit of Klondike Gold Rush National Historical Park. Alaska.
Photograph by: Tina Boucher, Alaska Natural Heritage Program

ON THE COVER
Mapped distribution of landcover types in the Chilkoot (left) and White Pass (right) Units of the Klondike Gold Rush National Historical Park, Alaska overlain on satellite imagery.
Image by: Lindsey Flagstad, Alaska Natural Heritage Program

Klondike Gold Rush National Historical Park

Landcover Classes and Plant Associations

Natural Resource Report NPS/KLGO/NRR—2015/917

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February 2015

U.S. Department of the Interior
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Natural Resource Stewardship and Science
Fort Collins, Colorado

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Abstract

This project addresses landcover at both the map class and plant association levels for Klondike Gold Rush National Historical Park (NHP). Landcover is classified, described and mapped at the map class level and classified and described at the plant association level. The 57 map classes and 86 plant associations described herein are based on the Alaska Vegetation Classification (Viereck et al. 1992) and informed by the floristics of 180 field plots. Landcover distribution was manually digitized on current aerial photography in a GIS environment and attributed at the map class level. A landcover map has been highlighted as a necessary ecological inventory from which the status, condition and trend of natural resources can be monitored (Moynahan and Johnson 2008). The landcover information presented here satisfies this need by providing both a reference and a framework for future natural resource management within Klondike Gold Rush NHP and across the greater region.

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Introduction

Klondike Gold Rush National Historical Park (herein also referred to as 'the Park' and Klondike Gold Rush NHP) is a medium-sized park (5,678 hectares [14,030 acres]) situated at the head of Lynn Canal in southeast Alaska. The park is chiefly comprised of the Chilkoot and White Pass Units, which transect the Coast Mountain Range and through low mountain passes, connect the coastal lowlands of southeast Alaska to the uplands of the Canadian interior. These natural corridors provided access to the Klondike Goldfields during the gold rush of the late 1800s and in a less sensational but more enduring manner, contribute to the unusual floristics of the Park. The rare mixing of maritime and continental climates affects the weather and subsequently the vegetation within the Park to create a relatively cold, dry and floristically-rich ecosystem (Nowacki et al. 2000).

Objectives

In support of the effective management of the diverse natural resources of Klondike Gold Rush NHP, the objectives of this project are to 1) identify, classify, describe and map the landcover classes and 2) identify, classify and describe the dominant plant associations that occur within the Park. This project provides the first landcover map for the Park, but the underlying classifications are informed by the Alaska Vegetation Classification (Viereck et al. 1992), the ecological descriptions of Paustian et al. (1994), as well as regional vegetation classifications completed for Glacier Bay National Park and Preserve (Boggs et al. 2008a), Yakutat Foreland (Shephard 1995) and Chugach National Forest (DeVelice et al. 1999). Provisional plant alliances and associations are proposed for the Park in accordance with the draft National Vegetation Classification (NVC) scheme.

This work was undertaken by the Regional Inventory Program within the Alaska Inventory and Monitoring Program NPS in cooperation with the Alaska Natural Heritage Program (AKNHP) and in support of the Vital Signs Monitoring Plan for the Southeast Alaska Network (Moynahan and Johnson 2008). The goal of the NPS Inventory and Monitoring Program is to provide reliable and consistent information for assessing the status, condition, and trend of key natural resources. Development of a landcover map for Klondike Gold Rush NHP was highlighted as a core ecological element (vital sign) necessary to provide a basic inventory on which this monitoring can be based (Moynahan and Johnson 2008) and resources managed.

Study Area

Klondike Gold Rush NHP occupies 5,254 hectares (ha) at the head of Lynn Canal, a fjord that extends deep into southeast Alaska's Coast Mountains (Figure 1). With an annual average visitorship of 876,872, Klondike Gold Rush NHP is the most-visited NPS unit in the Alaska Region (NPS 2013). The Park is comprised of the Chilkoot, White Pass, Skagway and Seattle Units. The natural, ice-free passages formed by the Chilkoot and White Passes have facilitated ecological and cultural exchange within the Klondike region for thousands of years with trade between coastal Tlingits and interior Athabascans long predating European contact (Thornton 2004). The Chilkoot Unit occupies 9,899 ha at the head of Taiya Inlet and commemorates the 1897 and 1898 passage of an estimated 25,000 - 30,000 fortune-seekers along the Chilkoot Trail from the Dyea town site inland to the Klondike goldfields near Dawson City (Ferreira 2011). The 26.5-km trail extends north from Dyea to the Canadian border where it continues as the Chilkoot Trail National Historic Site, administered by Parks Canada. The White Pass Unit occupies 1,346 ha in the valley adjacent to the east of the Chilkoot Unit and commemorates a lesser flux (5,000-10,000; Ferreira 2011) of would-be miners through its lower pass, yet arguably more treacherous route. The completion of the White Pass and Yukon (WP&Y) Railway in 1899 through the White Pass Unit absorbed the waning traffic to Dawson City. The Skagway and Seattle Units are 9-ha and 700-m^2 parcels located in the town of Skagway and city of Seattle, respectively. The Skagway Unit has been designated a Historic District, with 15 buildings on the National Historic Register (KellerLynn 2009). The old WP&Y Railroad Depot and Administration Complex on 2nd Ave and Broadway houses Park Headquarters (NPS 2013). The Seattle Unit interpretive center located in Pioneer Square's old Cadillac Hotel highlights Seattle's role as a point of departure for the Klondike Gold Rush. Due to their urban nature, the Skagway and Seattle Units are not addressed in this project.

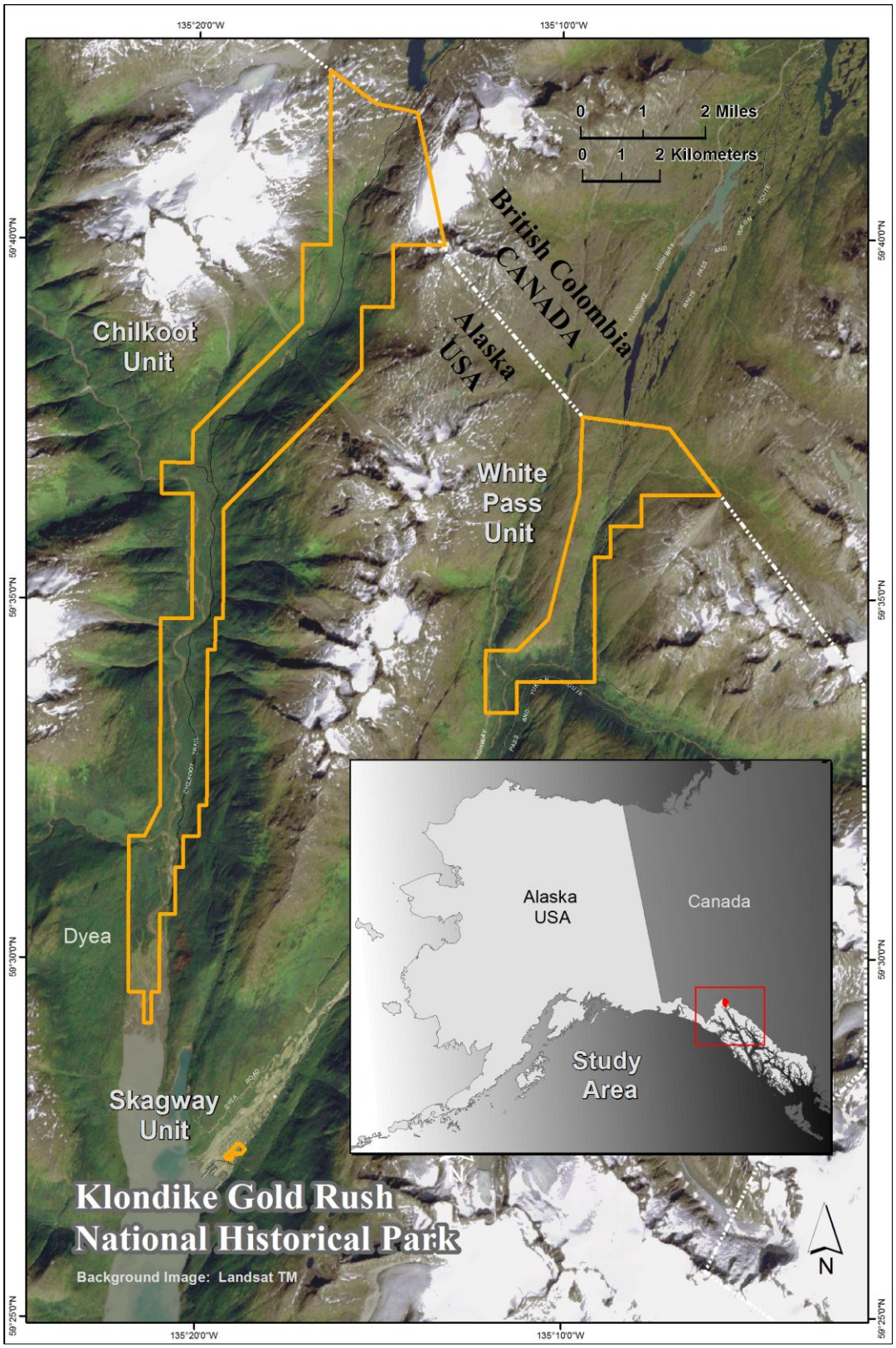


Figure 1 Vicinity and location of Klondike Gold Rush National Historical Park, Alaska.

Physiography

Klondike Gold Rush NHP follows two low mountain passes through the rugged, high-relief Coast Range of Alaska. The Chilkoot and White Pass Units follow the Taiya and Skagway River valleys, respectively from their alpine headwaters to forested lower valleys. The Chilkoot Unit, which rises from sea level to over 1,675 m, contains the entirety of the Taiya River. The White Pass Unit ranges in elevation from 294 to 1,150 m and contains the White Pass Fork and an adjoining section of the upper Skagway River. In its lower reaches the Taiya River is comprised of multiple braided channels dissecting active floodplains; upgradient of its confluence with the glacier-fed Norse River, the Taiya is constrained by high bedrock sidewalls. Although limited floodplains flank the subalpine reaches of the White Pass Fork, waterways typically cascade through bedrock-controlled, high-gradient channels within the White Pass Unit (Paustian et al. 1994). Both the Taiya and Skagway River systems spill from wide valley bottoms across uplifted tide flats and through estuaries to join the fjordwaters of Lynn Canal. Along these valleys, floodplains and stream terraces rise to steep alluvial fans and mountain slopes. Approaching the Chilkoot and White Passes, these younger landforms give way to glacier-scoured bedrock shields and rounded alpine summits. Although not common within the Park boundaries, the surrounding mountains support icefields and numerous glaciers.

Climate

Owing to its location at the head of a fjord that cuts deeply into the coastal mountains, Klondike Gold Rush NHP is characterized by a mix of continental and maritime climates that interface from sea level to the high alpine (Nowacki et al. 2000). Similar to much of southeast Alaska, wetness and disturbance are major climatic drivers for the development and maintenance of Klondike's ecosystems. Precipitation is delivered by frequent storms in the Gulf of Alaska that foster the lush growth of temperate rainforests, while disturbances associated with these same storms often reset vegetation to an earlier successional stage (Derr et al. 2005). However, Klondike's relative remoteness from the open ocean lessens storm effects and its proximity to the continental interior increases inputs of cold and dry air (Davey et al. 2007, Nowacki et al. 2001). As a result, the Klondike region experiences less precipitation and greater fluctuation in annual temperatures relative to much of southeast Alaska.

The name 'Skagway' refers to the effects of the legendary north wind (Thornton 2004), a namesake revealing the influence of climate on culture. At Chilkoot Pass, mean monthly wind speeds reach 23.5 m/s, while temperatures dip to -27.9^{o}C and snow reaches depths of over 4 m (for the highly discontinuous period of measurement from 2010 to 2013; RAWS 2014). At White Pass, mean monthly wind speeds reach 87.6 m/s, while temperatures dip to -29.9^{o}C and snow reaches depths of over 3 m (for the highly discontinuous period of measurement from 2010 to 2012; RAWS 2014). Below White Pass at the Moore Creek weather station, the mean monthly temperature for July (warmest month) is 10.2^{o}C, mean monthly temperature for December (coldest month) is -8.1^{o}C (for the period of record from 2004-2014; SNOTEL 2014). Average annual precipitation (including water equivalent of snow) is 59.0 cm with 74.9 cm as snowfall. Mean monthly precipitation for September (wettest month) is 101.7 cm received entirely as rain. The mean monthly precipitation for November (driest month) is 15.3 cm, with 14.4 cm received as snow (for the periods of record from 2004 to 2014 [precipitation] and from 2009 to 2014 [snow]; SNOTEL 2014).

In Skagway, for the semicontinuous period of record from 1950 to 2012, the mean monthly temperature for July (warmest month) is 14.6°C, mean monthly temperature for January (coldest month) is -4.6°C. Average annual precipitation (including water equivalent of snow) is 69.4 cm with 117.6 cm as snowfall. Mean monthly precipitation for September (wettest month) is 10.03 cm received entirely as rain. The mean monthly precipitation for May (driest month) is 2.3 cm, also received entirely as rain (WRCC 2014).

The Klondike region is projected to become warmer over the next century, change that is likely to transition winter maximum temperatures (-0.67°C) above freezing; and through increased rates of evapotranspiration, offset predicted gains in precipitation (WRCC 2014, Schirokauer 2009).

Geology

Regional Tectonics

The Coast Mountain Complex is a massive belt of plutonic and associated metamorphic rocks extending from southern British Columbia northward through southcentral Alaska and the Yukon. The Klondike region is underlain by the central granitic zone of this belt, which is comprised of granodioritic to granitic plutons of middle to late Tertiary age (Berg et al. 1972, Brew and Ford 1995). The accretion of the Alexander terrane to the leading edge of the North American Plate 70 - 55 million ybp (years before present) produced the convergence and crustal thickening necessary to initiate the intrusion of these plutons 58-48 million ybp (KellerLynn 2009).

Klondike Gold Rush NHP is located at the southern terminus of the Denali Fault system and inboard from the Queen Charlotte-Fairweather fault, which represents the surface expression of the subduction zone along which the Pacific Plate is consumed under the North American Plate (Yehle and Lemke 1972). Minor faults radiating from these larger fault systems have been inferred to run under the Taiya Inlet and River and the lower Skagway River valley and are thought to direct the linearity of the fjords, their attendant valleys (KellerLynn 2009, Yehle and Lemke 1972), and likely the consistent fracture pattern of bedrock exposed at higher elevations in White Pass.

Glacial History

Klondike is undeniably a glacial landscape. Although its current glacial extent is limited and decreasing, evidence of the multiple Pleistocene Epoch glaciations occurring in 49,000 and from 24,000 to 13,000 and 1,500 to 250 ybp remains. The earliest Pleistocene event covered the region with a thick field of ice, and is responsible for the downweighting and the subsequent isostatic release experienced by the region. The less extensive advance initiated 24,000 ybp is responsible for the glacially carved and scoured features that typify the modern landscape. The Little Ice Age events between 1,500 and 250 ybp advanced the extent of alpine glaciers, remnants of which survive today (Hamilton 1994, KellerLynn 2009).

It is estimated that coastal areas were depressed from 100 to 250 m by the early Pleistocene glaciation (Hamilton 1994). Extreme uplift in southeast Alaska began about 1770 AD and is modified by ice thinning, tectonic forcing, and global glacial isostatic adjustment (KellerLynn 2009, Larsen et al. 2005). In Klondike, the current rate of annual uplift is estimated at 21.02 (±4.06) mm/yr

with a net rise of 4.5 m relative to sea level over approximately 350 years of uplift (Larsen et al. 2005).

A map of the area dating from 1948 shows permanent ice and snow within the Park; however in the last half century this presence has diminished in concert with the greater thinning and recession of mountain glaciers across Alaska (Arendt et al. 2002, KellerLynn 2009). Although the Park does not currently support icefields or glaciers, perennial snow and ice are part of the Park's greater landscape and influence it's hydrological and disturbance processes. Glaciers remain an important source of water in both the Taiya and Skagway River watersheds and it is suggested that fossil permafrost may exist at upper elevations in the White Pass Unit; otherwise the Park is considered to be permafrost-free (KellerLynn 2009).

Surficial Geology

Within Klondike Gold Rush NHP, the surface expression of bedrock is largely restricted to alpine barrens and mountainslope cliffs; the remainder of the Park is mantled by unconsolidated material derived from the local bedrock. While minor residuum accumulates from the in situ weathering of bedrock along mountain slopes, the vast majority of unconsolidated material has been reworked by glacial processes and redeposited as colluvial and alluvial landforms along footslopes and valley bottoms. Colluvial deposits accumulate at the base of mountain sideslopes; alluvial deposits occur as fans, floodplains and deltas (summarized from Paustian et al. 1994). The Taiya River Delta extends offshore as a sediment wedge of decreasing thickness and grain size. Due to isostatic uplift, glaciomarine deposits once positioned in the delta are now present in the uplifted estuary at Dyea (KellerLynn 2009).

Soils

Soil development in Klondike Gold Rush NHP is generally limited by climate, disturbance and/or age. The harsh climate and short growing season in the alpine restricts the depth and extent of organic soils. Most commonly, soil in Klondike's alpine environments are mineral overlain by thin organics (Lithic Cryorthents) and typically occur over shallow bedrock and across convex topography. Less commonly, alpine soils are found as thick organic layers (Lithic Cryosaprists) associated with meadows and occurring over concave or otherwise protected topography. (Paustian et al. 1994).

Mountain sideslope soils transition from shallow organic soils over bedrock (Lithic Humicryods) on upper slopes to shallow, well-developed mineral soils with thick organic surfaces (Lithic Haplocryods) on midslopes and deep, well-developed mineral soils with thin organic surfaces (Typic Humicryods to Typic Haplocryods) on lower slopes. Mountain footslope and alluvial fan soils are commonly deep, poorly-developed and well-drained mineral soils (Entisols). Similarly, avalanche soils are highly mineral and well drained (Lithic Cryorthents), yet with time thick, organic-rich mineral surface layers they can develop from abundant deciduous shrub litter (Entic Cryumbrents, Paustian et al. 1994).

Floodplains soils are generally very deep, undeveloped and highly stratified. Older soils elevated above the active floodplain are typically well-drained (Cryorthents); whereas younger, regularly-

flooded soils are more poorly drained (Aquents). Similar to floodplain soils, the estuary soils at Dyea are very deep and undeveloped. Soils elevated above tidal influence tend to be well-drained (Cryofluvents); whereas those soils subject to daily or seasonal tides are more poorly drained (Aquents; Paustian et al. 1994).

Recent survey work by the Natural Resources Conservation Service (NRCS) will describe and map the soils and ecological sites of The Skagway–Klondike Gold Rush NHP; however the map and report are currently in draft form and not available for review.

Disturbance

Klondike is subject to the same types of natural disturbances active in pristine areas of the Coastal Range, but has experienced a much greater extent of human disturbance due to its gold rush history. Both natural and anthropogenic disturbances can be evaluated with respect to their frequency, scale and intensity.

Natural Disturbance

Earthquake and related effects of ground shaking represent infrequent yet potentially large-scale and high-intensity disturbances. Klondike's location at destructive plate margin makes the region susceptible to earthquakes. Because the Pacific plate is rotating counterclockwise as it converges with the North American Plate, movement is dissipated across a multitude of faults instead of being concentrated along one major fault. As a result, the region experiences many small earthquakes (NPS [no date]). While the probability of a large, destructive earthquake in the Klondike region is not precisely known, it is suggested that earthquakes ranging in magnitude from 6-8 could occur in the near future (Yehle and Lemke 1972).

The potential effects of earthquake include landslides, avalanches, tsunami and glacial outburst flooding, although earthquake is not prerequisite for their initiation. Saturated and loose sediments on sloped topography are particularly susceptible to landslide; moderate landslides are known to have occurred in the Park during periods of heavy rain and presumably during seismic events (Yehle and Lemke 1972). A large slide east of Sheep Camp killed 18 men in 1897 (New York Times, 1897).

Avalanches are common along the steep valley walls of the Chilkoot and White Pass Units (Nowacki et al. 2001). Most famously, the Palm Sunday series of avalanches in 1898, which occurred between Sheep Camp and the Scales on the Chilkoot Trail, caused approximately 65 fatalities, many of the deceased were buried at the Slide Cemetery in Dyea (KellerLynn 2009).

Although not earthquake induced, subaqueous sliding of the Skagway Delta, caused by coastal construction projects in 1966 and 1994 resulted in tsunami events (Hood et al. 2006). Presumably, subaqueous sliding of the Taiya Delta severed submarine cables on the floor of Taiya Inlet in 1927 (Yehle and Lemke 1972). The somewhat regular occurrence of these slides suggests that tsunamis will continue to affect the shoreline as long as the Taiya and Skagway Deltas are actively growing with sediment.

Glacial outburst flooding within the Chilkoot Unit represents an infrequent yet potentially large-scale and high-intenstiy disturbance. A warming climate has increased the rates of recession and thinning

for many southeast Alaska glaciers, including those that feed Park watersheds (Arendt et al. 2002). This warming increases the size of proglacial lakes and weakens the glacial moraines (particularly those that are ice-cored) that impound them (KellerLynn 2009). Flooding of the lower Taiya Valley estimated to have occurred between 1883 and 1887 and the Sheep Camp Flood of 1897 are thought to have resulted from glacial outburst floods of the Nourse proglacial lake and an unspecified glacier originating above Stone House, respectively (Ferreira 2011). In 2002, a lateral moraine of the West Creek glacier failed, releasing a volume of water that exceeded the 500-year flood estimates for West Creek. This outburst flood damaged private landowners' and NPS properties, including the lower Chilkoot Trail, Dyea Campground, and the historic Dyea town site (Denton et al. 2005). Of similar concern is a future glacial moraine outburst flood from the proglacial lake fronting the Nourse Glacier. If released, it is estimated that this flow would exceed five times the 500-year flood event for the Taiya River (Denton et al. 2005). This catastrophic downstream flooding would severely impact the lower portion of the Chilkoot Trail and potentially destroy the remains of the historic town site and park infrastructure in Dyea (NPS 2013).

Seasonal river and storm tidal flooding occurs in the lower reaches of the Chilkoot Unit. With its headwaters, streamflow of the Taiya is heavily influenced by snowmelt and therefore may experience seasonal flooding (Bernatz et al. 2011), especially during significant rain events. In its lower reaches the Taiya River has crested over 5 m (flood stage) 17 times since 1971 (NWS 2013). The gentle topography of the uplifted tidal flats at Dyea extends the reach of storm tides. Due to its inland and higher watershed position, the White Pass Unit does not experience the same types or extent of flooding.

Anthropogenic Disturbance

The low, ice-free Chilkoot and White Passes provided valuable trading routes between the coastal Chilkoot Tlingit and the interior Tagish Athabascan for two centuries prior to the arrival of Euro-Americans in the 19th century and for larger numbers of explorers, pioneers, prospectors and visitors since (Ferreira 2011). Despite their long history of use, human disturbance in both the Chilkoot and White Pass Units was overwhelmingly concentrated around the Gold Rush of 1897-98 when up to 30,000 and 10,000 fortune-seekers are estimated to have traveled the Chilkoot and White Passes, respectively (Ferreira 2011). Forests were cleared; settlements erected and mechanized transport built to move people, animals and goods through the passes (Paustian et al. 1994).

Settlements along both trails as well as customs houses at the summits of each pass were established. Described as 'a boisterous, transient aggregation of some 4,000 to 5,000 souls' (Norris 1996), Dyea served as the jumping off point for the Chilkoot Trail. Five miles north of Dyea was the second major river crossing and relatively small camp of Finnegan's Point (Ferreira 2011). Canyon City, located at the confluence of the Norse and Taiya Rivers grew to an encampment of 1,500 people and was the location of power generating facilities and the lower terminus of an aerial tramway through Chilkoot Pass (Ferreira 2011). Above Canyon City, the roadhouse and camp at Pleasant Camp served as a natural resting point at the top of the Taiya River canyon. The largest settlement, Sheep Camp, grew to 8,000 in the last stands of timber before the climb up Long Hill and The Scales (Ferreira 2011, Norris 1996). Settlements in the White Pass Unit were constrained by topography, but in the

relatively flat area surrounding the confluence of the Skagway River and its White Pass Fork, White Pass City grew to 1,800 people during the gold rush and later due to railway construction (Johnson 2004).

Chilkoot Unit forests were extensively logged in support of the rush. Dyea was completely cleared of trees, and 'severe denudation' of the landscape is described at Canyon City (Ferreira 2011). Specific impacts to the natural environment are described in the following:

> *'…including not only the devastation wrought on the forests for firewood, built structures at the camps and trail features such as bridges, but also the impressive, large-scale engineering systems of the tramways and utility lines'* (pg. 40, Ferreira 2011).

> *"Trail clearing, corduroy trail tread construction, and the creation of log bridges in areas outside of the larger camps further degraded the natural environment. As with the camps, the forest denudation brought with it an increased vulnerability to erosion, particularly after high-water and flood events."* (pg. 332 Ferreira 2011).

Buried charcoal layers in soil and historic photographs suggest a burn in the Sheep Camp area occurred at some time during the rush (Ferreira 2011).

The aerial tramway built from Canyon City to Chilkoot Pass and powered by stations at Canyon City and Sheep Camp allowed clients to ferry their goods over the difficult sections of trail along the Taiya River Canyon, Long Hill, The Scales and the Golden Stairs. Where the alignment passed through forest, land was cleared for passage (Ferreira 2011). Two shorter tramways were built from the bottom of the scales through the pass, with a 11.25 km-long powerline strung from the power plant at Canyon City to power one of these operations (Ferreira 2011).

In the White Pass Unit, the Bracket Wagon Road (from Skagway to the beginning of Dead Horse Gulch; Johnson 2004) and later a narrow-gauge railroad from Skagway to White Pass summit (33 km) were built to accommodate travel. A tram briefly operated between White Pass City and Heney Station on the White Pass & Yukon Railway located high on the steep mountainside above town (Johnson 2004).

Logging by the Skagway Lumber Company in the Lower Taiya River Valley represents the greatest post-gold rush, human-induced disturbance to Park vegetation. From 1949 to 1956 operations were based from Hosford's sawmill located approximately 3 mi upstream of Dyea. Logging during this period targeted *Picea sitchensis* and occurred primarily on the east side of the Taiya River from Dyea to Finnegan's Point. Later, *Populus balsamifera* ssp. *trichocarpa* was harvested from Dyea (1961-62) and additional *Picea sitchensis* was cut from the West Creek drainage (1968). Although most lumber felled in the West Creek drainage was located outside of the Park, a network of roads and bridges was built through park lands to access these stands (Norris 1996).

Today, the Chilkoot Unit is minimally impacted by residential and recreational use in Dyea as well as the passage of less than 5,000 hikers annually (3,750 overnight visitors in 2009). The White Pass Unit is bisected by small sections of the Klondike Highway (1.6 km; constructed in 1978) and the

now historic, White Pass and Yukon Railway, but receives little foot traffic due to a combination of rough terrain and limited accessibility (Bernatz et al. 2011).

Vegetation

The convergence of coastal, temperate rainforest, boreal forest and alpine systems in the Klondike region produces steep ecological gradients and unusually complex species assemblages (Moynahan and Johnson 2008). Along the coastline, estuarine plant associations develop in protected shores of the fjord heads and river mouths. Above tidal influence, lowlands support beach meadow associations and early seral woodlands forested by *Picea sitchensis* (Sitka spruce), and the rare and localized *Pinus contorta* var. *latifolia* (lodgepole pine). Similar to much of southeast Alaska, *Populus balsamifera* ssp. *trichocarpa* (black cottonwood) and *Picea sitchensis* codominate valley floor floodplains. Outside active floodplains, *Tsuga heterophylla* (western hemlock) becomes an increasingly dominant species in mountain toe and sideslope forests, with dominance transitioning to *Tsuga mertensiana* (mountain hemlock) in the subalpine. Different from much of southeast Alaska, species with affinities to interior climates such as *Betula papyrifera* (paper birch), *Pinus contorta* var. *latifolia* and *Abies lasiocarpa* (subalpine fir) occur in unique forest associations in Klondike. *Alnus viridis* ssp. *sinuata* (Sitka alder) shrublands develop in early-seral sites disturbed by glaciation, avalanche, landslide and flooding. Estuarine and riparian wetlands are relatively common in the Park; however steep topography and highly-fractured bedrock hinder the development of freshwater palustrine wetlands. When found these wetlands fringe small lakes and ponds or occur as headwater fens over shallow bedrock depressions. In the subalpine, dwarf stands codominated by *Tsuga mertensiana* and *Abies lasiocarpa* grow interspersed with dwarf shrub and alpine meadow communities (Paustian et al. 1994). With increasing exposure, alpine vegetation grades from dwarf ericaceous shrub to dry lichen-gramminoid communities. Barren rock and perennial snow and ice occupy the highest, most exposed alpine areas.

Floristics

Plant diversity in Klondike Gold Rush NHP is elevated by the interaction between the mild maritime and harsh continental climates. In fact, it has been suggested that the region at the head of Lynn Canal represents ‘the greatest center for plant diversity in Alaska’ (Pojar and Mackinnon 2004). Within the Park 385 vascular plant, 81 bryophyte and 766 lichen taxa have been confirmed (this study, Carlson et al. 2006, Spribille et al. 2010). The astounding lichen diversity ‘represents one of the largest numbers of lichenized and lichenicolous fungi per unit area ever reported and the largest number ever reported from any United States National Park of any size’ (Spribille et al. 2010). Conversely, the relative paucity of bryophyte taxa presumably relates to undersampling. To our knowledge, bryophyte-specific surveys have not been conducted in the park. As a result it is likely that the actual moss and liverwort diversity far exceeds the number or species documented to date. While several vascular plant and lichen taxa of conservation concern are known from the Park, none of the bryophyte taxa documented in this survey are considered rare.

Species of Conservation Concern

Three vascular plant species of current or former conservation concern have been reported from the Park. Conservation status relates to the extinction risk posed to a given species and is assessed on

global (G) and statewide (S) levels (Masters et al. 2012). State level ranks for taxa within Alaska are designated by the Alaska Natural Heritage Program; global ranks are designated by the conservation organization, NatureServe and are based on the collective state ranks. At both scales, numeric ranks range from 1 (species of highest conservation concern) to 5 (species of very low conservation concern). A detailed description of conservation status ranks is provided as Appendix A.

Micranthes occidentalis (S. Watson) Small — Alberta saxifrage
(syn. *Saxifraga occidentalis* S. Watson)
G5 S1
Micranthes occidentalis was collected along the Taiya River in 1995 (ALA 2004). Attempts by AKNHP to relocate the population in 2002 and 2011 were unsuccessful. Only one other collection from the Ketchikan area is known from Alaska.

Phyllodoce empetriformis (Sm.) D. Don — pink mountainheath
G5 S1S2
A small population of *Phyllodoce empetriformis* was found in the eastern-most alpine portion of the White Pass Unit in 2003 (Carlson et al. 2006). This species was collected by 1898 at 'White Pass' by A.L. Bolton (Hultén 1941-1950). Assuming the population encountered in 2003 represents the same documented in 1898, fewer than six populations are known in Alaska (Nawrocki et al. 2013).

Eleocharis kamtschatica (C.A. Mey.) Kom. — Kamchatka spikerush
G4 S4[1]
Eleocharis kamtschatica was found in an intertidal sedge-forb meadow at Dyea in 2002 and again in 2011 (this study, Carlson et al. 2006). This small spike rush is often overlooked and for this reason was historically under-documented. Recent collections prompted the downranking of its conservation status from an S2 to S4 in 2012 by the Alaska Natural Heritage Program (AKNHP).

Of the lichen taxa documented in Klondike, four are new to science and 196 are new to Alaska (Spribille et al. 2010). Although their taxonomy is somewhat unresolved and most species have not been formally ranked, these new taxa should be considered provisionally rare. Thirteen lichen species have been identified as rare and ranked by AKNHP:

Cavernularia lophyrea (Ach.) Degel. — pitted lichen
G4? S2S3
Fuscopannaria ahlneri (P. M. Jorg.) P. M. Jorg. — Fuscopannaria lichen
G4G5 S2S3
Fuscopannaria alaskana P. M. Jorg. & Tonsberg — Fuscopannaria lichen
G1 S2

[1] Previously ranked S2

Lobaria retigera (Bory) Trevis.	lung lichen
GNR S2S3	
Nephroma occultum Wetmore	kidney lichen
G4 S1	
Pilophorus cereolus (Ach.) Th. Fr.	nail lichen
G3G4 S2	
Pilophorus clavatus Th. Fr.	nail lichen
G4? S2S3	
Placynthium stenophyllum (Tuck.) Fink	blackthread lichen
G2G4 SU	
Pseudocyphellaria mallota (Tuckerman) H. Magnusson	Pseudocyphellaria lichen
G4 S1S3	
Pyrrhospora quernea (Dickson) Körber	Pyrrhospora lichen
G4 S1S3	
Sticta oroborealis Goward & Tonsberg	spotted felt lichen
G1G2 S2	
Umbilicaria angulata Tuck.	navel lichen
G4? S3	
Vestergrenopsis elaeina (Wahlenb.) Gyelnik	Vestergrenopsis lichen
GNR S2S3	

Nonnative Species

The historic and current accessibility of the Park have facilitated the introduction of nonnative plant species. Presumably, nonnative plants and propagules were unintentionally introduced to the region with the influx of goods, animals and people associated with the Klondike Gold Rush. Individuals wishing to cross to Canada were required to bring a combination of goods and funds to support their travel to Dawson (Johnson 2004), supplies were typically purchased in or imported from Seattle (Ferreira 2011) and included animal feed that could have been contaminated with nonnative seed. Nonnative plants and propagules continue to be dispersed along the trail, road and railway corridors that bisect the Park. As of the 2012 field season, 31 nonnative plant taxa had been confirmed growing in the Chilkoot (28 taxa) or White Pass (15 taxa) Units (Goodrich 2011). Infestations of note include the populations of *Euphrasia nemorosa* (common eyebright 42[2]) in Dyea, which represented a first record for the state when it was detected in 2002 (Carlson et al. 2006), the abundance of *Rumex acetosella* (sheep sorrel 51) on the tidal flats that presumably has persisted since the occupation of Dyea, and the presence of *Phalaris arundinacea* (reed canarygrass 83) at Sheep Camp on the

[2] The Invasiveness Ranking System for Non-Native Plants of Alaska (Carlson et al. 2008) assigns a rank to non-native plant species based on potential ecosystem impacts, biological attributes, known distribution, efficacy of control measures, and the potential for establishment in the different ecogeographic regions of Alaska. Based on this evaluation, species are ranked between zero and 100, where zero indicates low invasiveness and 100 indicates high aggressiveness.

Chilkoot Trail in 2011 that was apparently introduced with recent restoration work (Carlson et al. 2006, Goodrich 2011).

Methods

The landcover and plant association classifications, descriptions and map developed for Klondike Gold Rush NHP are based on aerial and satellite imagery that has been field checked by vegetation survey. Prior to field work, the locations for sampling transects were proposed on aerial photography taken in 2003. Following field work, plant associations and landcover classes were classified and described and landcover classes were mapped on the imagery with reference to vegetation plot data.

Sampling Design

Vegetation was sampled to characterize the different plant associations and landcover types within the Park. Plots were organized by transect, which were located to capture the full variation of vegetation present within the park. For efficiency of sampling, transects that were accessible and had steep environmental gradients were preferentially targeted.

Sampling intensity was guided by the size of the park, complexity of the environment, inherent variability of the vegetation and preexisting vegetation data (NPS 1994). Klondike Gold Rush NHP is a medium-sized park (1-100 km^2) with a transitional landscape position, which elevates its environmental complexity and vegetation variability. For medium-sized parks that are not fully accessible, such as Klondike Gold Rush NHP, a sampling intensity that places plots in representative vegetation polygons in pilot areas that represent the greatest possible diversity of vegetation is recommended (NPS 1994). Some preexisting vegetation data was available for Klondike; however the plot data was either limited in geographic scale or sampling intensity or not georeferenced. For these reasons this data was only minimally informative to our work.

Field Methods

Field work was conducted August 8-22, 2011 in the Chilkoot and White Pass Units by Tina Boucher, Lindsey Flagstad, Rebecca Shaftel and Abraham Schmidt (AKNHP). Parker Martyn (NPS) joined the effort on August 21 and 22, 2011. Additional plots were sampled in the Chilkoot Unit July 11-13, 2012 by Tina Boucher and Brian Heitz (AKNHP). The Chilkoot Unit was accessed by foot while the more remote White Pass Unit was accessed by foot, car and helicopter.

Floristic Data Collection

Along a given transect, sampling plots were located in homogenous vegetation using a modification of the "subjective sampling without preconceived bias" approach described by Mueller-Dombois and Ellenberg (1974). At each sample site a 100 m^2 or 400 m^2 vegetation plot was established, with plot size dependent on the physiognomy of the dominant vegetation. Smaller plots were completed for nonforested types and plot dimensions were increased for forested types. Plot boundaries were modified while maintaining total plot area to capture linear features.

All vascular and the dominant nonvascular plant taxa occurring within the plot were recorded, with dominance defined as those taxa with foliar cover exceeding 5%. Primary sources for the identification of vascular species were the Flora of Alaska (Hultén 1968) and the Flora of North America (1993). Nonvascular species were identified with reference to Lawton (1971), Vitt et al. (1988), Schofield (1992, 2002), Brodo et al. (2001), and the Flora of North America: Bryophyta

(2007). Taxa that could not be accurately or efficiently identified in the field were collected and pressed for later identification. A complete species list is provided as Appendix C.

Percent aerial cover was estimated for all taxa, physiognomic groups (e.g. needleleaf forest, tall shrub, forb) and categories of unvegetated groundcover (e.g. gravel, cobble). For this project, aerial cover is considered the vertical projection of an individual plant's foliage, or the outline collectively covered by all individuals of a species or physiognomic group on the ground as viewed from above (Brown 1954, Daubenmire 1959). Where multiple strata of vegetation were present (e.g. tree, shrub, herb) total cover often exceed 100%. Tree canopy covers were quantified using a densitometer; all other covers were estimated occularly. These methods of cover estimation are considered equal and treated as such (Vora 1988).

Height was recorded in meters for woody taxa and physiognomic groups. Tree heights were captured using a Laser Technology Inc. TruPulse 360 rangefinder; all other heights were visually estimated.

Environmental Data Collection

Latitude, longitude, elevation and positional error were recorded at the approximate center of each plot with a Trimble GeoXT 2008 hand-held GPS unit. Due to the difficulty of achieving the positional accuracy necessary to log a point using the Trimble unit under a dense forest canopy in mountainous terrain, backup points were logged at lower accuracy using a Garmin 76CSx hand-held GPS unit. Terrain slope was measured using a clinometer and recorded in degrees from level. Aspect was measured using a hand-held compass and recorded in degrees from true north. Landform and moisture class were described in accordance with Boggs et al. (2008a) and Viereck et al. (1992), respectively. Abiotic site data is summarized in Appendix B. All data were recorded on field forms (Appendix G) for later entry to tabular (Microsoft Access 2010) and spatial (ArcMap 10.1) database formats. The database used for plot data entry was developed by NPS Inventory and Monitoring and is consistent with previous work on National Park lands across the state. Vegetation, soils, and environmental data, as well as plot photographs and data sheets, are archived by NPS and are available for public distribution upon request.

Vegetation Analysis

Landcover classes and plant associations were classified using data from the 180 vegetation plots. To reduce heterogeneity within the dataset, plots were stratified into three physiognomic groups: 1) forest, 2) shrub, and 3) herbaceous. Preliminary vegetation groups were defined by both Two-way Indicator Species Analysis (TWINSPAN) and cluster analysis (McCune and Mefford 2006).

TWINSPAN is a divisive grouping method that begins with the entire sample (all plots) which is progressively divided into groups of associated plots following correspondence analysis (reciprocal averaging; McCune and Grace 2002, Lea 2011). Different from TWINSPAN, cluster analysis is an agglomerative grouping method that begins with a single plot, rather than the entire collection of plots. This method associates plots on the basis of species type and abundance. Cluster analysis for Klondike was performed using Ward’s linkage method and Euclidean distance.

Using these preliminary groupings, nonmetric multi-dimensional scaling (NMS) was used to visualize the compositional similarity within each group. To equalize the importance of common and uncommon species, species cover was relativized by the maximum value for each species; the Sørenson (dissimilarity) index was used as the distance measure (McCune and Grace 2002). All analyses (TWINSPAN, cluster and NMS) were performed using PC-ORD Version 5.10 (McCune and Mefford 2006). Association tables comparing species composition by plot were also constructed to facilitate comparisons among and within each group. The collective evaluation of the various groupings suggested by cluster analysis, ordination, association tables and literature review informed the final diagnosis of plot data and plant association nomenclature.

Landcover and Plant Association Classifications

The ecological classification of vegetation seeks to organize the continuum of species occurring across a landscape into discrete, observable, taxonomic classes. While this process allows the more precise and consistent communication of ecological concepts, it also requires generalization and the implementation of somewhat arbitrary boundaries based on character, indicator, differential and diagnostic species. This project classifies the existing (opposed to potential) vegetation occurring within Klondike Gold Rush NHP at both the landcover class and plant association levels. A landcover class can be considered a mappable unit that describes the observable biophysical material at the earth's surface. Plant associations represent a finer community type of definite floristic composition, uniform habitat conditions, and uniform physiognomy whose occurrence repeats across a landscape (Flahault and Schroter 1910). The scale and remoteness of most Alaska Parks has precluded the mapping of landcover at the plant association level. Each plant association represents a relatively narrow segment of the variation in vegetation that, when grouped by species composition and structure, inform the characteristics of their parent landcover class. The landcover classes described herein reference Level IV of the Alaska Vegetation Classification (Viereck et al. 1992) and generally correspond to the Plant Alliance level of the National Vegetation Classification (NVC; FGDC 2008). Similarly, the plant associations described for Klondike Gold Rush NHP reference Level V of the Alaska Vegetation Classification (Viereck et al. 1992) and generally correspond to the Plant Association level of the NVC (FGDC 2008). The floristics and environment of each landcover class are described. Plot data, site characteristics, distribution, disturbance and succession are summarized for each plant association.

Dichotomous keys for the classification of landcover classes and plant associations occurring in Klondike Gold Rush NHP provide a formal diagnosis of the vegetation sampled (Lea 2011). These keys have the two-fold purpose of documenting the current classification effort and providing a framework for future field identification and classification of vegetation. The information gained from correspondence, cluster and ordination analysis was compared to preexisting classifications (e.g. Boggs et al. 2008a, Shephard et al. 1995, DeVelice et al. 1999) to maintain consistency among regional plant associations. Plots that did not fit the descriptions of associations previously described for Alaska or were not similar to other plots in the White Pass or Chilkoot Units are considered undersampled plant associations and are listed at the end of the key for their physiognomic group.

National Vegetation Classification

In an effort to comply with the developing national standard, the plant associations identified for Klondike have been reconciled with the NVC. The NVC provides a consistent scheme allowing the production of uniform statistics about vegetation resources across the nation, based on vegetation data gathered at local, regional, or national levels (FGDC 2008) and is the classification recommended for landcover mapping for National Park units in the lower 48 states. The adoption of this standard in Alaska has been delayed by the paucity of formally-described and accepted vegetation types at the lower floristic levels for our region and is not required by NPS due to the scale and remoteness of Alaska Parks (Lea 2011). Lower floristic levels have been drafted for Alaska, however with the exception of some vegetation classes whose ranges extend to the Pacific Northwest; these classes have not been formally reviewed. Placement of plant associations within the NVC (Appendix F) was informed by the draft hierarchy and Alaska group descriptions that were generously provided by their authors, and also by the catalogue of plant associations maintained by AKNHP, which compiles information on over 1,300 plant associations documented for Alaska. Unless otherwise noted, the Alliances and Associations listed in this report should be treated as provisional and checked against the NVC when finalized.

Landcover Mapping

Landcover was mapped based on aerial and satellite imagery with reference to vegetation survey, environmental coverages and general patterns of image tone, texture, color and contrast. Field-based mapping (compared to that based entirely on remotely-sensed information) is considered more likely to produce landcover classes that are intuitive or interpretable to the field-based user and are less susceptible to the effects of image quality and image analysis (Lea 2011).

Landcover classes were manually digitized in ArcMap 10.1 on the best available imagery. For the entire White Pass Unit and where available in the Chilkoot Unit, polygons were delineated on a true-color, orthorectified mosaic of aerial photographs taken on July 1, 2003 at a scale of 1:12,000 and pixel ground resolution of 0.15 m. Because this high-resolution aerial photography was not available for high-elevation areas of the Chilkoot Unit, orthorectified satellite imagery captured by the IKONOS-2 satellite was used instead. This scene was collected on August 12, 2005 at a scale of 1:2,000 and pixel ground resolution of 1 m (Tobler 1987). Similarly, because IKONOS imagery was not available for the northwest corner of the Chilkoot Unit, this small alpine area was digitized on TM7 scenes collected on August 1, 1999 at a scale of 1:60,000 and a pixel ground resolution of 15 m; see Figure 2 for the distribution of source imagery.

Limited digitization was conducted in a stereo environment using Stereo Analyst for ArcGIS extension developed by ERDAS. Stereo Analyst allows users to collect and revise features with an X, Y, and Z position for each vertex directly on the stereoscopic (3D) display; however, for this project the extension was used for visual reference opposed to direct feature collection. Stereo LPS Block files were prepared from the above-referenced aerial photography for use in this environment.

A minimum mapping unit of 0.4 ha (1 ac) was applied when appropriate; however, many polygons delineating communities whose extents were well-defined yet occupied less than one acre (e.g. herbaceous communities, waterbodies and snow fields) and other polygons that were dissected by a

physical (i.e. tidal slough) or cultural feature (i.e. park boundary) and as a result occupied less than one acre were delineated to add value to and maintain consistency within the map products. Distinct landcover classes that were ecologically related and thus tended to co-occur often at individual extents far below the minimum mapping unit were mapped as landcover mosaics. These types occurred in the subalpine and alpine and were characterized by combinations of dwarf tree, dwarf shrub, lichen and rock. A floodplain attribute was added to each polygon indicating whether or not it was located in an active floodplain. Floodplain attribution was determined from the interpretation of imagery and hypsography.

All manual digitizing was performed in Zone 8 of the Universal Transverse Mercator coordinate system (UTM8) with reference to the North American Datum of 1983 (NAD83). All landcover class areas were calculated using the spatial analysis tools available in ArcGIS 10.1.

Nomenclature

Landcover class and plant association names were proposed based on professional judgment and review of ecological communities previously described for the area. Associations were named in accordance with guidance set forth in the National Vegetation Classification (FGDC 2008). Taxonomy follows the standardized names provided by the PLANTS Database (USDA, NRCS 2013). Species occurring in the same stratum are separated by a dash (–), and species occurring in different strata are separated by a slash (/). Diagnostic taxa that occur in the uppermost stratum are generally listed first, followed successively by those in lower strata (e.g. tree / shrub / herb). If a plant association has been defined in a published classification, then the original name was generally used. Due to taxonomic uncertainty and the difficulty of efficiently separating *Vaccinium ovalifolium* (oval-leaf blueberry) from *V. alaskaense* (Alaska blueberry) in the field after flowering yet before the maturation of fruit, these shrubs are collectively referred to as *Vaccinium ovalifolium*

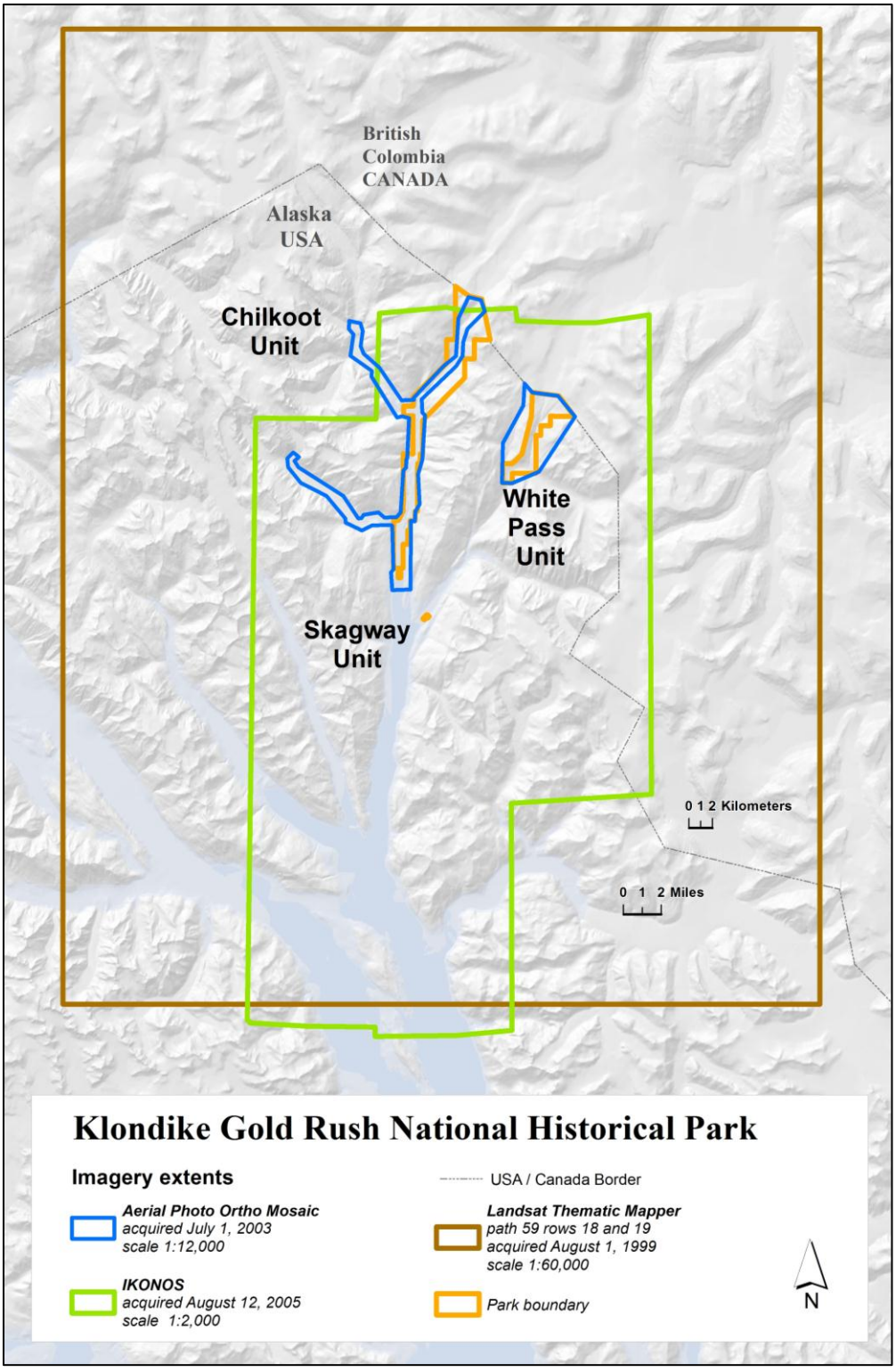


Figure 2 Distribution of source imagery referenced for landcover mapping in Klondike Gold Rush National Historical Park, Alaska.

Results

Vegetation Survey

Over the course of two field seasons, 180 field vegetation plots (171 in 2011, 9 in 2012) were completed (Figure 3). The floristic information gained from these plots forms the basis of the landcover and plant associations identified for the Park.

Landcover Classes

A total of 57 landcover classes, representing successional stages ranging from barren ground to old growth forest and elevational types ranging from coastal meadows to alpine tundra have been identified for Klondike Gold Rush NHP (Figure 4, Appendix D). Natural vegetation is represented by 52 of the landcover classes, cultural vegetation is represented by the 'Developed' landcover class and unvegetated areas, including water are represented by six classes.

Within the Chilkoot and White Pass Units, forested landcover classes occupy the greatest area (2,906 ha; Table 1). Likely due to the significant presence of Park lands in the alpine and subalpine zones, dwarf shrub (603 ha) and dwarf tree (500 ha) occupy the next greatest areas of natural vegetation. Accordingly, when landcover classes are grouped by the physiognomy of their dominant life forms, the tree group is represented by the greatest number (31) of landcover classes (Figure 5).

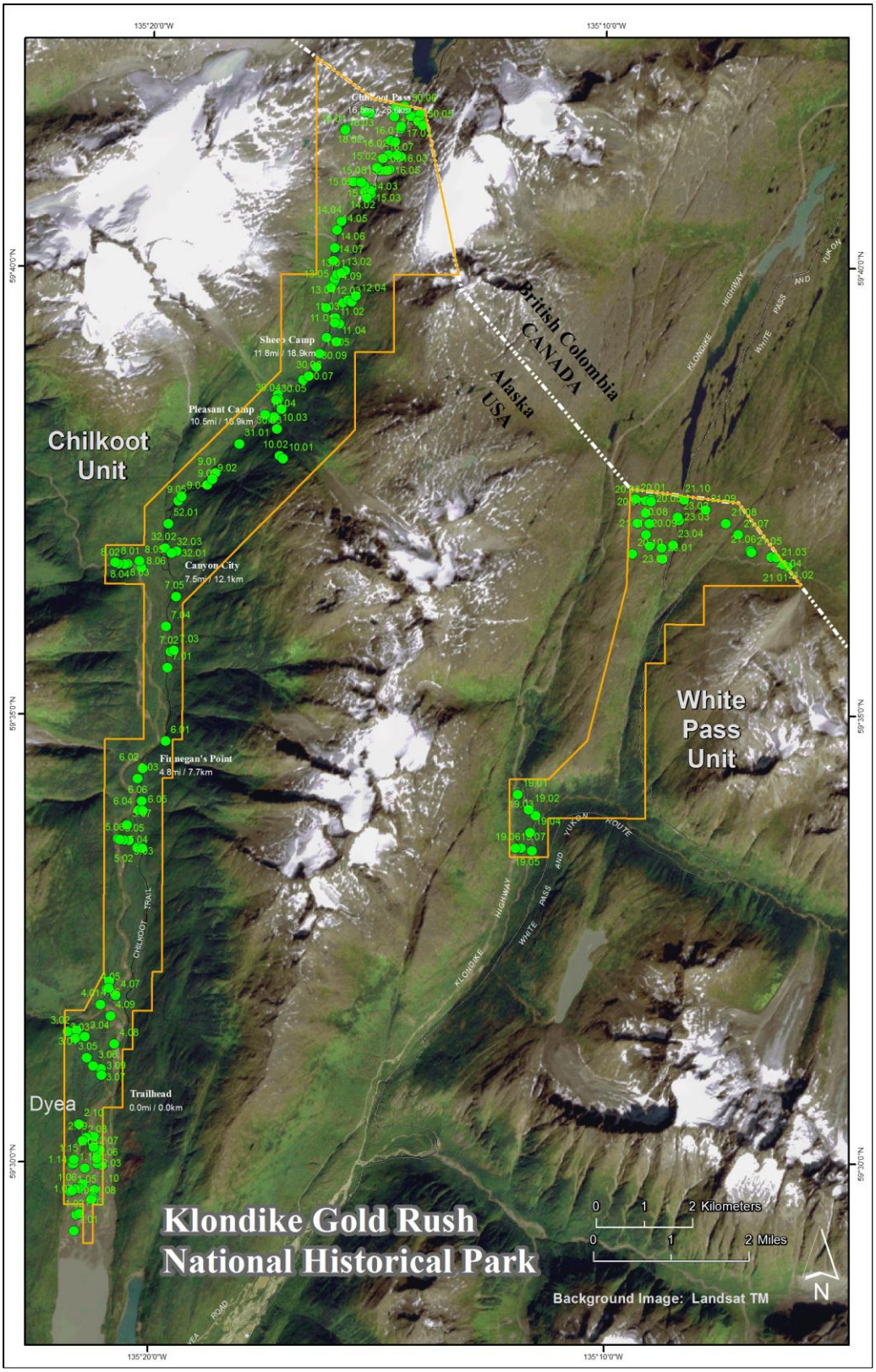


Figure 3 Location of vegetation survey plots within Klondike Gold Rush National Historical Park, Alaska.

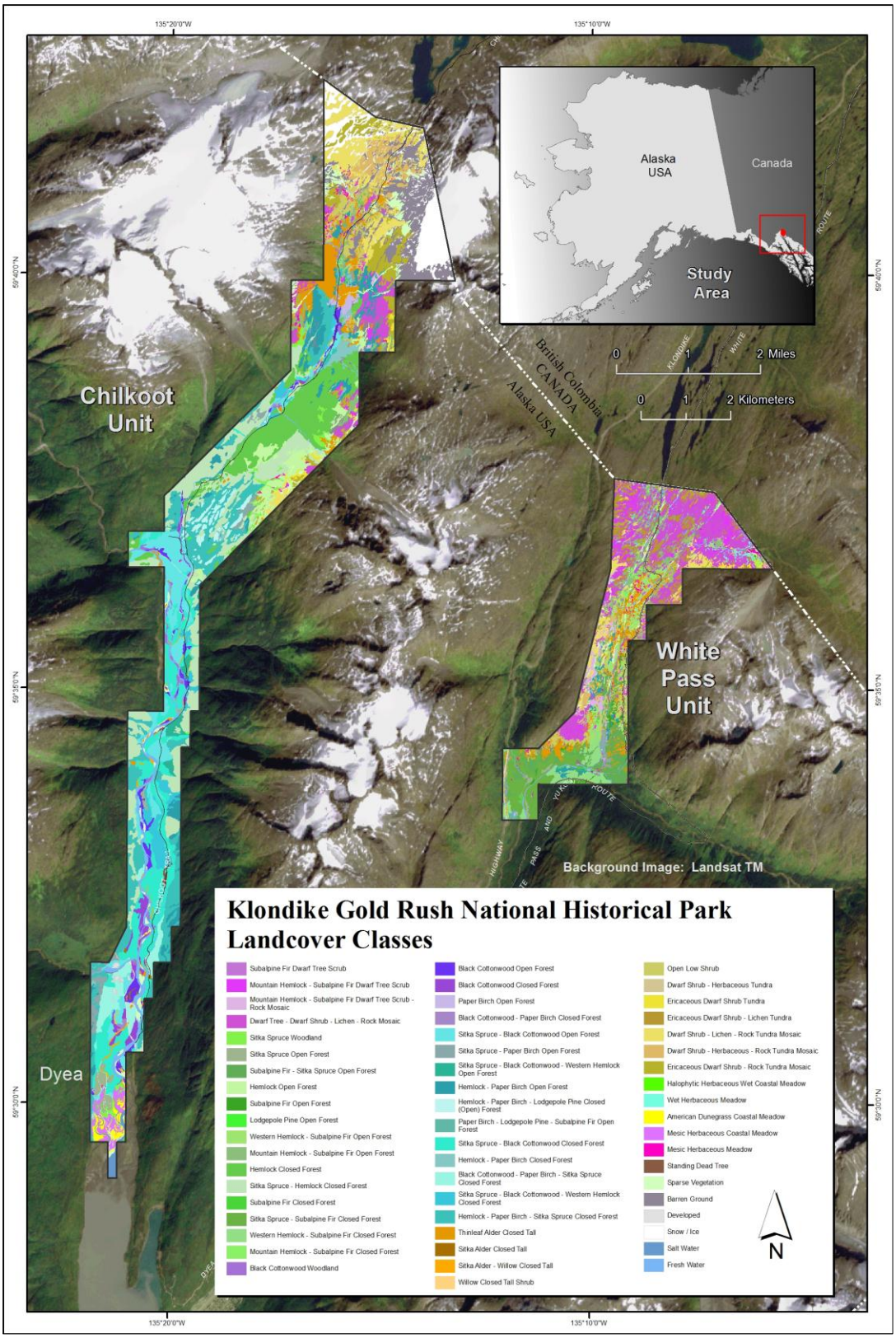


Figure 4 Distribution of landcover classes within Klondike Gold Rush National Historical Park, Alaska.

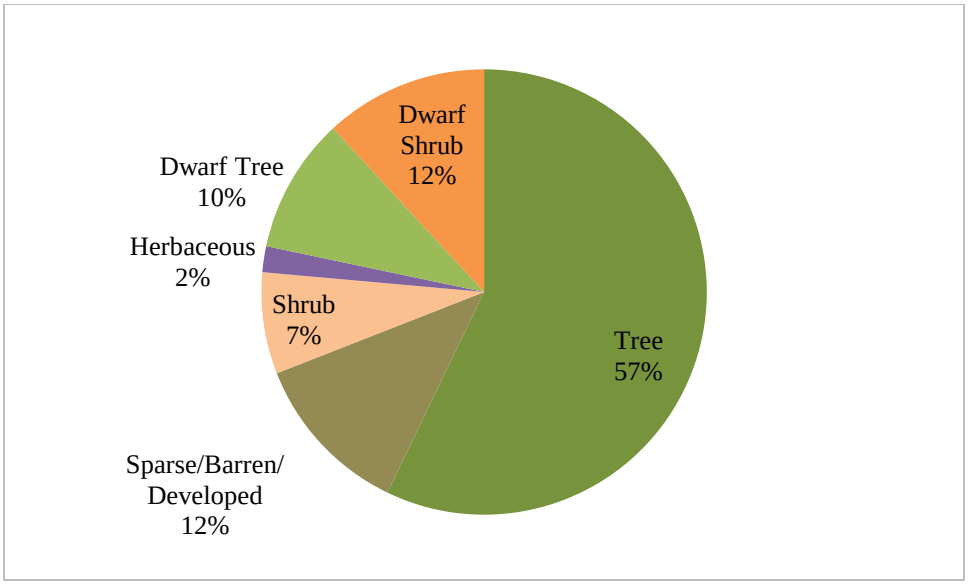


Figure 5 Distribution of terrestrial landcover classes by percent of map area among physiognomic groups within Klondike Gold Rush National Historical Park, Alaska.

Table 1 Summary of area occupied by landcover class in Klondike Gold Rush NHP, Alaska.

Vegetated Landcover Class Name	Area (ha)	Percent Area
Sitka Spruce - Hemlock Closed Forest	428.7	9.6
Dwarf Tree-Dwarf Shrub-Lichen-Rock Mosaic	386.6	8.6
Hemlock - Paper Birch - Sitka Spruce Closed Forest	382.5	8.5
Sitka Spruce - Black Cottonwood Closed Forest	311.3	6.9
Hemlock Closed Forest	302.2	6.7
Sitka Alder Closed Tall Shrub	217.8	4.9
Sitka Spruce - Black Cottonwood Open Forest	215.5	4.8
Ericaceous Dwarf Shrub - Rock Tundra Mosaic	185.8	4.1
Dwarf Shrub - Lichen - Rock Tundra Mosaic	179.7	4.0
Hemlock - Paper Birch Open Forest	177.9	4.0
Open Low Shrub	135.8	3.0
Mountain Hemlock - Subalpine Fir Open Forest	113.2	2.5
Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	104.4	2.3
Sitka Spruce - Subalpine Fir Closed Forest	100.2	2.2
Hemlock Open Forest	97.3	2.2
Subalpine Fir - Sitka Spruce Open Forest	95.1	2.1
Ericaceous Dwarf Shrub - Lichen Tundra	94.0	2.1
Sitka Spruce - Black Cottonwood - Western Hemlock Closed Forest	82.2	1.8
Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	80.8	1.8
Black Cottonwood - Paper Birch - Sitka Spruce Closed Forest	72.9	1.6
Sitka Spruce - Paper Birch Open Forest	58.2	1.3
Black Cottonwood Open Forest	52.3	1.2
Western Hemlock - Subalpine Fir Open Forest	50.8	1.1
Western Hemlock - Subalpine Fir Closed Forest	49.7	1.1
Hemlock - Paper Birch - Lodgepole Pine Closed (Open) Forest	44.1	1.0
Black Cottonwood Closed Forest	40.4	0.9
Hemlock - Paper Birch Closed Forest	38.3	0.9
Sitka Spruce Woodland	37.9	0.8
Mesic Herbaceous Coastal Meadow	34.9	0.8
Sitka Spruce Open Forest	31.9	0.7
Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub - Rock Mosaic	30.2	0.7
Mountain Hemlock - Subalpine Fir Closed Forest	28.8	0.6
Mesic Herbaceous Meadow	27.7	0.6
Ericaceous Dwarf Shrub Tundra	27.6	0.6
Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest	27.2	0.6
Black Cottonwood Woodland	19.9	0.4
American Dunegrass Coastal Meadow	18.9	0.4
Paper Birch Open Forest	18.3	0.4

Table 1 Summary of area occupied by landcover class in Klondike Gold Rush NHP, Alaska (continued).

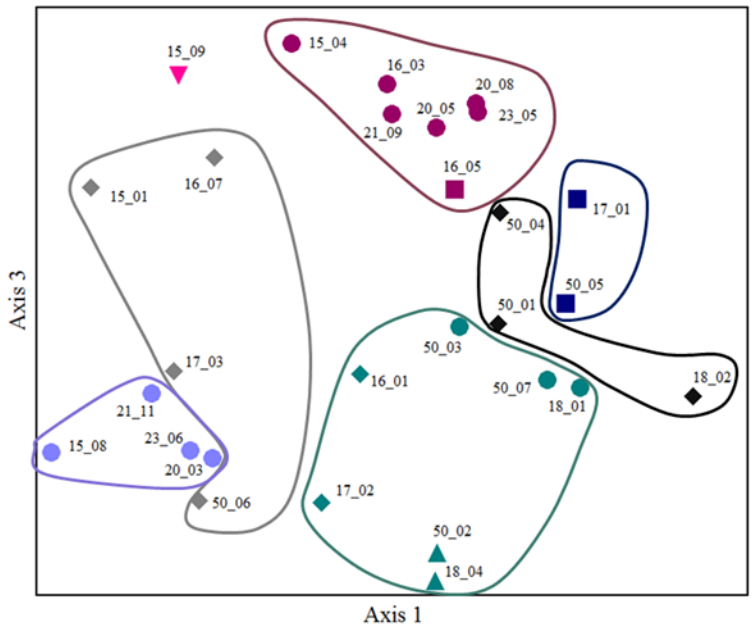
Vegetated Landcover Class Name		Area (ha)	Percent Area
Sitka Alder - Willow Closed Tall Shrub		17.9	0.4
Subalpine Fir Open Forest		17.2	0.4
Wet Herbaceous Meadow		12.0	0.3
Dwarf Shrub - Herbaceous Tundra		11.9	0.3
Landcover Class		3.6	0.1
Standing Dead Tree		3.5	0.1
Black Cottonwood - Paper Birch Closed Forest		3.0	0.1
Subalpine Fir Dwarf Tree Scrub		2.7	0.1
Thinleaf Alder Closed Tall Shrub		2.7	0.1
Subalpine Fir Closed Forest		2.4	0.1
Halophytic Herbaceous Wet Coastal Meadow		2.3	0.1
Willow Closed Tall Shrub		0.5	0.0
Lodgepole Pine Open Forest		0.4	0.0
	Total	4,481.2	100.0

Non-Vegetated Landcover Class Name		Area (ha)	Percent Area
Barren		260.2	34.1
Snow / Ice		199.0	26.0
Fresh Water		140.9	18.4
Sparse Vegetation		129.0	16.9
Developed		17.5	2.3
Salt Water		17.4	2.3
	Total	764.1	100.0

Plant Associations

A total of 86 plant associations were identified for Klondike Gold Rush NHP (Appendix D), of which 60 represent naturally occurring plant assemblages, while the remaining 26 are considered ‘undersampled’ and are listed to facilitate future regional comparison. Of the 60 plant associations described herein, 40 have been previously described and the remaining 20 are provisional pending the collection of additional plot data to support their natural and repeated occurrence in similar landscapes. The abundance of undersampled and provisional plant associations identified within Klondike Gold Rush NHP likely relates to the ecological mixing of continental and maritime vegetation types within its bounds.

Preliminary groupings of vegetation plots were overlain on the NMS ordination in order to assess their compositional similarity and potential membership to alliances and associations (Figure 6).



Plant Association	Plant Alliance
Empetrum nigrum - *Cladina* species	Black Crowberry Alpine or Tundra Dwarf Shrub Alliance
Empetrum nigrum / Mixed Dwarf Shrub / Rock	
Vaccinium uliginosum - *Empetrum nigrum*	Bog Blueberry - Black Crowberry Alpine or Tundra Dwarf Shrub Alliance
Phyllodoce glanduliflora	Yellow Mountain Heath Alpine or Tundra Dwarf Shrub Alliance
Cassiope mertensiana	Western Moss Heather Alpine or Tundra Dwarf Shrub Alliance
Carex pyrenaica ssp. micropoda - *Luzula* species - *Cladina* species	Pyrenean Sedge Mesic Herbaceous Alliance
Luzula arcuata - *Cladina* species	Curved Woodrush Mesic Herbaceous Alliance
Harrimanella stelleriana - *Cladina* species	Alaska Bellheather Alpine or Tundra Dwarf Shrub Alliance
Harrimanella stelleriana - *Luetkea pectinata*	
Harrimanella stelleriana - *Phyllodoce glanduliflora*	

Figure 6 Ordination of alpine sites in Klondike Gold Rush National Historical Park, Alaska. Sites are grouped by plant alliance and association. Shared symbol color indicates membership to the same plant alliance, shared symbol shape indicates membership to the same plant association.

Similar to the majority area occupied by forested landcover, a majority of plant association types fall in the tree physiognomic group, presumably due to the preponderance of forested land within the Park (Figure 7). Although herbaceous landcover types occupy only 2% of the total park area this physiognomic group houses 23% of the plant associations identified for the Park suggesting that these herbaceous association are inherently diverse, yet spatially restricted. Even more spatially restricted are the nonvascular plant associations, which represent 7% of all associations identified for the Park, yet occur at scales too fine to map.

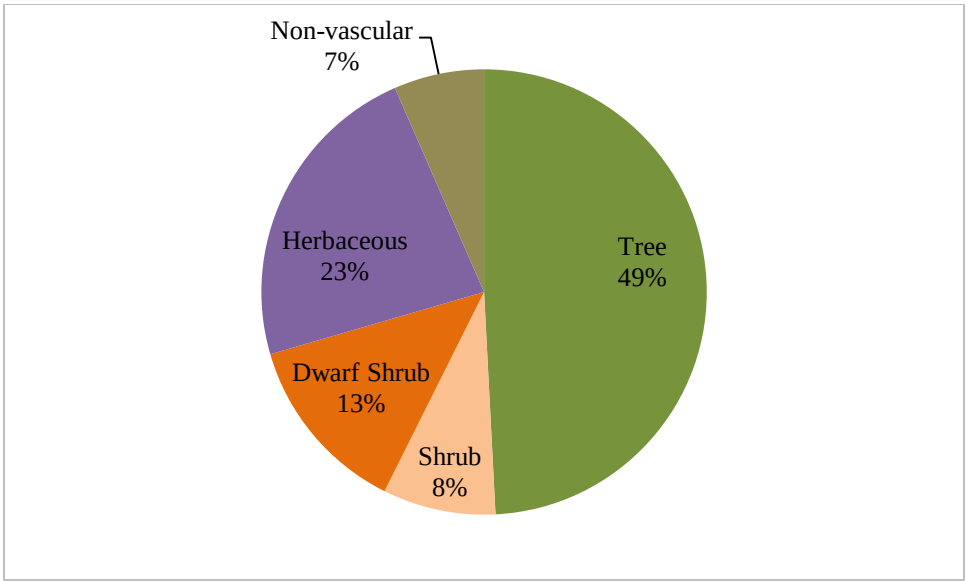


Figure 7 Distribution of plant associations among physiognomic groups within Klondike Gold Rush National Historical Park, Alaska.

None of the plant associations known or thought to occur in Klondike Gold Rush NHP have been formally ranked as rare (with rarity defined as a conservation status of G1 or G2, S1 or S2), and although the range and extent of provisional plant associations is not completely known, it is thought that most of these associations occur commonly outside of the Park and that their distribution is relatively secure. However, the *Pinus contorta* var. *latifolia*/*Cladina* Species plant association has been described as 'very rare' in neighboring regions of British Columbia, where it is found only on the driest bedrock outcrops with thin soils (Banner et al. 1993). Based on this description and the limited occurrence of this association within Klondike, a provisional range rank of imperiled to vulnerable (S2S3) is proposed for this plant association in Alaska. Similarly, *Abies lasiocarpa* is of rare, local occurrence in the mountains of southeast Alaska (Viereck and Little 2007), due to this inherent rarity, all associations including *Abies lasiocarpa* as a dominant or codominant species are provisionally range ranked as vulnerable to apparently secure (S3S4) within Alaska. These associations include:

- *Abies lasiocarpa / Cassiope mertensiana*
- *Abies lasiocarpa / Harrimanella stelleriana*
- *Abies lasiocarpa - Picea sitchensis / Menziesia ferruginea - Oplopanax horridus*
- *Tsuga heterophylla - Abies lasiocarpa / Menziesia ferruginea*
- *Tsuga mertensiana - Abies lasiocarpa / Menziesia ferruginea*
- *Tsuga mertensiana - Abies lasiocarpa / Phyllodoce glanduliflora*

The ranks provisionally assigned to these associations may be modified pending additional site data and further clarification of its state and global distribution, trend and threats.

Plant Species

A total of 342 unique plant taxa were documented during field work (Appendix C). The distribution of these taxa among physiognomic groups is as follows: 9 trees, 32 shrubs, 16 dwarf shrubs, 60 graminoids, 156 forbs (including ferns and allies), 24 lichens, 39 mosses and 6 liverworts. The 273 vascular plant taxa documented in our survey represent 71% of the 385 vascular plants known to occur in the Park (Carlson et al. 2006). Likely because the current survey recorded dominant nonvascular species and did not target microhabitats, the 24 unique lichen taxa documented represent less than one percent of the 766 lichenized and lichenicolous fungi known to occur in the Park (Spribille et al. 2010).

Landcover Classes

Key to Klondike Gold Rush National Historical Park Landcover Classes

This dichotomous key can be used for the identification of landcover classes from vegetation plot data collected within Klondike Gold Rush NHP. For best results:

1. Locate a representative portion of the site in question. The vegetation and environment within the site should be relatively homogeneous.

2. Estimate the canopy cover for the diagnostic species used in the key.

3. Beginning with the Master Key, apply the couplets in sequential order to identify a landcover class.

4. To ensure accuracy, compare the written description of the landcover class with species composition, vegetation structure, and site characteristics. Ocular estimates can be imprecise, so if the site description does not fit the classification, revisit the key allowing a margin of +/- 5 percent in the cover cut levels.

5. For the purposes of this key, a species or life form is considered dominant when it comprises at least 75% cover within of a given vegetation stratum; species or life forms are considered codominant when each comprises 25-75% cover within a stratum.

Master Key

1a. Cultural vegetation: where vegetation displays a characteristic combination of dominant growth forms adapted to relatively intensive human manipulations ..... **Developed Class**
1b. Natural vegetation: where ecological processes primarily determine species and site characteristics 2

2a. Vegetation with at least 10% cover of trees 3
2b. Vegetation with less than 10% cover of trees 6

3a. Tree cover is comprised of mature trees over 1.8 m tall 4
3b. Tree cover is comprised of dwarf trees up to 1.8 m tall ..... **Dwarf Forest Classes**

4a. At least 75% of tree cover contributed by needleleaf species ..... **Needleleaf Forest Classes**
4b. Less than 75% of tree cover contributed by needleleaf species 5

5a. At least 75% of tree cover contributed by broadleaf species ..... **Broadleaf Forest Classes**
5b. Broadleaf or needleleaf species contribute 25-75% of tree cover..... ..... **Mixed Needleleaf/Broadleaf Forest Classes**

6a. Shrub cover is at least 25% 7
6b. Shrub cover is less than 25% 8

7a. Shrubs more than 1.5 m tall ..... **Tall Shrub Classes**
7b. Shrubs 20 cm to 1.5 m tall ..... **Open Low Shrub**
7c. Shrubs less than 20 cm tall ..... **Dwarf Shrub Classes**

8a. Herbaceous cover is 25% or more ..... **Herbaceous Classes**
8b. Herbaceous cover is less than 25% ..... **Sparse and Barren Classes**

Key to Dwarf Forest Classes

1a. Patches of dwarf tree occupy at least 40% of the ground surface 2
1b. Patches of dwarf tree occupy less than 40% of the ground surface 3

2a. *Abies lasiocarpa* comprises at least 75% of dwarf tree cover ..... **Subalpine Fir Dwarf Tree Scrub**
2b. *Abies lasiocarpa* comprises less than 75% of dwarf tree cover ..... **Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub**

3a. Rock and crustose lichen occupies more than 40% of the ground cover ..... **Mountain Hemlock - Subalpine Fir Tree Scrub-Rock Subalpine Mosaic**
3b. A mosaic of dwarf shrub, lichen (crustose, foliose and fruticose) and rock occupy more than 40% of the ground cover ..... **Dwarf Tree-Dwarf Shrub-Lichen-Rock Subalpine Mosaic**

Key to Needleleaf Forest Classes

1a. Tree canopy is 10-24% cover ..... **Sitka Spruce Woodland**
1b. Tree canopy is 25-59% cover 2
1c. Tree canopy is 60-100% cover 8

2a. *Picea sitchensis* comprises at least 75% of tree cover ..... **Sitka Spruce Open Forest**
2b. *Picea sitchensis* comprises less than 75% to the total tree cover 3

3a. *Picea sitchensis* and *Abies lasiocarpa*, together comprise 25-75% of tree cover ..... **Subalpine Fir – Sitka Spruce Open Forest**
3a. *Picea sitchensis* and *Abies lasiocarpa*, together comprise less than 25% of tree cover 4

4a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise at least 75% of tree cover ..... **Hemlock Open Forest**
4b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise less than 75% to the total tree cover 5

5a. *Abies lasiocarpa* comprises at least 75% of tree cover ..... **Subalpine Fir Open Forest**
5a. *Abies lasiocarpa* comprises less than 75% of tree cover 6

6a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Abies lasiocarpa,* together comprise 25-75% of tree cover 7
6b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Abies lasiocarpa*, together comprise less than 25% of tree cover ..... **Lodgepole Pine Open Forest**

7a. *Tsuga heterophylla* and *Abies lasiocarpa* codominate ..... **Western Hemlock – Subalpine Fir Open Forest**
7b. *Tsuga mertensiana* and *Abies lasiocarpa* codominate ..... **Mountain Hemlock – Subalpine Fir Open Forest**

8a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise at least 75% of tree cover ..... **Hemlock Closed Forest**
8b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise less than 75% to the total tree cover 9

9a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Picea sitchensis,* together comprise at least 75% of tree cover ..... **Sitka Spruce – Hemlock Closed Forest**
9b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Picea sitchensis*, together comprise less than 75% of tree cover 10

10a. *Abies lasiocarpa* comprises at least 75% of tree cover ..... **Subalpine Fir Closed Forest**
10b. *Abies lasiocarpa* comprises less than 75% of tree cover 11

11a. *Abies lasiocarpa* and *Picea sitchensis*, together comprise at least 75% of tree cover ..... **Sitka Spruce – Subalpine Fir Closed Forest**
11a. *Abies lasiocarpa* and *Picea sitchensis*, together comprise less than 75% of tree cover 12

12a. *Tsuga heterophylla* and *Abies lasiocarpa* codominate ..... **Western Hemlock – Subalpine Fir Closed Forest**
12b. *Tsuga mertensiana* and *Abies lasiocarpa* codominate ..... **Mountain Hemlock – Subalpine Fir Closed Forest**

<u>Key to Broadleaf Forest Classes</u>
1a. Tree canopy is 10-24% cover ..... **Black Cottonwood Woodland**
1b. Tree canopy is 25-59% cover 2
1c. Tree canopy is 60-100% cover 3

2a. *Populus balsamifera* ssp. *trichocarpa* comprises at least 75% of tree cover ..... **Black Cottonwood Open Forest**
2b. *Populus balsamifera* ssp. *trichocarpa* comprises less than 75% of tree cover ..... **Paper Birch Open Forest**

3a. *Populus balsamifera* ssp. *trichocarpa* comprises at least 75% of tree cover..... .....**Black Cottonwood Closed Forest**
3b. *Populus balsamifera* ssp. *trichocarpa* and *Betula papyrifera*, together comprise at least 75% of tree cover ..... **Black Cottonwood – Paper Birch Closed Forest**

Key to Mixed Needleleaf/Broadleaf Forest Classes
1a. Tree canopy is 25-59% cover..... Open Mixed Forest (2)
1b. Tree canopy is 60-100% cover.....Closed Mixed Forest (7)

2a. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise at least 75% of tree cover .....**Sitka Spruce - Black Cottonwood Open Forest**
2b. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise less than 75% of tree cover 3

3a. *Picea sitchensis* and *Betula papyrifera*, together comprise at least 75% of tree cover..... ..... **Sitka Spruce – Paper Birch Open Forest**
3b. *Picea sitchensis* and *Betula papyrifera*, together comprise less than 75% of tree cover.....4

4a. *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*, together comprise at least 75% of tree cover..... .....**Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest**
4b. *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*, together comprise less than 75% of tree cover 5

5a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise at least 75% of tree cover.....**Hemlock – Paper Birch Open Forest**
5b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise less than 75% of tree cover.....6

6a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*), *Betula papyrifera* and *Pinus contorta* var. *latifolia*, together comprise at least 75% of tree cover .... **Hemlock – Paper Birch – Lodgepole Pine Closed (Open) Forest**
6b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise less than 75% of tree cover..... **Paper Birch – Lodgepole Pine** – **Subalpine Fir Open Forest**

7a. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise at least 75% of tree cover .....**Sitka Spruce – Black Cottonwood Closed Forest**
7b. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise less than 75% of tree cover 8

8a. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise at least 75% of tree cover.....**Hemlock – Paper Birch Closed Forest**

8b. *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise less than 75% of tree cover 9

9a. *Populus balsamifera* ssp. *trichocarpa*, *Betula papyrifera* and *Picea sitchensis*, together comprise at least 75% of tree cover..... **Black Cottonwood – Paper Birch – Sitka Spruce Closed Forest**
9b. *Populus balsamifera* ssp. *trichocarpa*, *Betula papyrifera* and *Picea sitchensis*, together comprise less than 75% of tree cover 10

10a. *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla* together comprise at least 75% of tree cover ..... **Sitka Spruce – Black Cottonwood – Western Hemlock Closed Forest**
10b. *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla* together comprise less than 75% of tree cover 11

11a. *Tsuga* species (*T. mertensiana* and/or *T. heterophylla*), *Betula papyrifera* and *Picea sitchensis*, together comprise at least 75% of tree cover ..... **Hemlock – Paper Birch – Sitka Spruce Closed Forest**
11b. *Tsuga* species (*T. mertensiana* and/or *T. heterophylla*), *Betula papyrifera* and *Picea sitchensis*, together comprise less than 75% of tree cover ..... **Hemlock – Paper Birch – Lodgepole Pine Closed (Open) Forest**

Key to Tall Shrub Classes

1a. *Alnus* spp. contribute at least 75% of total shrub cover 2
1b. *Alnus* spp. contribute less than 75% of total shrub cover 3

2a. *Alnus viridis* ssp. *sinuata* is the dominant tall shrub species ..... **Sitka Alder Closed Tall Shrub**
2b. *Alnus incana* ssp. *tenuifolia* is the dominant tall shrub species ..... **Thinleaf Alder Closed Tall Shrub**

3a. *Alnus viridis* ssp. *sinuata* and *Salix* species, together comprise 25-75% of tall shrub cover..... **Sitka Alder -Willow Closed Tall Shrub**
3b. *Salix* species comprise at least 75% of tall shrub cover..... **Willow Closed Tall Shrub**

Key to Dwarf Shrub Classes

1a. Patches of dwarf shrub and herbaceous species occupy at least 60% of the ground surface..... 2
1b. Patches of dwarf shrub and herbaceous species occupy less than 60% of the ground surface..... 3

2a. Herbaceous species comprise at least 40% of vegetated cover ..... **Dwarf Shrub-Herbaceous Tundra**
2b. Herbaceous species cover comprise less than 40% of vegetated cover ..... **Ericaceous Dwarf Shrub Tundra**

3a. Foliose and fruticose lichen dominates the ground not occupied by vascular plant species..... ..... **Ericaceous Dwarf Shrub-Lichen Tundra Mosaic**
3b. A mosaic of rock and lichen (crustose, foliose and fruticose) dominates the ground not occupied by vascular plant species ..... **Dwarf Shrub-Lichen-Rock Tundra Mosaic**
3c. Rock and crustose lichen dominate the ground not occupied by vascular plant species 4

4a. Herbaceous species comprise at least 40% of vascular plant cover..... ..... **Dwarf Shrub-Herbaceous-Rock Tundra Mosaic**
4b. Herbaceous species cover comprise less than 40% of vascular plant cover..... ..... **Ericaceous Dwarf Shrub-Rock Tundra Mosaic**

Key to Herbaceous Classes
1a. Site is wet with semipermanent or standing water present 2
1b. Site is dry to mesic with little or no standing water..... 3

2a. Site is tidally-influenced; vegetation is dominated by salt-tolerant species..... ..... **Halophytic Herbaceous Wet Coastal Meadow**
2b. Site is not tidally-influenced ..... **Wet Herbaceous Meadow**

3a. *Leymus mollis* comprises at least 50% of the ground cover..... .....**American Dunegrass Coastal Meadow**
3b. *Leymus mollis* comprises less than 50% of the ground cover..... 4

4a. Site is coastal (i.e. currently or historically tidally-influenced), vegetation includes salt-tolerant species..... **Mesic Herbaceous Coastal Meadow**
4b. Site is not coastal, a common type in subalpine and alpine..... **Mesic Herbaceous Meadow**

Key to Sparse and Barren Classes
1a. Total vegetation cover is 10 to 24%..... 2
1b. Total vegetation cover is less than 10%..... 3

2a. Standing dead trees present in plot..... **Standing Dead Tree**
2b. Standing dead trees not present in plot ..... **Sparse Vegetation**

3a. Barren ground dominates the landcover..... **Barren Ground**
3b. Perennial snow and/or ice dominate the landcover..... **Snow / Ice**
3c. Water dominates the landcover..... 4

4a. Water is marine or tidally influenced..... **Salt Water**
4b. Water is not marine or tidally influenced..... **Fresh Water**

Description of Landcover Class Fields

Translated Name: common names of dominant or codominant taxa
Scientific Name: scientific names of dominant or codominant taxa

The following rules apply to both scientific and translated nomenclature:

- Taxa occurring in the same strata are separated by a hyphen (-)
- Taxa occurring in different strata are separated by a forward slash (/)
- Taxa included parenthetically occur in the plant association with less consistency
- Taxa occurring in the uppermost stratum are listed first, followed successively by those in lower strata. Within the same stratum, the order of names generally reflects decreasing levels of dominance, constancy or diagnostic value of the taxa.
- Taxonomy is given in accordance with nomenclature accepted by the USDA PLANTS Database (USDA, NRCS 2013)

Images: Photographic images were selected from the member or representative plots. Distribution graphics were generated from the landcover map.

Number of Plots Sampled: number and site code of plots sampled that represent the landcover class. A site code included in [brackets] indicates that plot data were used to inform the landcover class, but do not necessarily key to that landcover class.

Map Area: the total area occupied by the landcover class given in hectares and percent of total Park land.

Distribution: distribution of the landcover class within the Park (unless otherwise noted) including comments on patch size, and frequency and location of occurrence

Classification: the vegetation cover minimums for inclusion in the landcover class, occasionally modified by environmental setting.

Environment: a summary of the landscape position, associated landforms and topography of the landcover class within the Park; slope, aspect, elevation, hydrology and soils may also be discussed.

Vegetation: a summary of the floristic composition and physiognomy of the landcover class including the taxa observed, the vertical strata in which these taxa occur, and the minimum cover values required for inclusion in the class. Indicator species, the influence of mesohabitat and the variability of inconstant (nondiagnostic) species may also be discussed.

Succession and Disturbance: a summary of the successional and disturbance regimes that influence the stability and within-stand pattern of the type.

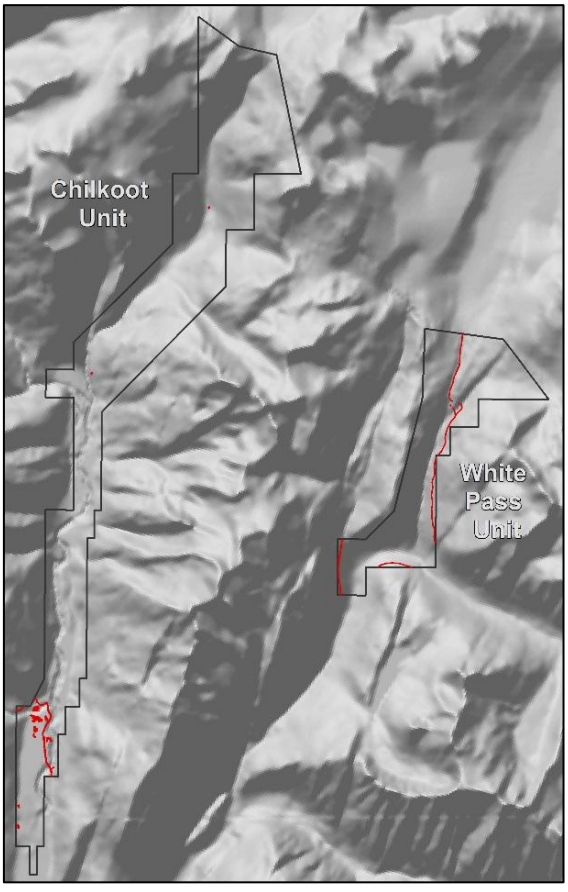
Plant Associations: a list of plant associations known or expected to be included in the landcover class based on plot data collected in the present study; this data is also summarized in Appendix F.

Developed Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the Sheep Camp Ranger Station and a gravel road north of Dyea
Map Area: 17.5 ha; 0.3%
Distribution: Small to large and/or linear patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Cultural vegetation
Environment: Site characters vary depending on the purpose of development and may have been modified during the process of development. Development usually targets easily-accessed, flat ground close to water or natural travel corridors.
Vegetation: Displays a characteristic combination of dominant growth forms adapted to relatively intensive human manipulations. Dominant species are those remnant from the site's pre-disturbance conditions, but also include widespread and common nonnative species.
Succession and Disturbance: Regular human disturbance typically holds sites in an early-seral state
Plant Associations: No natural plant associations; often with culturally-modified plant assemblages.





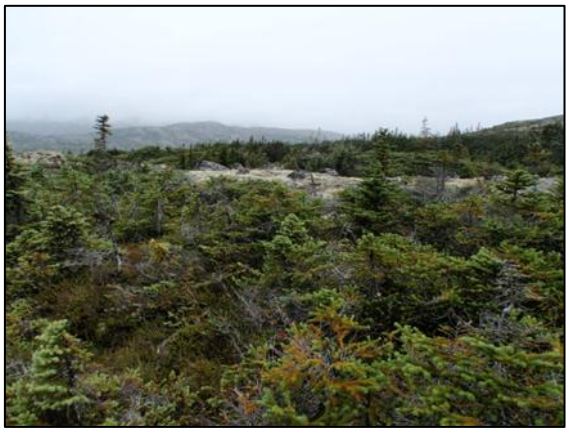


Dwarf Tree Landcover Classes

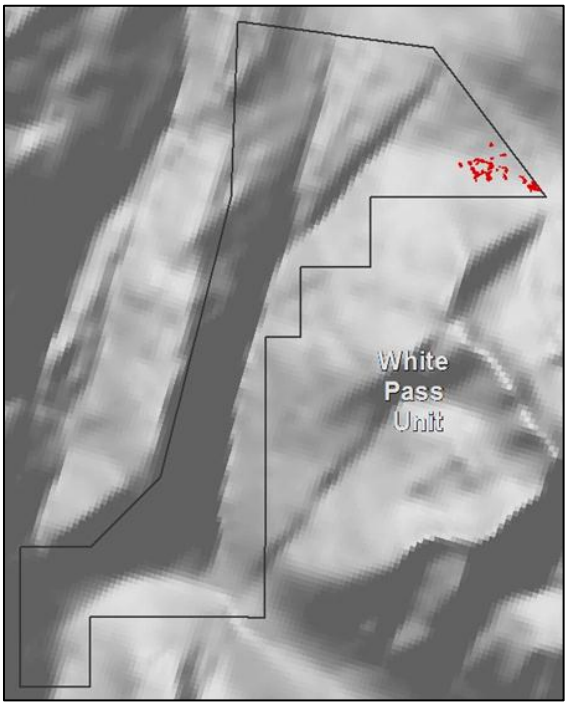
Subalpine Fir Dwarf Tree Scrub Landcover Class

Abies lasiocarpa Dwarf Tree Scrub Landcover Class

Number of Plots Sampled: 2 (20.01, 21.04)
Map Area: 2.7 ha; 0.1%
Distribution: Small patch type; uncommon; occurrence restricted to the White Pass Unit**.**
Classification: Patches of dwarf trees less than 1.8 m tall occupy at least 40% of the ground surface; *Abies lasiocarpa* comprises at least 75% of dwarf tree cover.
Environment: Dry and cold timberline sites where exposure diminishes the persistence of snow.
Vegetation: Dominated by dwarf *Abies lasiocarpa*; common understory species are *Cassiope mertensiana* and *Harrimanella stelleriana*. Dwarf *Tsuga mertensiana* may become codominant with increasing protection/wetness. Below timberline, vegetation grades to stands of open, *Abies lasiocarpa*; above timberline, vegetation grades to a mosaic of dwarf shrubs, herbs, lichen and rock.
Succession and Disturbance: late-seral; no significant disturbance
Plant Associations:
Abies lasiocarpa/Cassiope mertensiana
Abies lasiocarpa/Harrimanella stelleriana





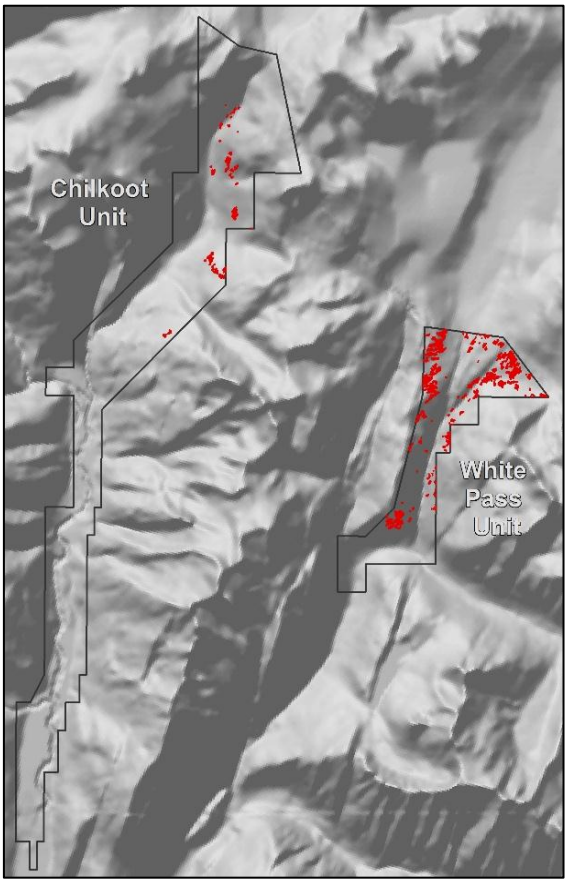


Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub Landcover Class

Number of Plots Sampled: 6 (13.01, 20.02, 20.04, 20.07, 21.05, 21.07)
Map Area: 80.8 ha; 1.5%
Distribution: Small patch type; occurrence uncommon in the Chilkoot Unit, common in the White Pass Unit.
Classification: Patches of dwarf trees less than 1.8 m tall occupy at least 40% of the ground surface; *Abies lasiocarpa* comprises less than 75% of dwarf tree cover.
Environment: Semiprotected timberline sites; type extends to lower elevations in the White Pass Unit presumably due to greater connectivity to continental climate and flora of which, *Abies lasiocarpa* is characteristic.
Vegetation: Codominated by dwarf *Tsuga mertensiana* and *Abies lasiocarpa*; dwarf *Tsuga heterophylla* may be present and *Abies lasiocarpa* may be absent. Common understory species are *Phyllodoce glanduliflora*, *Harrimanella stelleriana* and *Vaccinium vitis-idaea*. *Abies lasiocarpa* may become dominant with increasing exposure/dryness; *Tsuga mertensiana* may become dominant with increasing protection/wetness. Below timberline, vegetation grades to stands of open to closed forest dominated by *Tsuga mertensiana*, *T. heterophylla* and/or *Abies lasiocarpa*; above timberline, vegetation grades to a mosaic of dwarf shrubs, herbs, lichen and rock.
Succession and Disturbance: late-seral; avalanche
Plant Associations:
Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glanduliflora
Tsuga mertensiana/Harrimanella stelleriana
Tsuga mertensiana/Vaccinium vitis-idaea



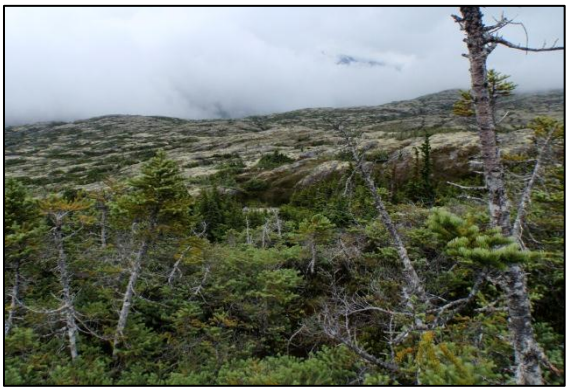


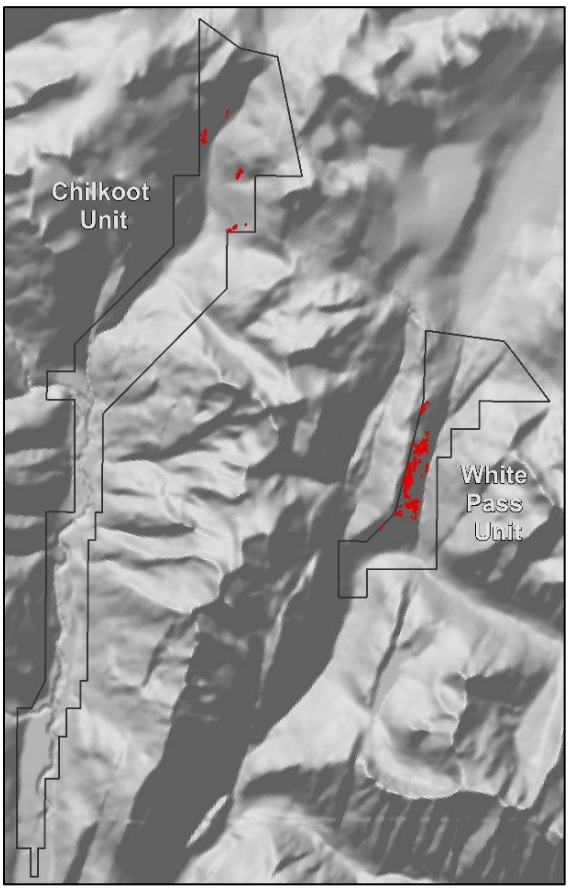


Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub - Rock Mosaic Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the White Pass area
Map Area: 30.2 ha; 0.6%
Distribution: Small patch type; occurrence uncommon in the Chilkoot Unit, common in the White Pass Unit.
Classification: Patches of dwarf trees less than 1.8 m tall, occupy less than 40% of the ground surface; rock and crustose lichen occupy more than 40% of the ground cover.
Environment: Semiprotected timberline sites with high surface exposure of bedrock; type extends to lower elevations in the White Pass Unit presumably due to greater connectivity to continental climate and flora of which, *Abies lasiocarpa* is characteristic.
Vegetation: Although plot data was not collected for this type, vegetation is presumed similar to the Mountain Hemlock – Subalpine Fir Dwarf Tree class. Dwarf *Tsuga mertensiana* and *Abies lasiocarpa* are the dominant trees, common understory species are *Phyllodoce glanduliflora*, *Harrimanella stelleriana* and *Vaccinium vitis-idaea*. *Abies lasiocarpa* may become dominant with increasing exposure/dryness; *Tsuga mertensiana* may become dominant with increasing protection/wetness. Below timberline, vegetation grades to stands of open to closed forest dominated by *Tsuga mertensiana*, and/or *Abies lasiocarpa*; above timberline, vegetation grades to a mosaic of dwarf shrubs, herbs, lichen and rock.
Succession and Disturbance: late-seral; avalanche
Plant Associations: None identified, but may include:
Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glanduliflora
Tsuga mertensiana/Harrimanella stelleriana
Tsuga mertensiana/Vaccinium vitis-idaea







Dwarf Tree - Dwarf Shrub - Lichen - Rock Mosaic Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the White Pass area

Map Area: 386.6 ha; 7.4%

Distribution: Large patch type; occurrence common in the Chilkoot Unit, abundant in the White Pass Unit.

Classification: Patches of dwarf trees less than 1.8 m tall, occupy less than 40% of the ground surface; a mosaic of dwarf shrub, lichen (crustose, foliose and fruticose) and rock occupy more than 40% of the ground cover.

Environment: Upper timberline sites with high surface exposure of bedrock; trees establish and grow to dwarf stature in semiprotected pockets.

Vegetation: Dwarf *Tsuga mertensiana* and/or *Abies lasiocarpa* are dominant trees; common understory species are *Cassiope mertensiana, Phyllodoce glanduliflora* and *Carex macrochaeta*. In lower timberline sites, vegetation grades to more continuous stands of dwarf *Tsuga mertensiana* and/or *Abies lasiocarpa*; above timberline, vegetation grades to dwarf shrub with herbaceous and/or lichen components.

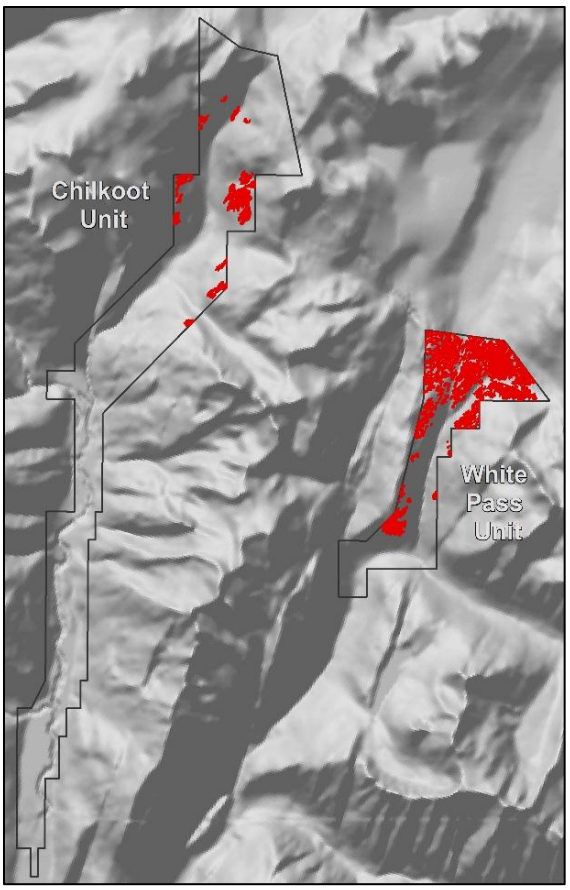
Succession and Disturbance: late-seral; avalanche

Plant Associations: None identified, but may include:

Abies lasiocarpa/Cassiope mertensiana
Abies lasiocarpa/Harrimanella stelleriana
Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glanduliflora
Tsuga mertensiana/Harrimanella stelleriana
Tsuga mertensiana/Vaccinium ovalifolium



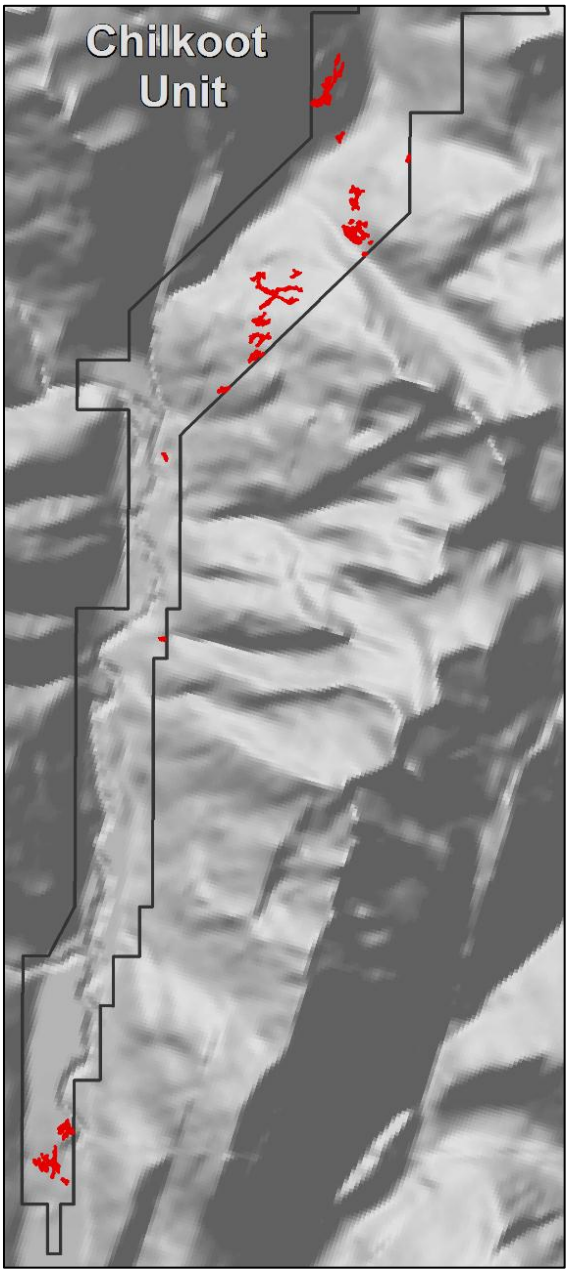




Needleleaf Forest Landcover Classes

Sitka Spruce Woodland Landcover Class

Number of Plots Sampled: 1 ([1.15], 2.06)
Map Area: 37.9 ha; 0.7%
Classification: Vegetation with 10-24% cover of trees; *Picea sitchensis* comprises at least 75% of tree cover.
Environment: Due to the wide ecological tolerance of *Picea sitchensis*, this landcover type is bimodal with respect to elevation; environment includes both coastal sites on the uplifted tidal flats at Dyea to disturbed areas at timberline.
Vegetation: *Picea sitchensis* is the dominant tree. In coastal sites, the understory is dominated by a diversity of early seral forbs and graminoids as well as dry lichen and moss species. Many of the common herbaceous species such as *Chamerion angustifolium, Argentina egedii, Lathyrus japonicus* var. *maritimus Honckenya peploides, Leymus mollis, Festuca rubra* and *Deschampsia beringensis*, are components of the mesic herbaceous meadows to which this type grades. At timberline, *Alnus viridis* ssp. *sinuata* dominates the lower stratum. On younger or more disturbed landforms (i.e. those more recently uplifted or deglaciated) *Alnus viridis* ssp. *sinuata* thickets become continuous. On older, more stable landforms, vegetation grades to open forests dominated by *Picea sitchensis* or codominated by *Picea sitchensis* and *Tsuga heterophylla.*
Succession and Disturbance: early-seral; isostatic uplift (low-elevation)
Plant Associations:
*Picea sitchensis/*Seral Herb

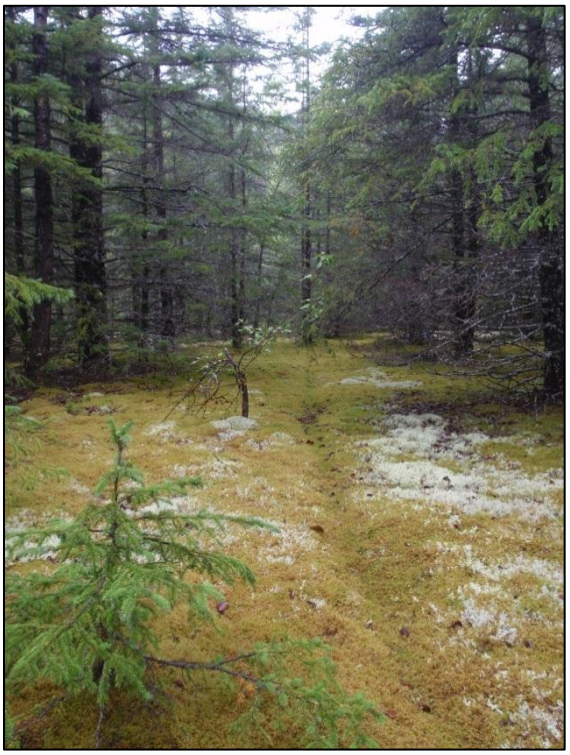


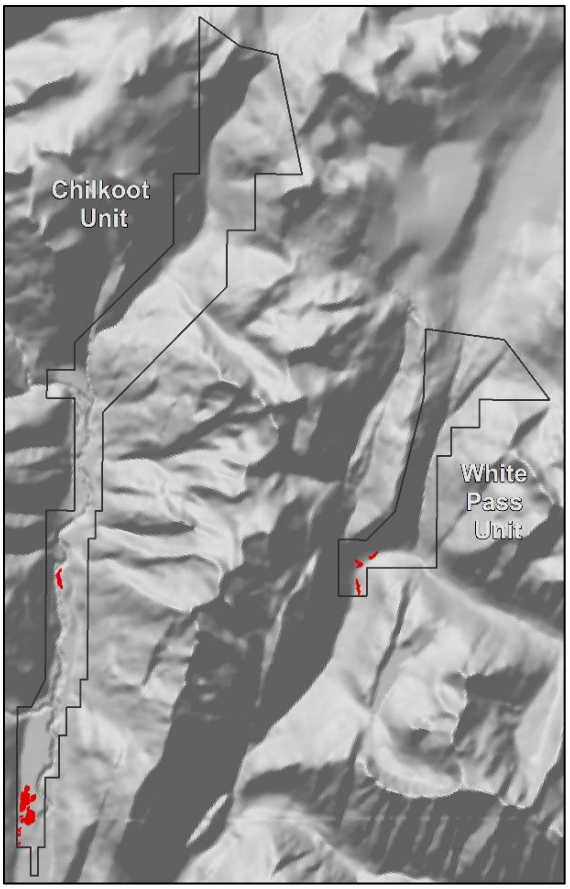




Sitka Spruce Open Forest Landcover Class

Number of Plots Sampled: 4 (1.16, [2.09], 2.10, 5.04)
Map Area: 31.9 ha; 0.6%
Distribution: Medium patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with 25-59% cover of trees; *Picea sitchensis* comprises at least 75% of tree cover.
Environment: Low elevation valley bottoms and inactive floodplains.
Vegetation: *Picea sitchensis* is the dominant tree. *Alnus viridis* ssp. *sinuata* occurs in forest openings; feather mosses and lichen dominate the groundcover, which is depauperate with respect to vascular plants. Vegetation grades to *Picea sitchensis* woodlands on more recently uplifted sections of the Dyea flats. Towards the active floodplain, vegetation grades to open and closed forests codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa.* On older, more-stable landforms, vegetation grades to closed forests of the same composition.
Succession and Disturbance: mid-seral; river flooding; historic logging
Plant Associations:
Picea sitchensis/Hylocomium splendens



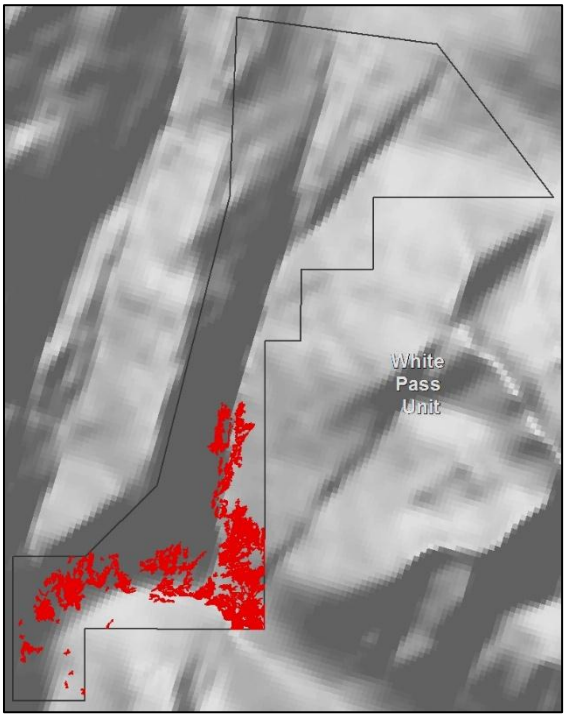


Subalpine Fir - Sitka Spruce Open Forest Landcover Class

Number of Plots Sampled: 1 (19.02)
Map Area: 95.1 ha; 1.8%
Distribution: Large patch type; common; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 25-59% cover of trees; *Picea sitchensis* and *Abies lasiocarpa*, together comprise 25-75% of tree cover.
Environment: Relatively cold and dry pockets in valley bottoms and along mountain sideslopes; extending to the subalpine.
Vegetation: *Abies lasiocarpa* and *Picea sitchensis* are the codominant trees; understory shrubs are *Menziesia ferruginea* and *Oplopanax horridus*. On older, more stable landforms, vegetation grades to closed forests of the same composition or those codominated by *Tsuga heterophylla* and *Abies lasiocarpa*. In colder, drier sites, *Abies lasiocarpa* may become dominant. In the subalpine, *Picea sitchensis* is progressively replaced by *Tsuga* species.
Succession and Disturbance: mid- to late-seral; historic logging
Plant Associations:
Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus

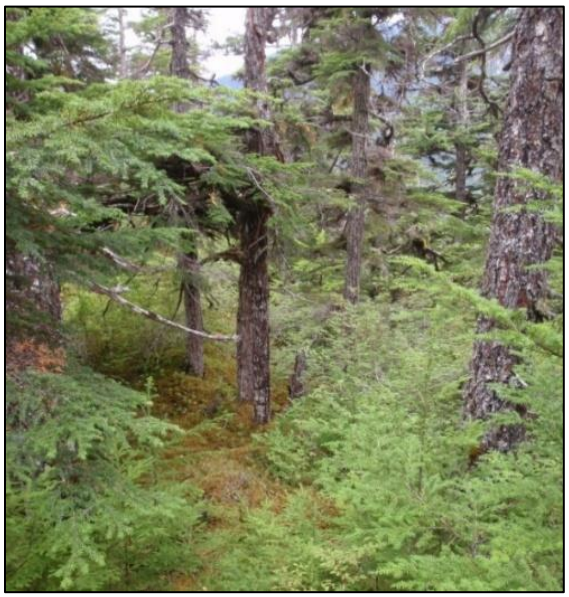


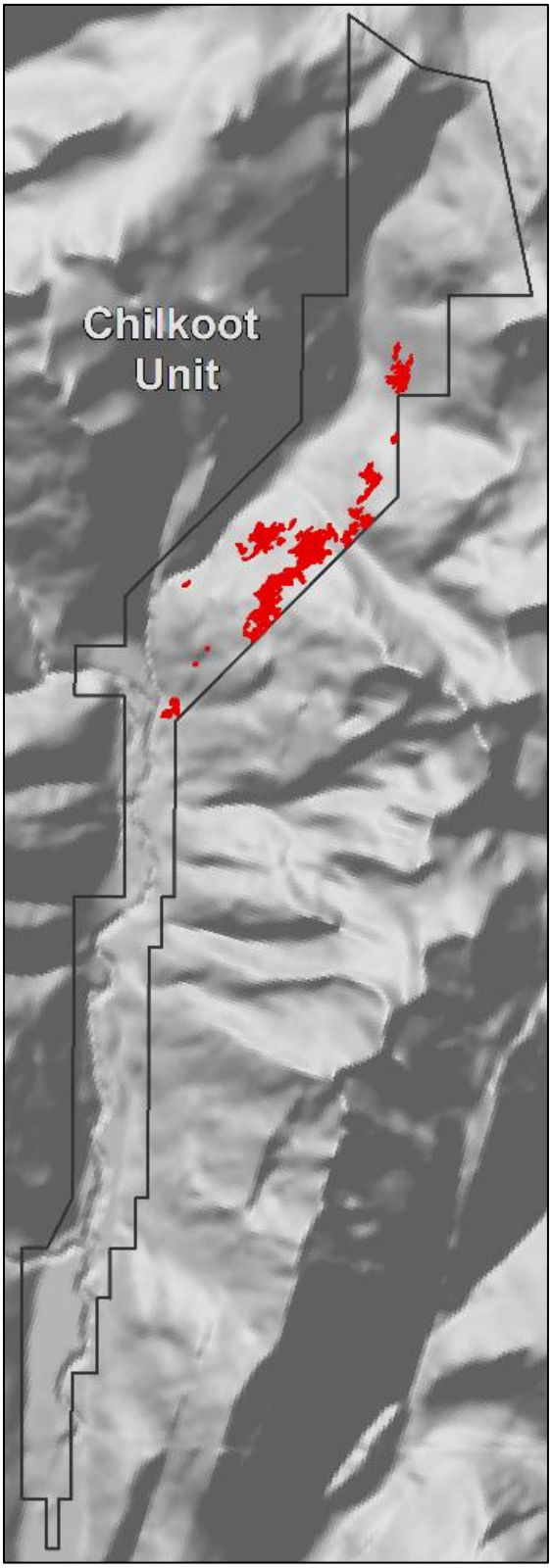




Hemlock Open Forest Landcover Class

Number of Plots Sampled: 2 (7.05, 10.01[3])
Map Area: 97.3 ha; 1.9%
Distribution: Medium patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 25-59% cover of trees; *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise at least 75% of tree cover.
Environment: Subalpine mountain sideslopes, especially stable benches and troughs.
Vegetation: *Tsuga heterophylla* and *T. mertensiana* are the dominant trees where dominance of *T. mertensiana* increases with elevation. Common understory shrubs are *Menziesia ferruginea* and *Vaccinium ovalifolium*; feather mosses dominate the ground cover, which is depauperate with respect to vascular plant species. On older, more stable landforms, vegetation grades to closed forests of the same composition. In the upper subalpine, vegetation grades to forest types dominated by *Tsuga mertensiana*.
Succession Plant Associations:
Tsuga heterophylla/Menziesia ferruginea
Tsuga mertensiana/Vaccinium ovalifolium





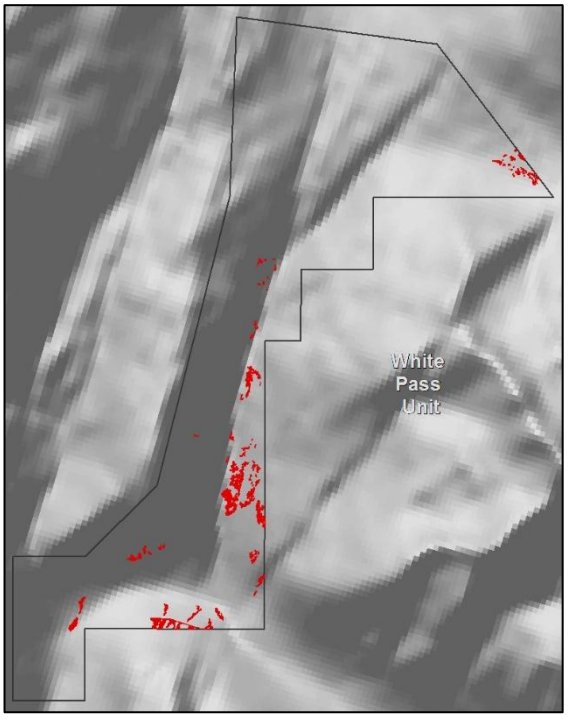
[3] Plant association plot only

Subalpine Fir Open Forest Landcover Class

Number of Plots Sampled: 1 (21.02)
Map Area: 17.2 ha; 0.3%
Distribution: Medium patch type; uncommon; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 25-59% cover of trees; *Abies lasiocarpa* comprises at least 75% of tree cover.
Environment: Dry and cold sites on mountain sideslopes and gentle topography in the subalpine.
Vegetation: *Abies lasiocarpa* is the dominant tree. Plot data was not collected from mountain sideslopes supporting this type; however in subalpine sites *Cassiope mertensiana* and presumably other dwarf shrubs in the heath family are common understory species. Towards timberline, vegetation grades to dwarf forests of the same composition or those codominated by *Abies lasiocarpa* and *Tsuga mertensiana*; adjacent nonforested vegetation is often dominated by a diversity of forbs and/or dwarf shrubs. At lower elevations vegetation grades to open forests codominated by *Picea sitchensis* and *Abies lasiocarpa* or closed forests that in areas of lesser stability may include *Picea sitchensis* and in areas of greater stability may include *Tsuga* species.
Succession and Disturbance: late-seral, river, stream flooding
Plant Associations:
Abies lasiocarpa/Cassiope mertensiana





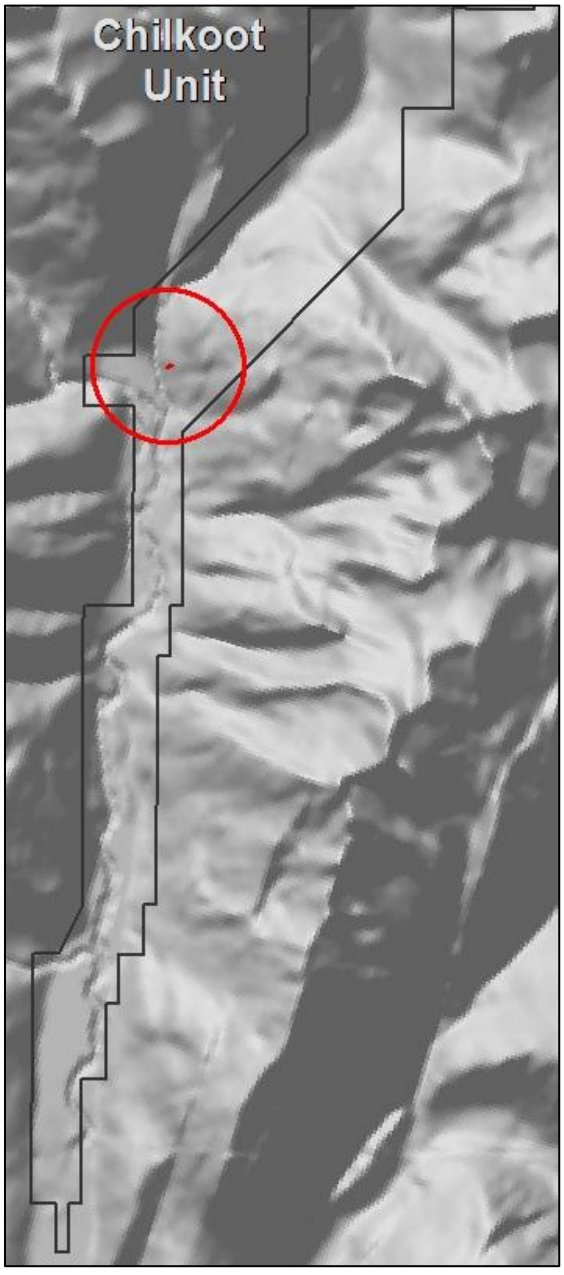


Lodgepole Pine Open Forest Landcover Class

Number of Plots Sampled: 1 (32.03)
Map Area: 0.4 ha; <0.1%
Distribution: Small patch type; uncommon; occurrence restricted to Chilkoot Unit.
Classification: Vegetation with 25-59% cover of trees; *Pinus contorta* var. *latifolia* comprises at least 75% of tree cover.
Environment: Dry knobs underlain by shallow bedrock and cliffs on mountain sideslopes.
Vegetation: *Pinus contorta* var. *latifolia* is the dominant tree; *Tsuga heterophylla* saplings often present. Dry lichen species dominate the understory, which is depauperate with respect to vascular plant species. In sites with greater soil development, vegetation grades to open or closed forests with increasing presence of *Tsuga heterophylla*, *Betula papyrifera,* and /or *Picea sitchensis.*
Succession and Disturbance: late-seral; no significant disturbance
Plant Associations:
Pinus contorta var. *latifolia*/*Cladina* species





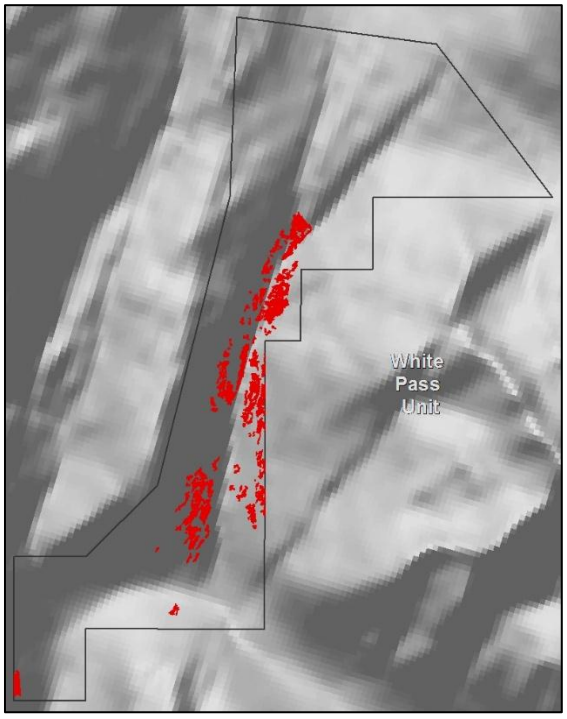


Western Hemlock - Subalpine Fir Open Forest Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from closed forest plots of similar species composition
Map Area: 50.8 ha; 1.0%
Distribution: Small to medium patch type; common; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 25-59% cover of trees, of tree cover; *Tsuga heterophylla* and *Abies lasiocarpa*, together comprise at least 75% of tree cover; lower mountain sideslopes.
Environment: Cold valley bottoms and mountain sideslopes to the subalpine.
Vegetation: *Tsuga heterophylla* and *Abies lasiocarpa* are the dominant trees. Although plot data was not collected for this type, *Menziesia ferruginea* is presumably a common shrub. On older, more stable sites vegetation grades to closed forests of the same composition; on younger, more disturbed sites vegetation grades to open forests with a greater presence of *Picea sitchensis*.
Succession and Disturbance: mid- to late-seral; avalanche, historic logging
Plant Associations: None identified, but may include:
Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea

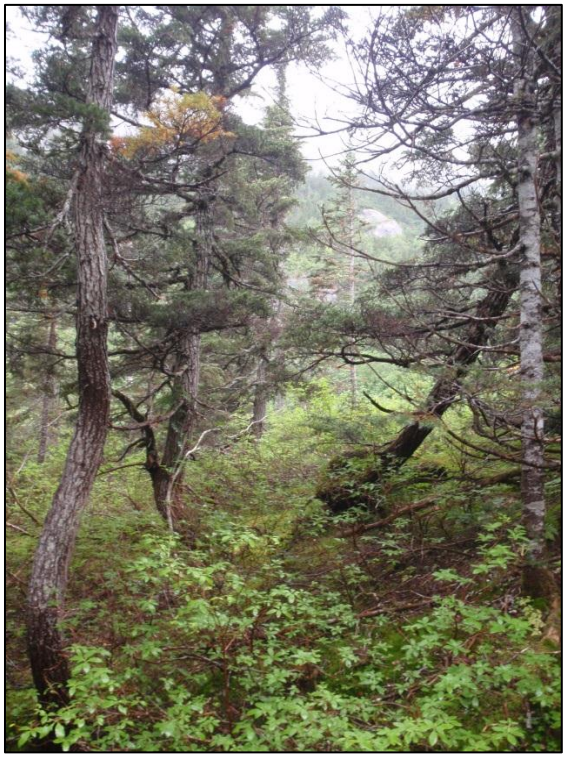


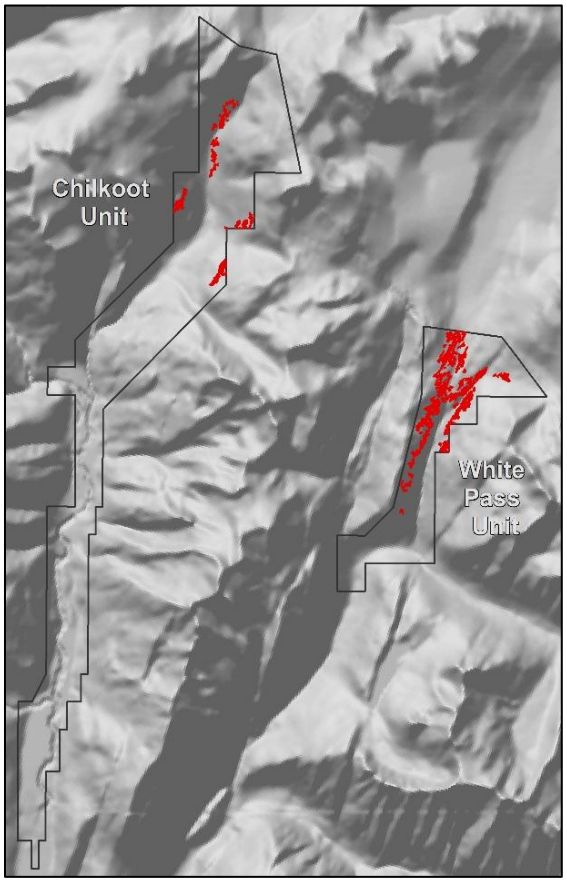




Mountain Hemlock - Subalpine Fir Open Forest Landcover Class

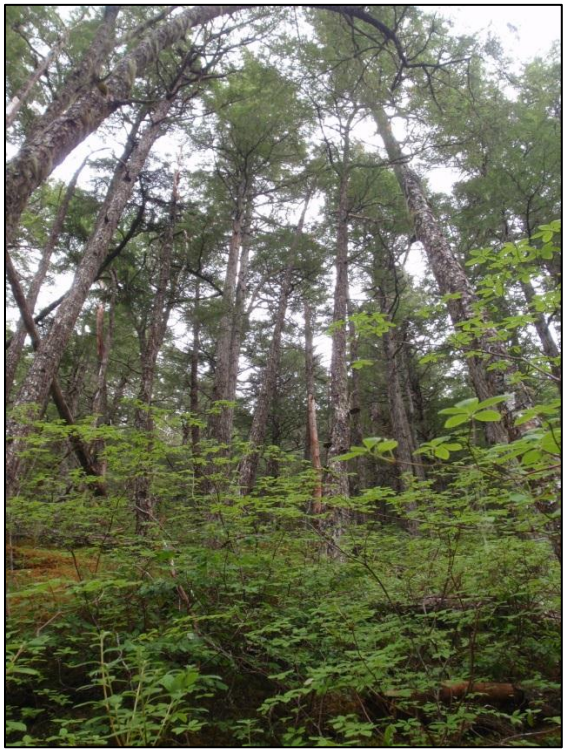
Number of Plots Sampled: 1 (14.05)
Map Area: 113.2 ha; 2.2%
Distribution: Small patch type; uncommon in the Chilkoot Unit, common in the White Pass Unit.
Classification: Vegetation with 25-59% cover of trees; *Tsuga mertensiana* and *Abies lasiocarpa* comprise 25-75% of tree cover; upper mountain sideslopes.
Environment: Subalpine mountain sideslopes; appears to occur above 460 m. and 920 m. in the Chilkoot and White Pass Units, respectively. In the White Pass Unit, occurs above the alder line, which appears to be coincident with a Pleistocene glaciation trimline.
Vegetation: *Tsuga mertensiana* and *Abies lasiocarpa* are the dominant trees; *Menziesia ferruginea* and *Vaccinium ovalifolium* are common shrubs; feather mosses dominate the groundcover. Towards timberline, vegetation grades to dwarf forests of the same composition; downgradient, vegetation grades to open forests dominated by *Tsuga heterophylla* and *Abies lasiocarpa*.
Succession and Disturbance: late-seral; avalanche
Plant Associations:
Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea

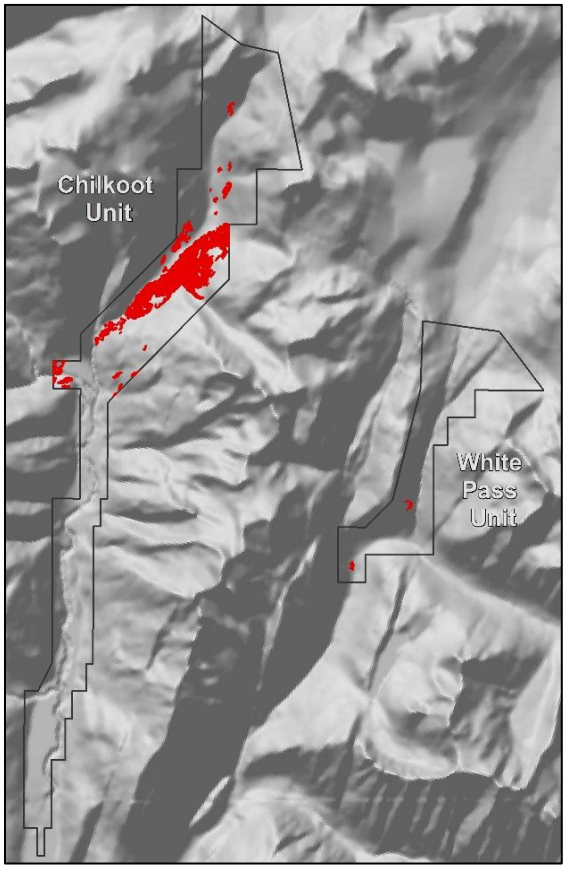




Hemlock Closed Forest Landcover Class

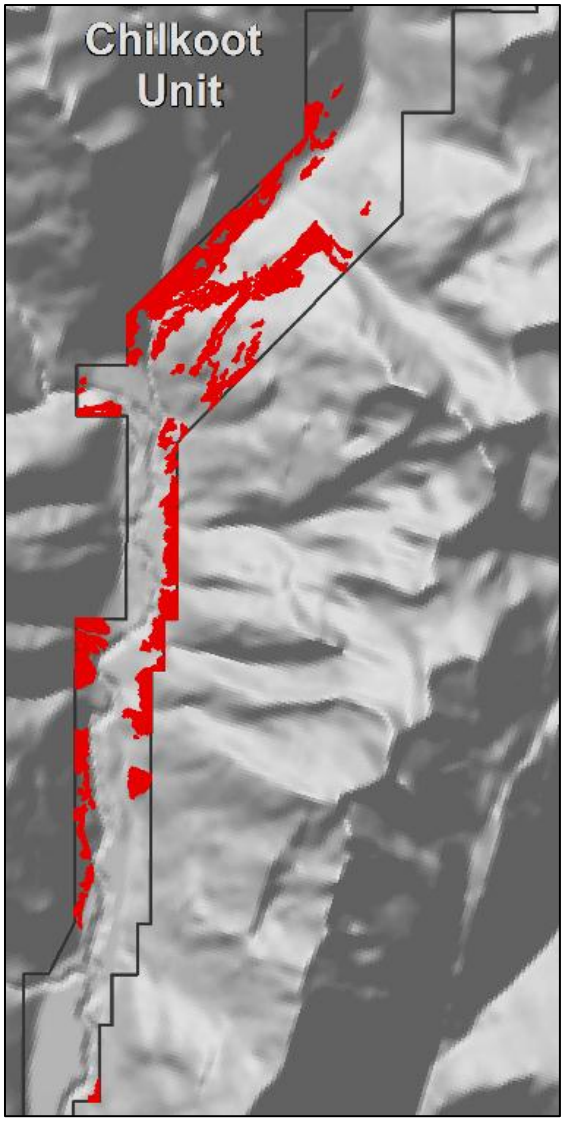
Number of Plots Sampled: 15 (8.01, [9.02], 9.05, 10.03, 11.03, 12.03, 12.04, 13.02, 15.06, 19.04, 30.01, 30.02, 30.03, 30.08, 31.01)
Map Area: 302.2 ha; 5.8%
Distribution: Medium patch type; abundant in the Chilkoot Unit, uncommon in the White Pass Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) comprise at least 75% of tree cover.
Environment: Lower mountain sideslopes, especially stable benches, troughs and terraces.
Vegetation: *Tsuga* species are the dominant trees, with dominance transitioning from *T. heterophylla* to *T. mertensiana* with elevation. Common shrubs are *Menziesia ferruginea* and *Vaccinium ovalifolium*. The fern *Dryopteris expansa* is abundant in more productive sites. Feather mosses dominate the ground cover and often, vascular plant species are not well represented. In more protected or older sites, vegetation grades to closed forests of the same composition. In more disturbed sites, vegetation grades to closed forests with greater presence of *Picea sitchensis* and less commonly, *Betula papyrifera*.
Succession and Disturbance: late-seral; historic logging
Plant Associations:
Tsuga heterophylla/Hylocomium splendens
Tsuga heterophylla/Menziesia ferruginea
Tsuga heterophylla-Tsuga mertensiana
Tsuga heterophylla-Tsuga mertensiana/Dryopteris expansa
Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea
Tsuga heterophylla/Vaccinium ovalifolium
Tsuga mertensiana/Vaccinium ovalifolium





Sitka Spruce - Hemlock Closed Forest Landcover Class





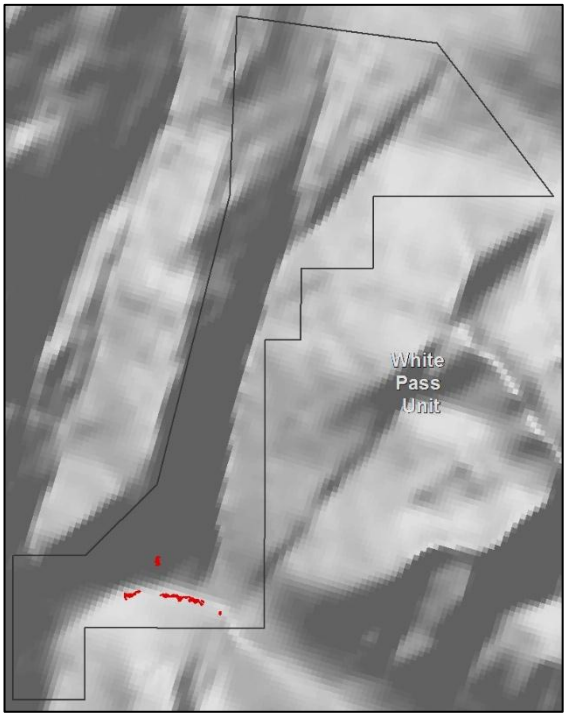
Number of Plots Sampled: 11 (6.01, 6.05, 7.02[4], 7.03, 9.01, [9.03], 9.04, 10.02, 10.04, 30.04, 52.01)
Map Area: 428.7 ha; 8.2%
Distribution: Medium to large patch type; common; yet restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga* species and *Picea sitchensis*, together comprise at least 75% of tree cover.
Environment: Lower mountain side and toeslopes.
Vegetation: *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Picea sitchensis* are the codominant trees. *Menziesia ferruginea* and *Oplopanax horridus* are common shrubs. The fern *Dryopteris expansa* is abundant in more productive sites. Feather mosses dominate the ground cover. Vascular species are not well-represented and sites susceptible to flooding are often depauperate. Where sideslopes steepen and become more broken vegetation grades to open or closed forests with greater presence of *Betula papyrifera*. On smoother sideslopes, vegetation grades to closed forests dominated by *T. heterophylla*. Where toeslopes meet the floodplain, vegetation grades to open forests with greater presence of *Populus balsamifera* ssp. *trichocarpa*.
Succession and Disturbance: mid-seral, historic logging
Plant Associations:
Tsuga heterophylla/Menziesia ferruginea
Tsuga heterophylla-Picea sitchensis/Depauperate
Tsuga heterophylla-Picea sitchensis/Gymnocarpium dryopteris
Tsuga heterophylla-Picea sitchensis/Hylocomium splendens
Tsuga heterophylla-Picea sitchensis/Oplopanax horridus
Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea
*Tsuga mertensiana-Picea sitchensis/*Moss

[4] Plant association plot only

Subalpine Fir Closed Forest Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photograph is from an open forest plot of similar species composition
Map Area: 2.4 ha; <0.1%
Distribution: Small patch type; uncommon; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 60-100% cover of trees; *Abies lasiocarpa* comprises at least 75% of tree cover.
Environment: Cold pockets in valley bottoms along riverine corridors.
Vegetation: *Abies lasiocarpa* is the dominant tree. Although plot data was not collected for this type, *Menziesia ferruginea* is presumably a common shrub. Vegetation grades to open forests of the same composition or open to closed forests with components of *Picea sitchensis* towards the river and increasing *Tsuga heterophylla* away from the river.
Succession and Disturbance: late-seral; historic logging
Plant Associations: None identified, but may include:
Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus
Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea



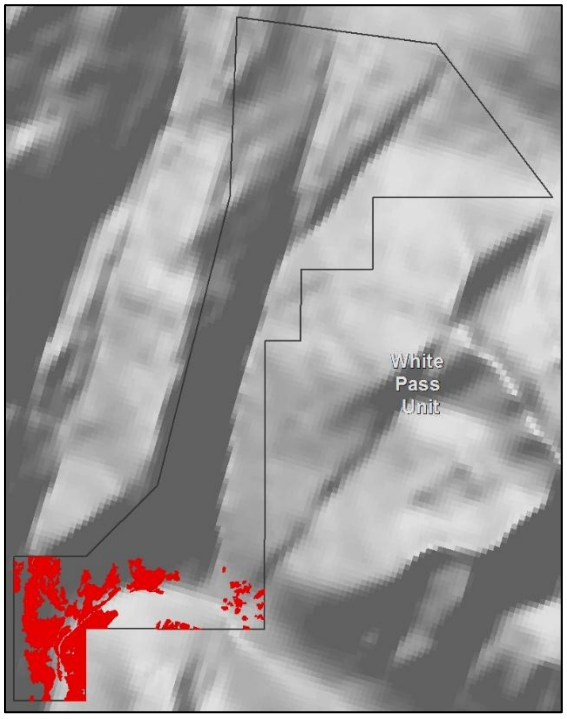


Sitka Spruce - Subalpine Fir Closed Forest Landcover Class

Number of Plots Sampled: 2 (19.01, 19.03)
Map Area: 100.2 ha; 1.9%
Distribution: Small to large patch type; common; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 60-100% cover of trees; *Abies lasiocarpa* and *Picea sitchensis*, together comprise at least 75% of tree cover.
Environment: Lower mountain sideslopes; often adjacent to rivers.
Vegetation: *Abies lasiocarpa* and *Picea sitchensis* are the dominant trees. Common shrubs are *Oplopanax horridus* and *Menziesia ferruginea*. Ferns such as *Gymnocarpium dryopteris* and *Dryopteris expansa* are locally abundant. In more disturbed or steeper areas, vegetation grades to open forests of the same composition. On more stable landforms, vegetation grades to closed forests codominated by *Abies lasiocarpa* and *Tsuga heterophylla*.
Succession and Disturbance: mid-seral; historic logging
Plant Associations:
Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus





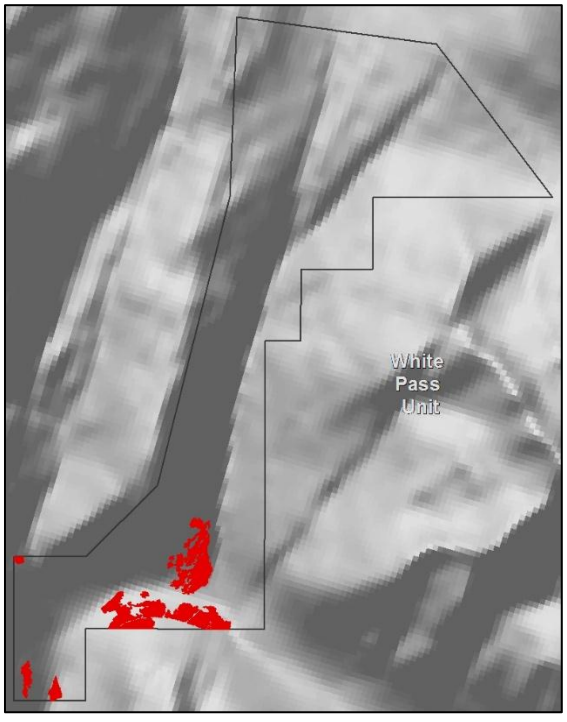


Western Hemlock - Subalpine Fir Closed Forest Landcover Class

Number of Plots Sampled: 2 (19.05, 19.07)
Map Area: 49.7 ha; 0.9%
Distribution: Medium patch type; common; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga heterophylla* and *Abies lasiocarpa*, together comprise at least 75% of tree cover; lower mountain sideslopes.
Environment: Cold valley bottoms and mountain sideslopes.
Vegetation: *Tsuga heterophylla* and *Abies lasiocarpa* are the dominant trees. *Menziesia ferruginea* is a common shrub. On younger sites vegetation grades to open forests of the same composition; on, more disturbed sites vegetation grades to open or closed forests with a greater presence of *Picea sitchensis*.
Succession and Disturbance: late-seral; historic logging
Plant Associations:
Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea





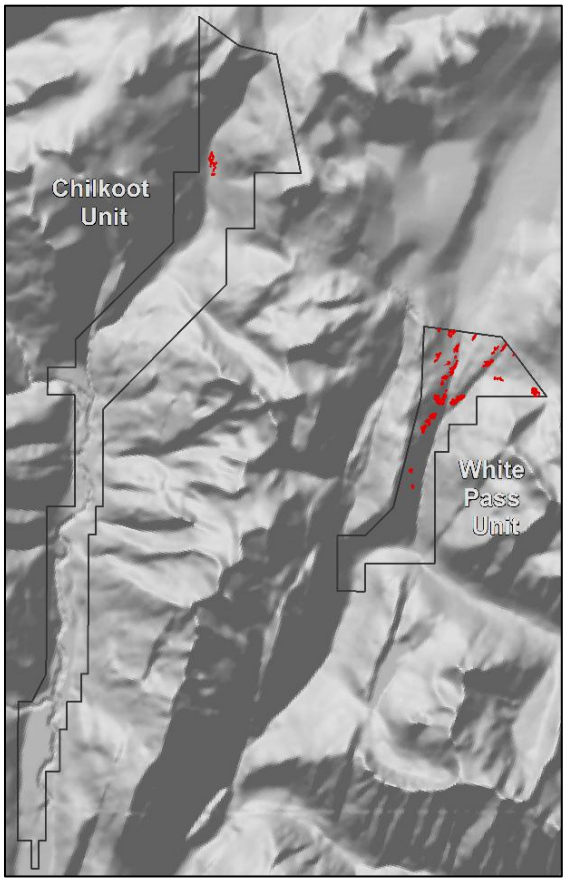


Mountain Hemlock - Subalpine Fir Closed Forest Landcover Class

Number of Plots Sampled: 4 (14.06, 14.07, 23.01, 23.04)
Map Area: 28.8 ha; 0.5%
Distribution: Small patch type; uncommon in the Chilkoot, more common in the White Pass Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga mertensiana* and *Abies lasiocarpa*, together comprise at least 75% of tree cover; upper mountain sideslopes.
Environment: Subalpine mountain sideslopes; appears to occur above 460 m. and 920 m. in the Chilkoot and White Pass Units, respectively. In the White Pass Unit, occurs above the alder line, which is presumably coincident with a Pleistocene glaciation trimline.
Vegetation: *Tsuga mertensiana* and *Abies lasiocarpa* are the dominant trees; *Menziesia ferruginea Vaccinium ovalifolium* are common shrubs; *Phyllodoce glanduliflora* is a common dwarf shrub; feather mosses dominate the groundcover. Towards timberline, vegetation grades to dwarf forests of the same composition; downgradient, vegetation grades to open forests dominated by *Tsuga heterophylla* and *Abies lasiocarpa*.
Succession and Disturbance: late-seral, no significant disturbance
Plant Associations:
Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea
Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glanduliflora





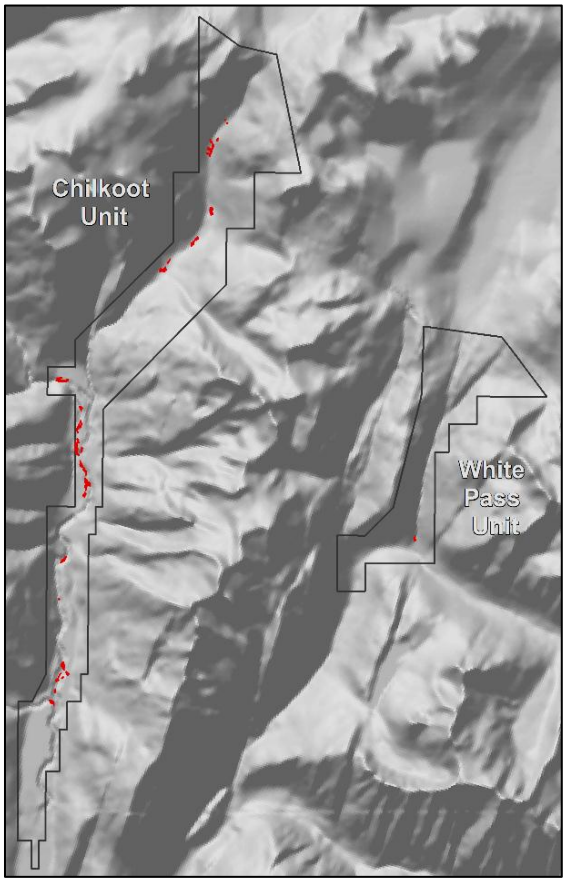


Broadleaf Forest Landcover Classes

Black Cottonwood Woodland Landcover Class

Number of Plots Sampled: 3 (4.07, 8.02, [8.03])
Map Area: 19.9 ha; 0.4%
Distribution: Small to medium, often linear patch type; common in the Chilkoot Unit, uncommon in the White Pass Unit.
Classification: Vegetation with 10-24% cover of trees; *Populus balsamifera* ssp. *trichocarpa* comprises at least 75% of tree cover.
Environment: Active floodplains and riparian corridors to approximately 500 m in the Chilkoot Unit.
Vegetation: *Populus balsamifera* ssp. *trichocarpa* is the dominant tree; the shrub, *Alnus viridis* ssp. *sinuata* dominates the understory. The fern, *Dryopteris expansa* is locally abundant. Towards the more active floodplain, vegetation grades to closed thickets of tall *Alnus* and/or *Salix* species. Towards the inactive floodplain or on otherwise older and more stable landforms, vegetation grades to open forests of the same composition or those codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa.*
Succession and Disturbance: early-seral; river flooding, historic logging (Dyea area only)
Plant Associations:
Alnus viridis ssp. *sinuata/Dryopteris expansa*
Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*

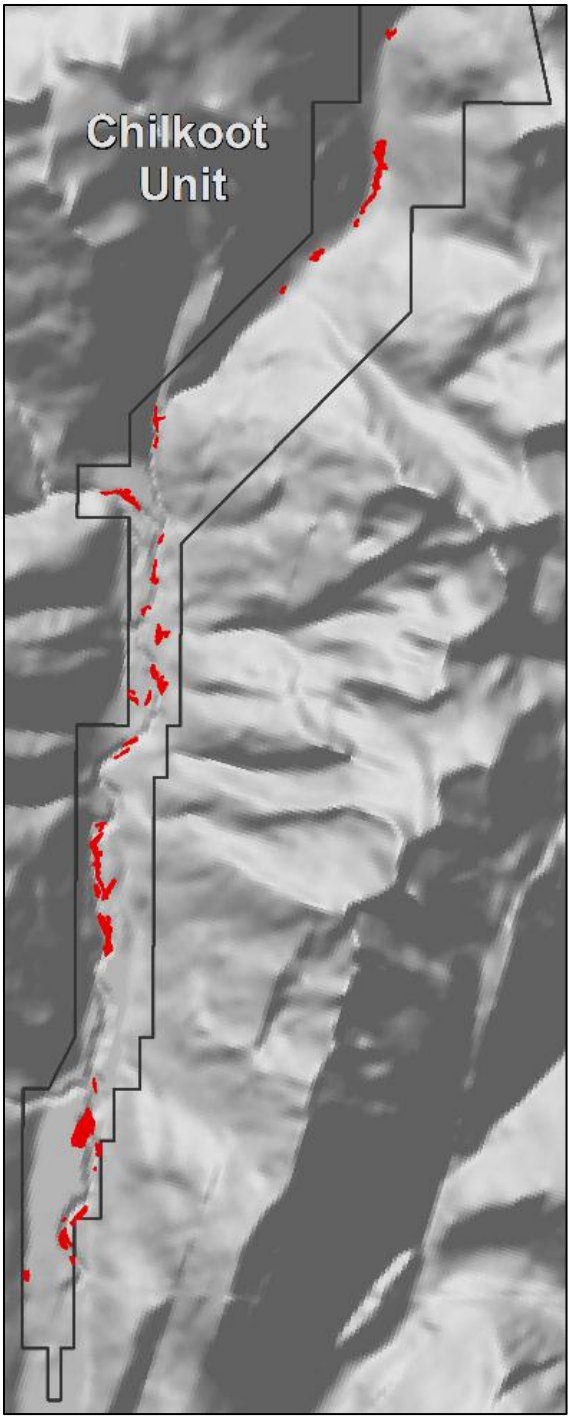




Black Cottonwood Open Forest Landcover Class

Number of Plots Sampled: 5 (5.05, 8.06, 11.02, 11.06, 14.04)
Map Area: 52.3 ha; 1.0%
Distribution: Small to medium, often linear patch type; common; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 25-59% cover of trees; *Populus balsamifera* ssp. *trichocarpa* comprises at least 75% of tree cover.
Environment: Active floodplains and riparian corridors to approximately 500 m
Vegetation: *Populus balsamifera* ssp. *trichocarpa* is the dominant tree; the shrub, *Alnus viridis* ssp. *sinuata* dominates the understory. In the lower shrub stratum, *Oplopanax horridus* and *Viburnum edule* are locally abundant. Towards the more active floodplain, vegetation grades to woodlands of the same composition or *Alnus* and/or *Salix* thickets. Towards the inactive floodplain or on otherwise older and more stable landforms, vegetation grades to closed forests of the same composition or those codominated by *Picea sitchensis*.



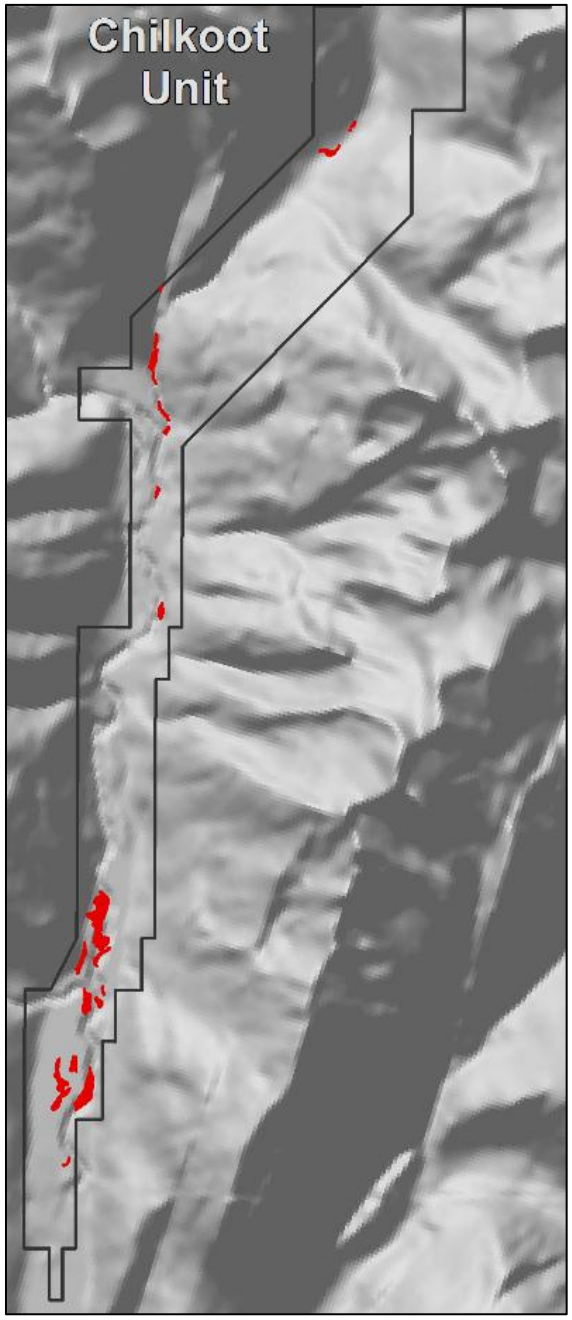


Succession and Disturbance: early- to mid-seral; river flooding, historic logging (Dyea area only)
Plant Associations:
Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*

Black Cottonwood Closed Forest Landcover Class

Number of Plots Sampled: 4 (3.07, 4.04, 4.06, 4.09)
Map Area: 40.4 ha; 0.8%
Distribution: Small to medium, often linear patch type; common; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Populus balsamifera* ssp. *trichocarpa* comprises at least 75% of tree cover.
Environment: Active floodplains and riparian corridors to approximately 500 m in the Chilkoot Unit.
Vegetation: *Populus balsamifera* ssp. *trichocarpa* is the dominant tree; the shrub, *Alnus viridis* ssp. *sinuata, Cornus sericea* ssp. *sericea* and *Oplopanax horridus* are common shrubs. The fern *Gymnocarpium dryopteris* is locally abundant. Towards the more active floodplain, vegetation grades to open forests of the same composition. Towards the inactive floodplain or on otherwise older and more stable landforms, vegetation grades to open to closed forests codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*.



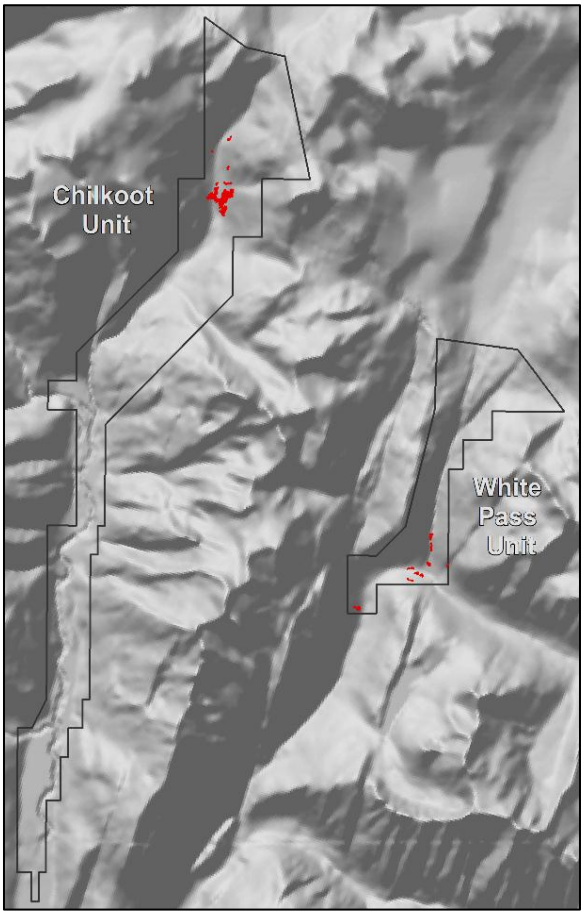


Succession and Disturbance: mid-seral; river flooding, historic logging (Dyea area only)
Plant Associations:
Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Populus balsamifera ssp. *trichocarpa/Gymnocarpium dryopteris*
Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*

Paper Birch Open Forest Landcover Class

Number of Plots Sampled: 2 (12.01, 14.09)
Map Area: 18.3 ha; 0.3%
Distribution: Small to medium patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with 25-59% cover of trees; *Betula papyrifera* comprises at least 75% of tree cover.
Environment: Cliffs and boulder fields on mountain sideslopes.
Vegetation: *Betula papyrifera* is the dominant tree. *Alnus viridis* ssp. *sinuata* and *Menziesia ferruginea* are common shrubs. On gentler slopes, vegetation transitions to open or closed forests codominated by *Betula papyrifera* and *Tsuga* species. Where cliffs transition to benches, vegetation grades to closed forests dominated by *Tsuga* species. Often grades to open forests codominated by *Betula papyrifera* and *Picea sitchensis* at the margin of boulder fields.
Succession and Disturbance: mid-seral; rock fall
Plant Associations:
Betula papyrifera/Alnus viridis ssp. *sinuata*
Betula papyrifera/Menziesia ferruginea



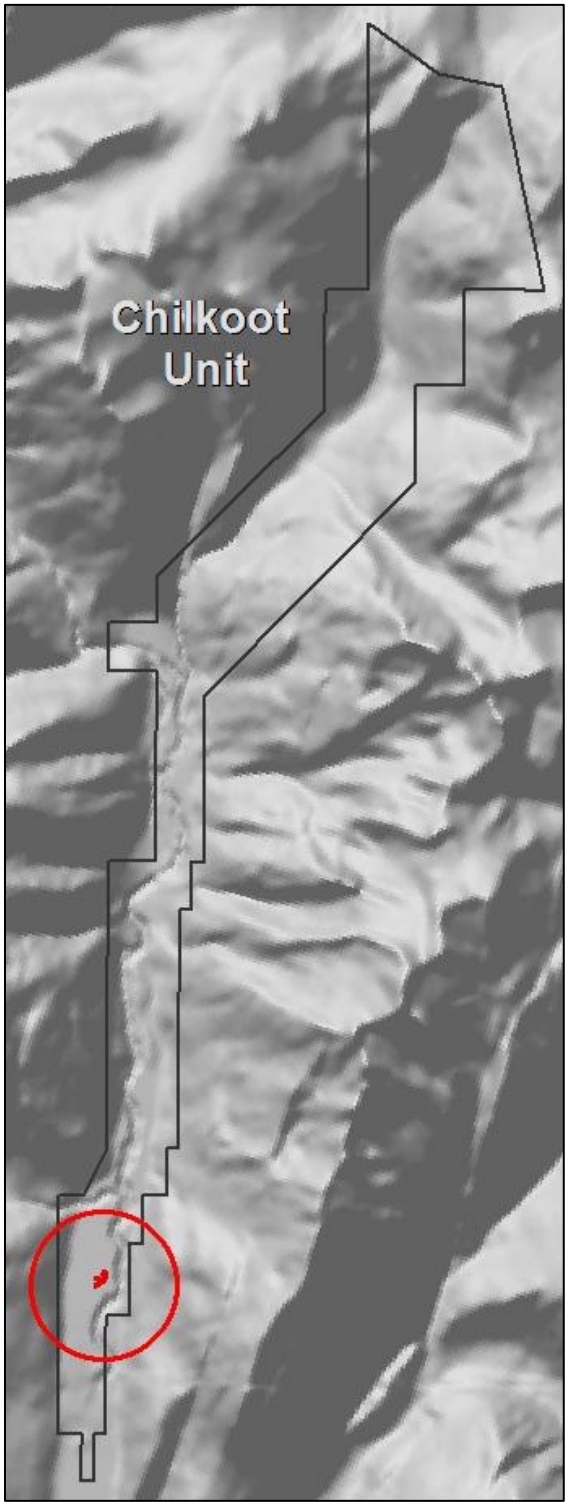




Black Cottonwood - Paper Birch Closed Forest Landcover Class

Number of Plots Sampled: 1 (3.08)
Map Area: 3.0 ha; 0.1%
Distribution: Small patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Populus balsamifera* ssp. *trichocarpa* and *Betula papyrifera*, together comprise at least 75% of tree cover.
Environment: Inactive floodplains, topographic highs (e.g. bedrock outcrops) adjacent to the river
Vegetation: *Populus balsamifera* ssp. *trichocarpa* and *Betula papyrifera* are the dominant trees. *Cornus sericea* ssp. *sericea* is a common shrub. Towards the active floodplain, vegetation grades to a variety of types, most commonly open to closed forests (co)dominated by *Populus balsamifera* ssp. *trichocarpa, Picea sitchensis* or less commonly to closed thickets of *Alnus* and/or *Salix* species. Outside of the floodplain vegetation grades to open to closed forests codominated by *Betula papyrifera, Picea sitchensis* and/or *Tsuga heterophylla*.
Succession and Disturbance: mid-seral; river flooding, historic logging (Dyea area only)
Plant Associations:
Populus balsamifera ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*



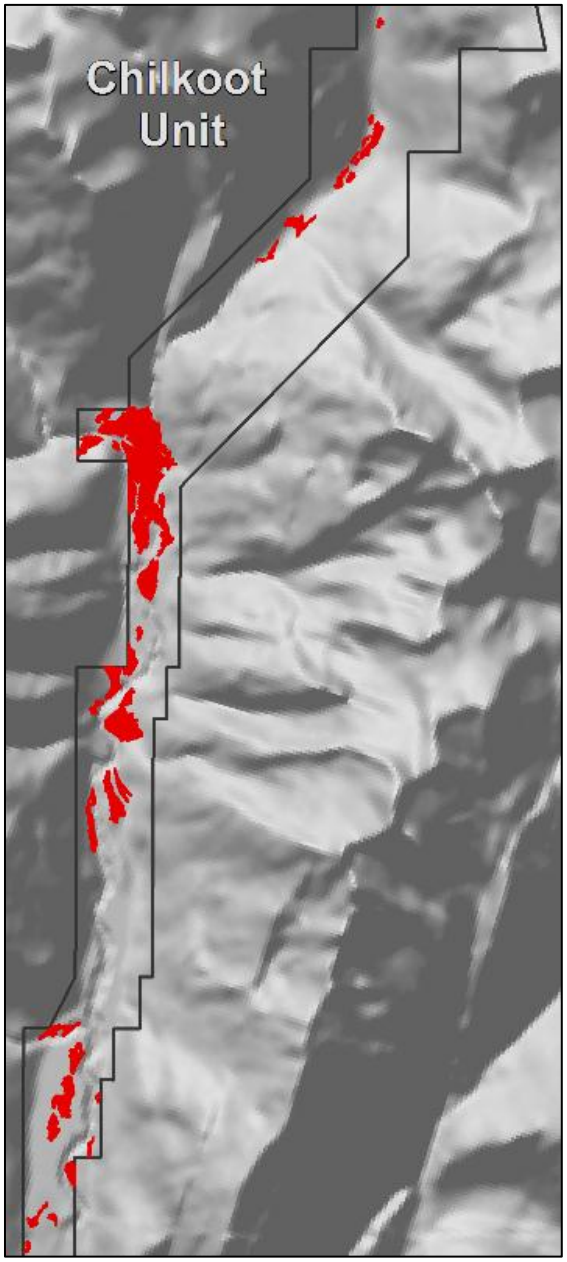


Mixed Needleleaf/Broadleaf Forest Landcover Classes

Sitka Spruce - Black Cottonwood Open Forest Landcover Class

Number of Plots Sampled: 8 (5.02, 5.06, 5.07, 6.03, 7.04, 8.04, 8.05, 11.05, [30.05])
Map Area: 215.5 ha; 4.1%
Distribution: Large patch type; common; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 25-59% cover of trees; *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise at least 75% of tree cover.
Environment: Active floodplains, abandoned overflow plains and riparian corridors
Vegetation: *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* are the dominant trees. *Alnus viridis* ssp. *sinuata*, *Cornus sericea* ssp. *sericea*, *Viburnum edule* and *Oplopanax horridus* are common shrubs. *Abies lasiocarpa* saplings and dry lichen-dominated ground cover are characteristic of abandoned overflow plains. Towards the more active floodplain, vegetation transitions to closed thickets of tall *Alnus* and/or *Salix* species or open to closed forests dominated by *Populus balsamifera* ssp. *trichocarpa.* Towards the inactive floodplain, vegetation transitions to closed forests of the same composition or those codominated by *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*.
Succession and Disturbance: mid-seral; river flooding, historic logging

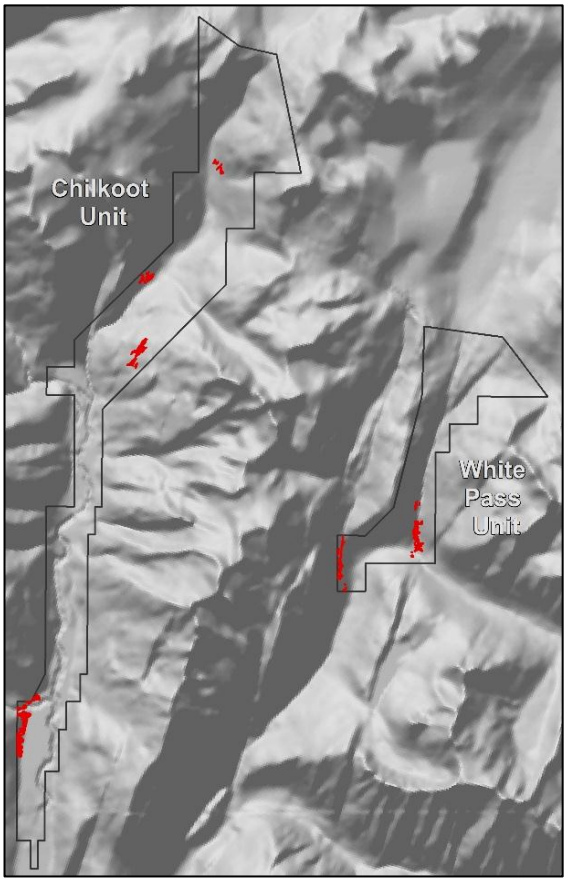




Plant Associations:
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cladina* species
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*

Sitka Spruce - Paper Birch Open Forest Landcover Class

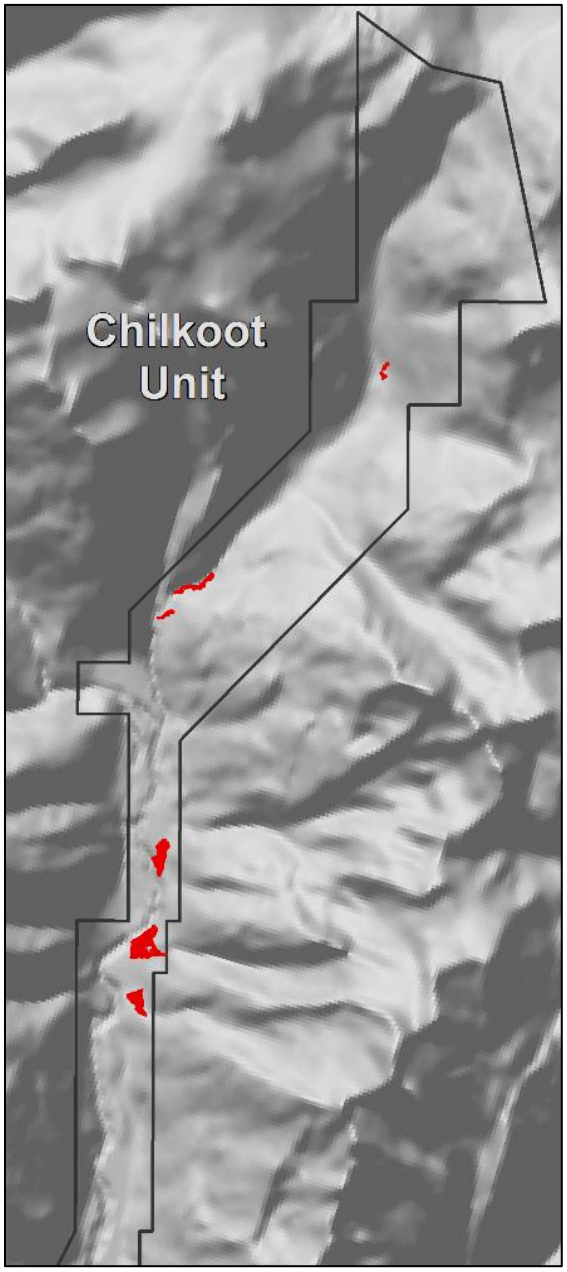




Number of Plots Sampled: 1 (3.01)
Map Area: 58.2 ha; 1.1%
Distribution: Medium patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with 25-59% cover of trees; *Picea sitchensis* and *Betula papyrifera*, together comprise at least 75% of tree cover.
Environment: broken mountain sideslopes
Vegetation: *Picea sitchensis* and *Betula papyrifera* are the dominant trees. Feather mosses dominate the groundcover, which is depauperate with respect to vascular plant species. On younger, more-disturbed (broken) sideslopes, vegetation grades to closed thickets of *Alnus viridis* ssp. *sinuata*. On older, less-disturbed (smooth) sideslopes, vegetation grades to open or closed forests (co)dominated by *Picea sitchensis* and/or *Tsuga heterophylla.* In the White Pass Unit, *Abies lasiocarpa* is a common codominant in adjoining forest types.
Succession and Disturbance: mid-seral; rock fall, historic logging
Plant Associations:
Betula papyrifera-Picea sitchensis/Hylocomium splendens



Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest Landcover Class

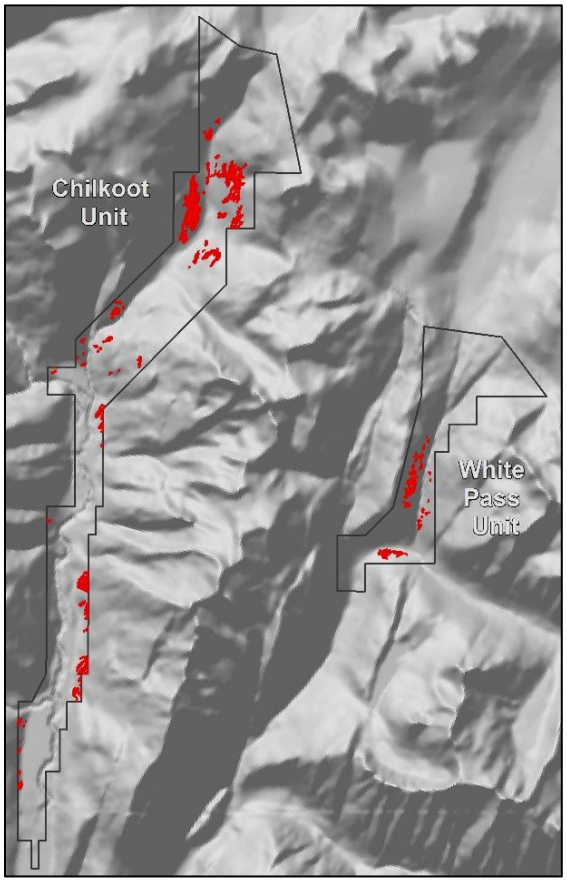


Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photograph is from a closed forest plots of similar species composition
Map Area: 27.2 ha; 0.5%
Distribution: Small patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 25-59% cover of trees; *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*, together comprise at least 75% of tree cover.
Environment: inactive floodplains, mountain toe and side slopes, toe edge of vegetated alluvial fans
Vegetation: *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla* are the dominant trees. Although plot data was not collected for this type, *Cornus sericea* ssp. *sericea* is presumed to be a common shrub. Towards the active floodplain or on otherwise younger, more-disturbed landforms, vegetation grades closed thickets of *Alnus viridis* ssp. *sinuata* or open forests codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*. On older, more stable landforms, vegetation grades to closed forests of the same composition or closed forests codominated by *Picea sitchensis* and *Tsuga heterophylla.*
Succession and Disturbance: mid-seral; rockfall, landslide, historic logging
Plant Associations: None identified, but may include:
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa-Tsuga heterophylla*/Depauperate



Hemlock - Paper Birch Open Forest Landcover Class





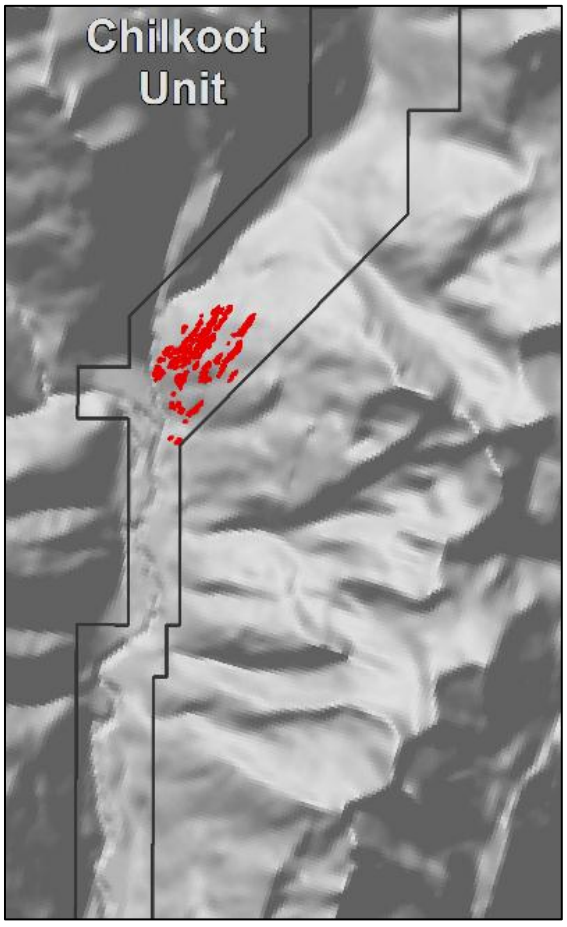
Number of Plots Sampled: 2 (3.03[5], 13.04)
Map Area: 177.9 ha; 3.4%
Distribution: Small to medium patch type; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with 25-59% cover of trees; *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise at least 75% of tree cover.
Environment: Cliffs or otherwise broken mountain sideslopes.
Vegetation: *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera* are the dominant trees; *Menziesia ferruginea* is a common shrub; over shallow bedrock, lichen may dominate the ground cover. On more-disturbed (broken) sideslopes, vegetation grades to open forests dominated by *Betula papyrifera*; towards shallow bedrock knobs, vegetation grades to open to closed forests codominated by *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*), *Betula papyrifera* and *Pinus contorta* var. *latifolia*. On older, less-disturbed (smooth) sideslopes, vegetation grades to closed forests of the same composition or open to closed forests dominated by *Tsuga* species.
Succession and Disturbance: mid-seral; avalanche, rock fall
Plant Associations:
Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea
Stereocaulon paschale



[5] Plant association plot only

Hemlock - Paper Birch - Lodgepole Pine Closed (Open) Forest Landcover Class

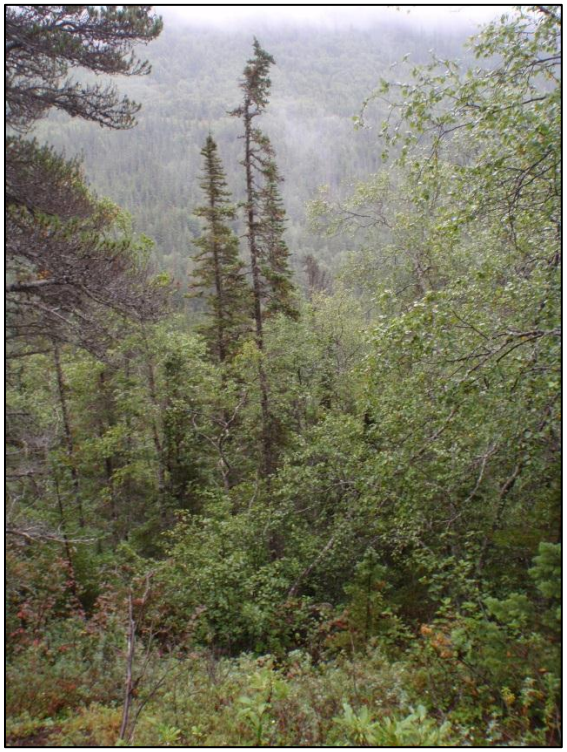


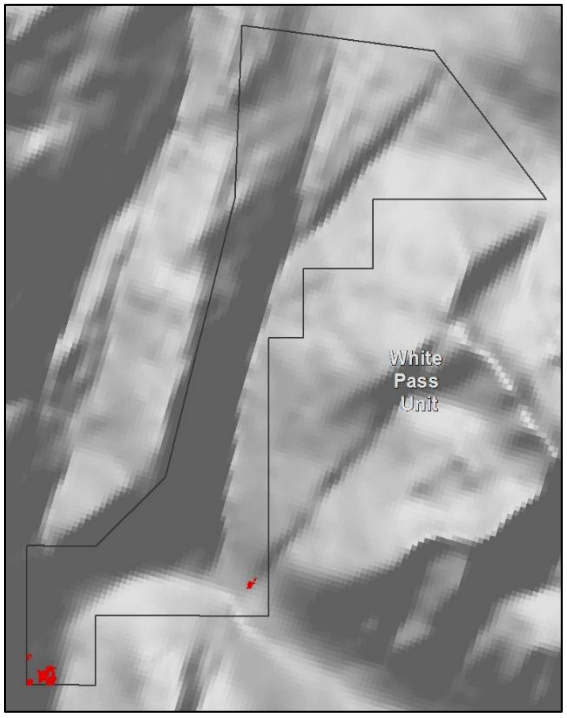


Number of Plots Sampled: 1 (32.02)
Map Area: 44.1 ha; 0.8%
Distribution: Small patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 25-100% cover of trees; *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*), *Betula papyrifera* and *Pinus contorta* var. *latifolia*, together comprise at least 75% of tree cover.
Environment: Dry knobs underlain by shallow bedrock and cliffs on mountain sideslopes.
Vegetation: *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*), *Betula papyrifera* and *Pinus contorta* var. *latifolia* are the dominant trees. Feather mosses and dry lichen dominate the ground cover; vascular plant species are not well represented. In sites with less soil development, vegetation grades to open forests dominated by *Pinus contorta* var. *latifolia*. In sites with greater soil development, vegetation grades to open or closed forests codominated by *Tsuga heterophylla*, *Betula papyrifera*, and /or *Picea sitchensis*.
Succession and Disturbance: mid- to late-seral; no significant disturbance
Plant Associations:
Tsuga heterophylla-Betula papyrifera-Pinus contorta var. *latifolia-Picea sitchensis*/Moss

Paper Birch - Lodgepole Pine - Subalpine Fir Open Forest Landcover Class

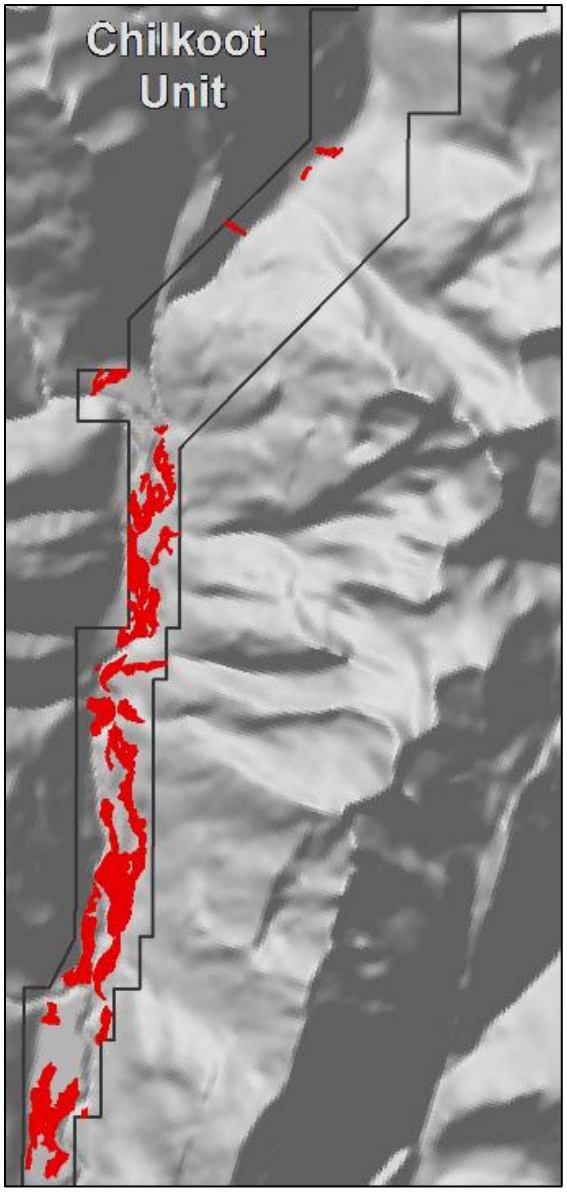
Number of Plots Sampled: 1 **(**19.06)
Map Area: 3.6ha; 0.1%
Distribution: Small to medium patch type; uncommon; occurrence restricted to the White Pass Unit.
Classification: Vegetation with 25-59% cover of trees; *Betula papyrifera*, *Pinus contorta* var. *latifolia* and *Abies lasiocarpa* together comprise at least 75% of tree cover.
Environment: Cliffs or otherwise broken mountain sideslopes.
Vegetation: *Betula papyrifera*, *Pinus contorta* var. *latifolia* and *Abies lasiocarpa* are the dominant trees. The low shrub, *Ledum groenlandicum* is locally abundant. On more-disturbed (broken) sideslopes, vegetation transitions to closed thickets of *Alnus viridis* ssp. *sinuata* or open forests dominated by *Betula papyrifera*. On less-disturbed (smooth) sideslopes, vegetation grades to variety of open to closed forest types codominated by *Abies lasiocarpa*, *Picea sitchensis* and/or *Tsuga heterophylla*.
Succession and Disturbance: late-seral; no significant disturbance
Plant Associations:
Betula papyrifera-Abies lasiocarpa-Pinus contorta var. *latifolia/Ledum groenlandicum*





Sitka Spruce - Black Cottonwood Closed Forest Landcover Class





Number of Plots Sampled: 10 (2.07, 3.04, 4.01, 4.05, 5.03, 6.02, 6.06, 30.06[6], 30.07)
Map Area: 311.3 ha; 5.9%
Distribution: Large patch type; abundant; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*, together comprise at least 75% of tree cover.
Environment: Active floodplains, and riparian corridors
Vegetation: *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* are the dominant trees. *Alnus viridis* ssp. *sinuata*, *Cornus sericea* ssp. *sericea*, *Viburnum edule* and *Oplopanax horridus* are common shrubs. In the absence of a well-developed shrub stratum, feather mosses often dominate the ground cover. Towards the more active floodplain, vegetation transitions to open forests of the same composition or open or closed forests dominated by *Populus balsamifera* ssp. *trichocarpa*. Towards the inactive floodplain, vegetation transitions to closed forests codominated by *Picea sitchensis*, *Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*.
Succession and Disturbance: mid-seral; river flooding, historic logging
Plant Associations:
Alnus viridis ssp. *sinuata*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Rhytidiadelphus* species
Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*



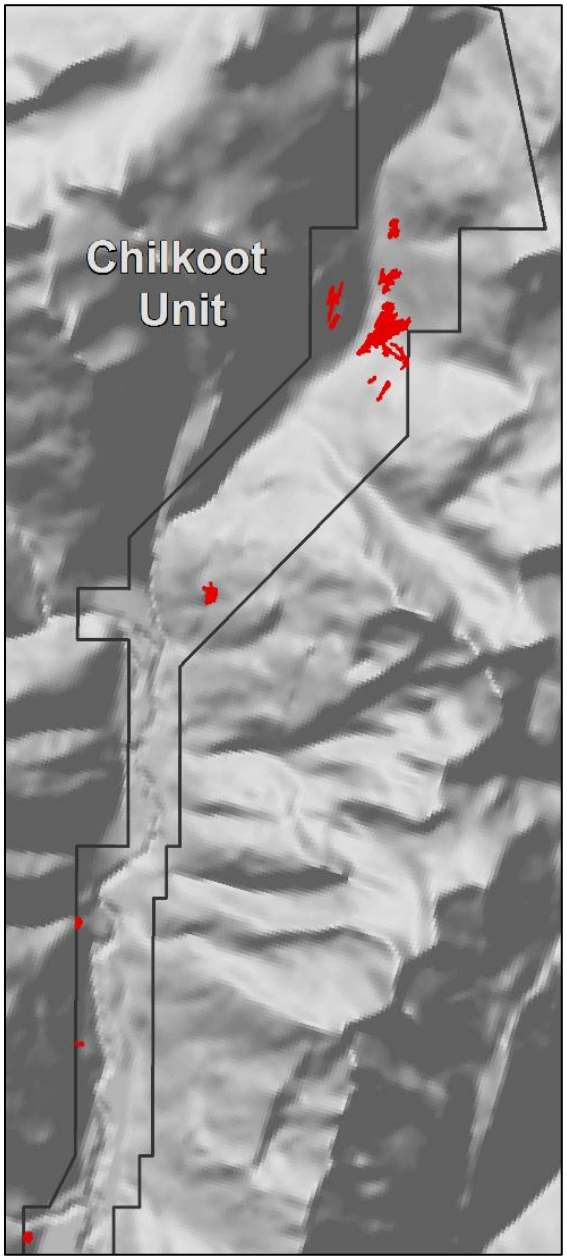
[6] Plant association plot only

Hemlock - Paper Birch Closed Forest Landcover Class

Number of Plots Sampled: 3 (3.02, 11.04, 13.03)
Map Area: 38.3 ha; 0.7%
Distribution: Small to medium patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera*, together comprise at least 75% of tree cover.
Environment: Cliffs or otherwise broken mountain sideslopes.
Vegetation: *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*) and *Betula papyrifera* are the dominant trees; *Menziesia ferruginea* and *Oplopanax horridus* are common shrubs. On more-disturbed (broken) sideslopes, vegetation grades to open forests of the same composition. Towards shallow bedrock knobs, vegetation grades to open to closed forests codominated by *Tsuga* species (*T. heterophylla* and/or *T. mertensiana*), *Betula papyrifera* and *Pinus contorta* var. *latifolia*. On older, less-disturbed (smooth) sideslopes, vegetation grades to open to closed forests dominated by *Tsuga* species.
Succession and Disturbance: mid-seral; avalanche
Plant Associations:
Betula papyrifera-Tsuga heterophylla/Oplopanax horridus
Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea

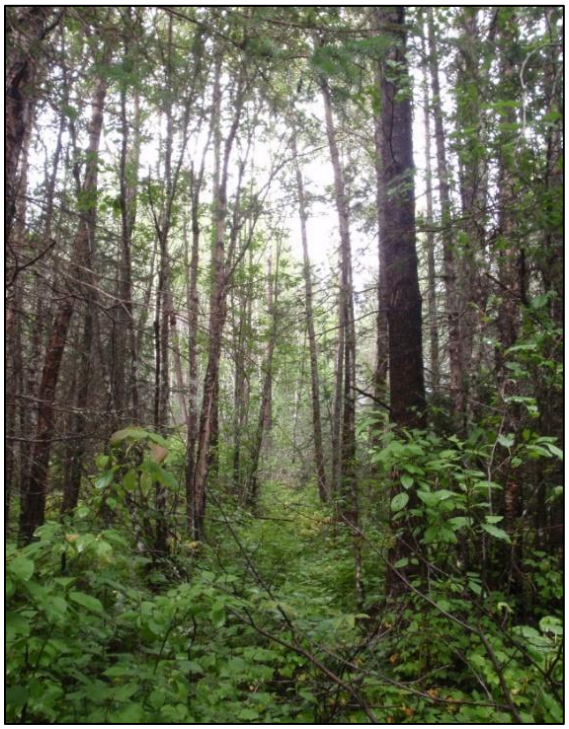


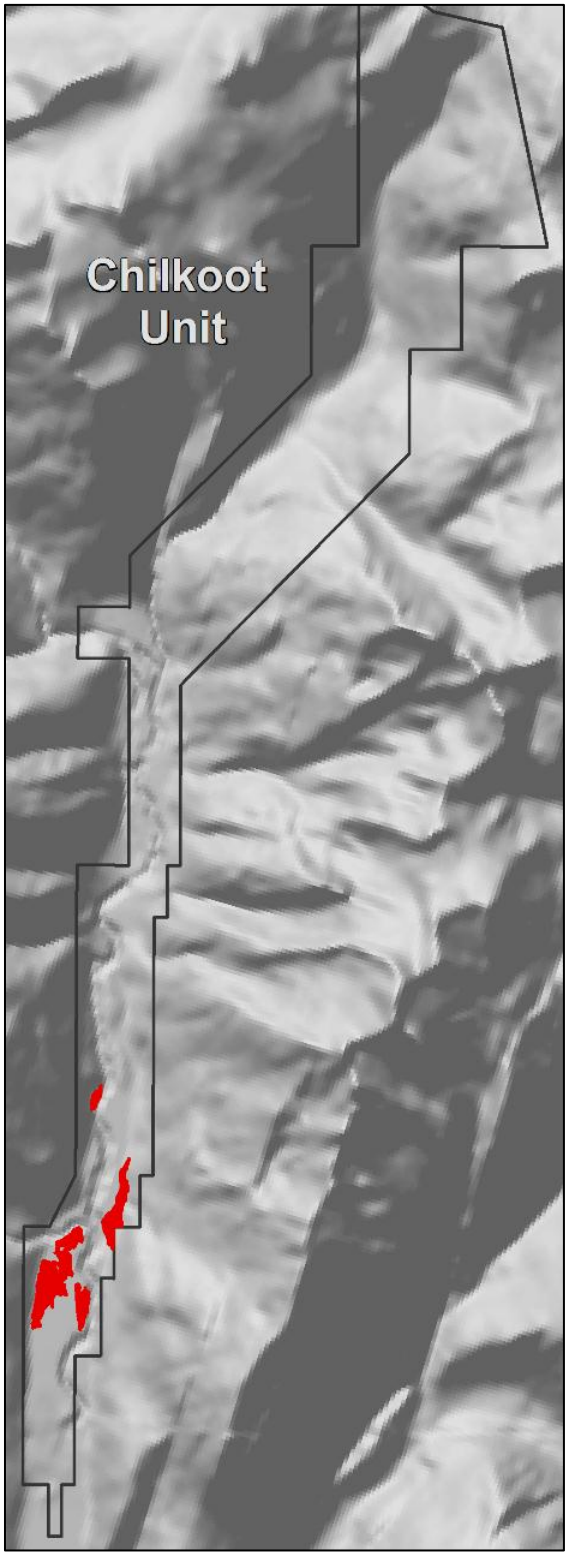




Black Cottonwood - Paper Birch - Sitka Spruce Closed Forest Landcover Class

Number of Plots Sampled: 1 (3.05)
Map Area: 72.9ha; 1.4%
Distribution: Large patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Populus balsamifera* ssp. *trichocarpa*, *Betula papyrifera* and *Picea sitchensis*, together comprise at least 75% of tree cover.
Environment: Inactive floodplains
Vegetation: *Populus balsamifera* ssp. *trichocarpa*, *Betula papyrifera* and *Picea sitchensis* are the dominant trees. *Alnus viridis* ssp. *sinuata*, *Cornus sericea* ssp. *sericea* and *Viburnum edule* are common shrubs. Towards the more active floodplain, vegetation grades to open or closed forests codominated by *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis.* Outside of the floodplain, vegetation grades to open or closed forests codominated by *Tsuga* species, *Betula papyrifera* and/or *Picea sitchensis*.
Succession and Disturbance: mid-seral; river flooding
Plant Associations:
Populus balsamifera ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*





Sitka Spruce - Black Cottonwood - Western Hemlock Closed Forest Landcover Class

Number of Plots Sampled: 2 (5.01, 7.01)
Map Area: 82.2 ha; 1.6%
Distribution: Medium to large patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla* together comprise at least 75% of tree cover.
Environment: Inactive floodplains, mountain toe and side slopes, toe edge of vegetated alluvial fans
Vegetation: *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla* are the dominant trees. *Alnus viridis* ssp. *sinuata*, *Cornus sericea* ssp. *sericea* and *Viburnum edule* are common shrubs; in the absence of a well-developed shrub stratum, ground cover may be depauperate.
Succession and Disturbance: mid-seral; rockfall, landslide, historic logging
Plant Associations:
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Picea sitchensis-Populus balsamifera ssp. *trichocarpa-Tsuga heterophylla*/Depauperate

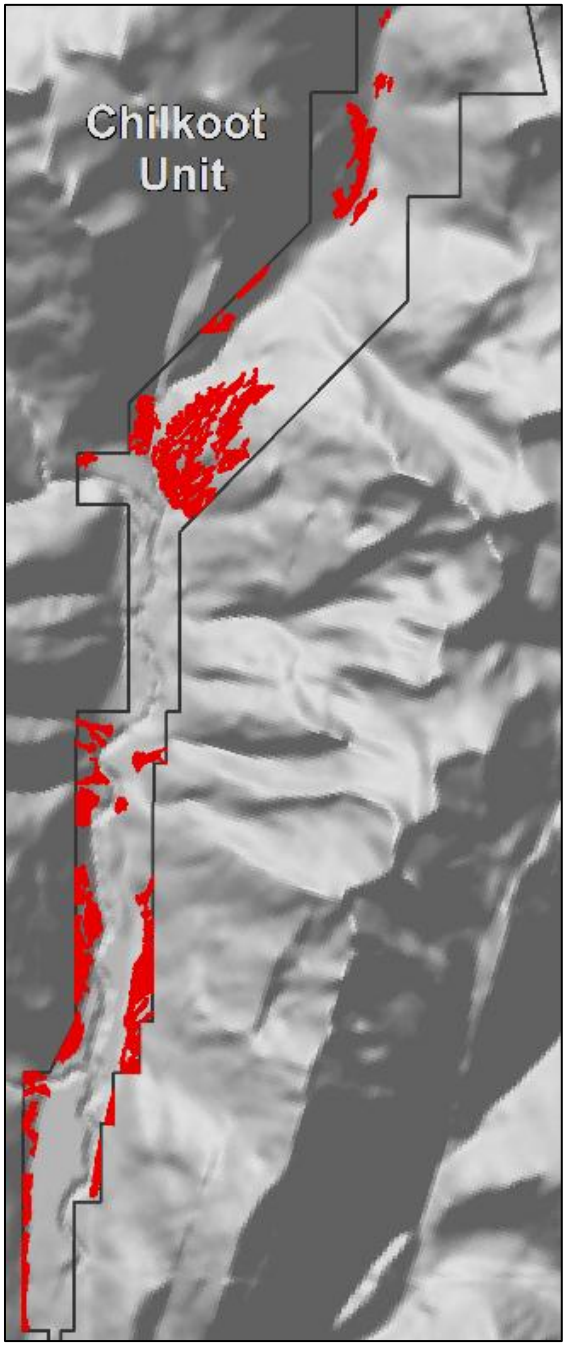




Hemlock - Paper Birch - Sitka Spruce Closed Forest Landcover Class

Number of Plots Sampled: 5 (4.02, 6.04, 30.09, 32.01, 51.01)
Map Area: 382.5 ha; 7.3%
Distribution: Medium patch type; common; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with 60-100% cover of trees; *Tsuga* species, *Betula papyrifera* and *Picea sitchensis,* together comprise at least 75% of tree cover.
Environment: Valley bottoms, mountain toe and sideslopes.
Vegetation: *Tsuga* species (*T. mertensiana* and/or *T. heterophylla*), *Betula papyrifera* and *Picea sitchensis* are the dominant trees. *Alnus viridis* ssp. *sinuata Viburnum edule, Oplopanax horridus, Cornus sericea* ssp. *sericea* and *Menziesia ferruginea* are common shrubs. Feather mosses may dominate the groundcover. Where this type adjoins active floodplains, vegetation grades to open to closed forests codominated by *Picea sitchensis, Populus balsamifera* ssp. *trichocarpa* and *Tsuga heterophylla*. On younger, otherwise more disturbed landforms above the floodplain, vegetation grades to open forests codominated by *Betula papyrifera* and *Picea sitchensis*. Towards older yet broken sideslopes, vegetation grades to open to closed forests codominated by *Tsuga* species (*T. mertensiana* and/or *T. heterophylla*) and *Betula papyrifera*. Towards older and more stable (smooth) sideslopes, vegetation grades to closed forests codominated by *Picea sitchensis* and *Tsuga* species (*T. mertensiana* and/or *T. heterophylla*).
Succession and Disturbance: mid-seral; river flooding, historic logging





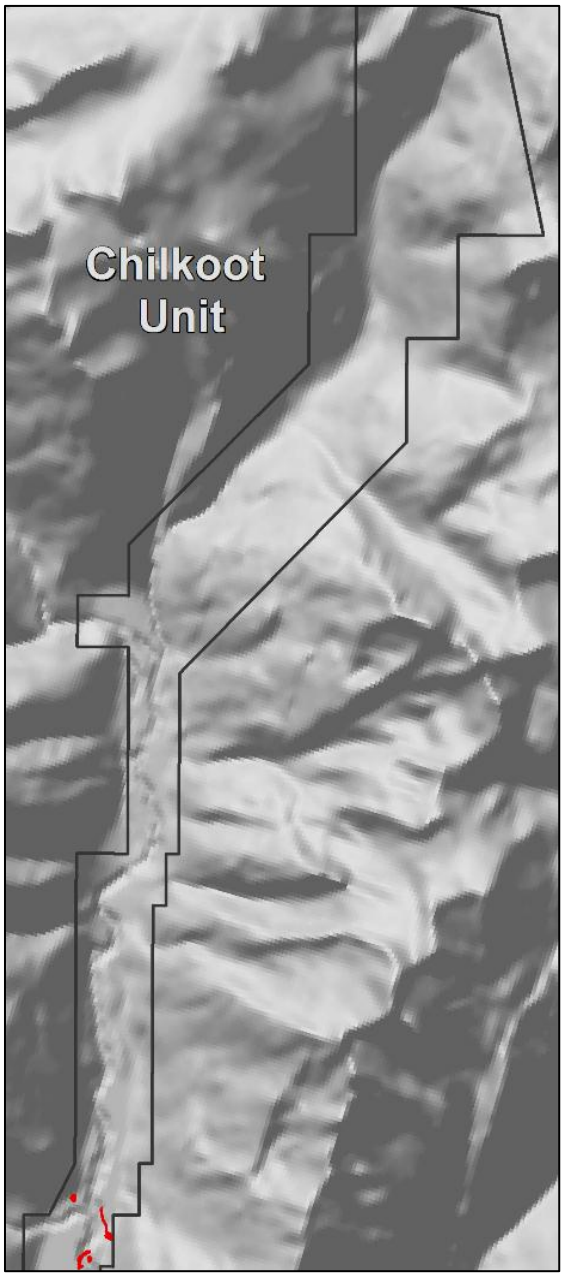
Plant Associations:
Betula papyrifera-Picea sitchensis/Hylocomium splendens
Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Cornus sericea ssp. *sericea*
Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea

Tall Shrub Landcover Classes

Thinleaf Alder Closed Tall Shrub Landcover Class

Number of Plots Sampled: 2 (4.03, 4.08)
Map Area: 2.7 ha; 0.1%
Distribution: Small patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs more than 1.5 m tall; *Alnus incana* ssp. *tenuifolia* comprises at least 75% of this tall shrub cover.
Environment: Recently-deposited, fine grained alluvium along the active floodplain and abandoned floodplain channels of the lower Taiya River.
Vegetation: *Alnus incana* ssp. *tenuifolia* is the dominant shrub; the lower stature shrub, *Cornus sericea* ssp. *sericea* is often common in the understory. Towards more active floodplains, vegetation grades to closed thickets dominated by *Alnus viridis* ssp. *sinuata*. Towards the inactive floodplain, vegetation grades to open forests (co)dominated by *Populus balsamifera* ssp. *trichocarpa, Picea sitchensis* and/or *Betula papyrifera*.
Succession and Disturbance: early-seral; river flooding
Plant Associations:
Alnus incana ssp. *tenuifolia-Alnus viridis* ssp. *sinuata*
Picea sitchensis-Betula papyrifera/Alnus incana ssp. *tenuifolia/Cornus sericea* ssp. *sericea*



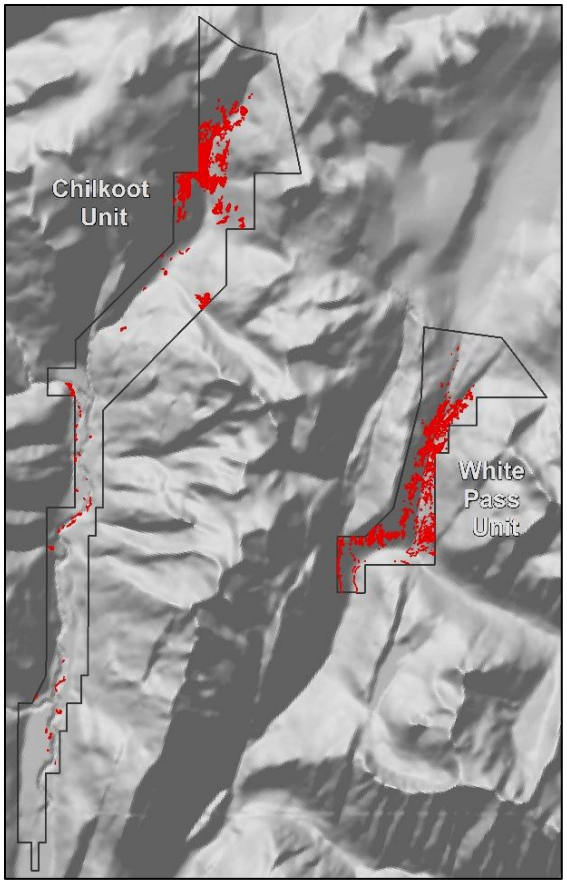




Sitka Alder Closed Tall Shrub Landcover Class

Number of Plots Sampled: 8 ([8.03], 11.01, 13.05, 14.08, 15.05[7], 16.06, 23.02[7], [30.06])
Map Area: 217.8 ha; 4.2%
Distribution: Small to large patch type, often linear along rivers; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs more than 1.5 m tall; *Alnus viridis* ssp. *sinuata* comprises at least 75% of this tall shrub cover.
Environment: Due to the wide ecological tolerance of *Alnus viridis* ssp. *sinuata*, environments range from active floodplains and riparian corridors on valley bottoms, avalanche and landslide paths on mountain sideslopes and alluvial fans. Also common in the subalpine on landforms released from glaciation in the Pleistocene.
Vegetation: *Alnus viridis* ssp. *sinuata* is the dominant shrub. Lower stature shrubs such as *Oplopanax horridus* and *Menziesia ferruginea* are common. The fern *Dryopteris expansa* is locally abundant. Towards more active floodplains, vegetation grades to open low shrub and sparse landcover types. Towards the inactive floodplain, vegetation grades to closed thickets codominated by *Alnus* and *Salix* species or open to closed forests dominated by *Populus balsamifera* ssp. *trichocarpa*. Due to the somewhat stochastic nature of snow and landslides, a variety of landcover types may adjoin thickets of *Alnus viridis* ssp. *sinuata* in these environments. Most commonly open to closed forests (co)dominated by *Tsuga heterophylla*, *Picea sitchensis* and/or *Betula papyrifera* are adjacent to this class. In the subalpine, vegetation grades downgradient to open forests codominated by *Tsuga mertensiana*, *Abies lasiocarpa* and/or *Betula papyrifera* and upgradient to dwarf *Tsuga mertensiana* and *Abies lasiocarpa* forests that are often





[7] Plant association plot only

mosaicked with herbaceous meadows and patches of dwarf shrub.

Succession and Disturbance: early- to late-seral; associated with a variety of disturbance types including, deglaciation, river flooding, mass-wasting of snow, rock or soil, as well as anthropogenic use and development but also persist in the subalpine as long-term seral stages.

Plant Associations:

Alnus viridis ssp. *sinuata/Dryopteris expansa*
Alnus viridis ssp. *sinuata/Menziesia ferruginea*
Alnus viridis ssp. *sinuata/Oplopanax horridus*

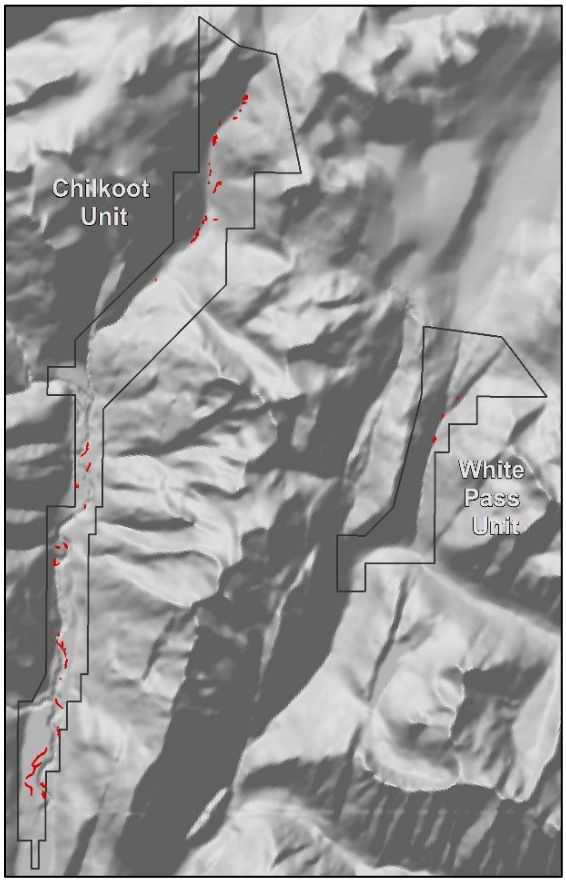


Sitka Alder - Willow Closed Tall Shrub Landcover Class

Number of Plots Sampled: 2 (14.01, 14.03)
Map Area: 17.9 ha; 0.3%
Distribution: Small patch type; common in the Chilkoot Unit; uncommon in the White Pass Unit.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs more than 1.5 m tall; *Alnus viridis* ssp. *sinuata* and *Salix* species, together comprise 25-75% of this tall shrub cover.
Environment: Areas of concave, gentle topography where drainage is impeded. Abandoned channels in the floodplain and in other areas of water accumulation (e.g. swales, toe edge of alluvial fans) along riverine corridors into the subalpine. Typically occurring on coarser-grained sediments compared to *Alnus incana* ssp. *tenuifolia*.
Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*S. alaxensis, S. barclayi, S. sitchensis*); the lower stature shrub *Oplopanax horridus* is locally abundant; bryophyte species often dominate the otherwise sparse groundcover. Towards the more active floodplain, vegetation grades to thickets dominated by *Alnus* species; toward the inactive floodplain, vegetation grades to open to closed forests (co)dominated by *Populus balsamifera* ssp. *trichocarpa* and/or *Picea sitchensis*. At higher elevations vegetation grades to variety of types including mesic herbaceous meadows, tall thickets of *Alnus viridis* ssp. *sinuata* and open forests (co)dominated by *Tsuga heterophylla, Tsuga mertensiana, Abies lasiocarpa* and/or *Betula papyrifera*.
Succession and Disturbance: early- to mid-seral, river flooding, mass wasting of snow, soil and rock
Plant Associations:
Alnus viridis ssp. *sinuata/Oplopanax horridus*
Alnus viridis ssp. *sinuata-Salix alaxensis*





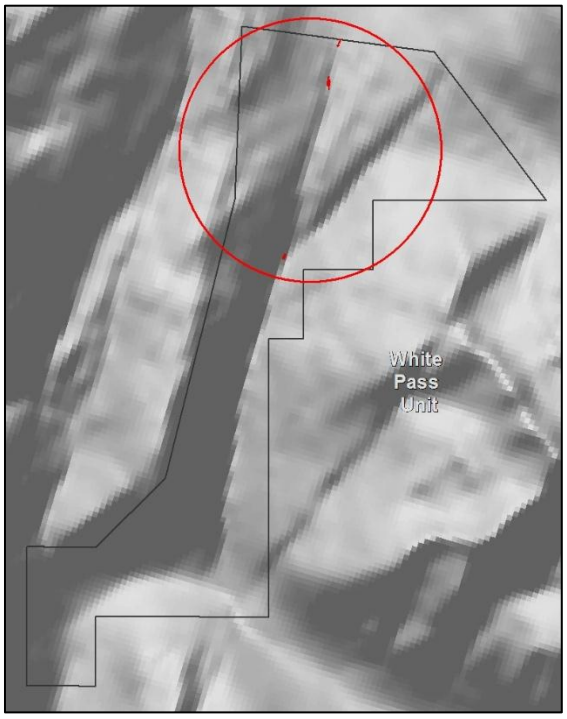


Willow Closed Tall Shrub Landcover Class

Number of Plots Sampled: 2 (21.10[8], 23.03[8])
Map Area: 0.5 ha; <0.1%
Distribution: Small patch type; uncommon; occurrence restricted to the White Pass Unit.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs more than 1.5 m tall; *Salix* species comprise at least 75% of this tall shrub cover.
Environment: Areas of concave, gentle topography (e.g. basins, ditches and swales) where drainage is impeded in the subalpine; standing water may be present.
Vegetation: *Salix barclayi* is often the dominant shrub; a variety of early-seral forbs including *Sanguisorba canadensis* and *Anemone richardsonii* comprise the understory. In areas of greater soil development, vegetation grades to wet to mesic herbaceous meadows. In areas of younger, more-disturbed soils, vegetation grades to closed thickets of *Alnus viridis* ssp. *sinuata* and/or *Salix* species. This class is often adjoined by isolated stands of *Tsuga mertensiana* and *Abies lasiocarpa.*
Succession and Disturbance: early-seral, flooding
Plant Associations:
Salix barclayi/Mixed Herb



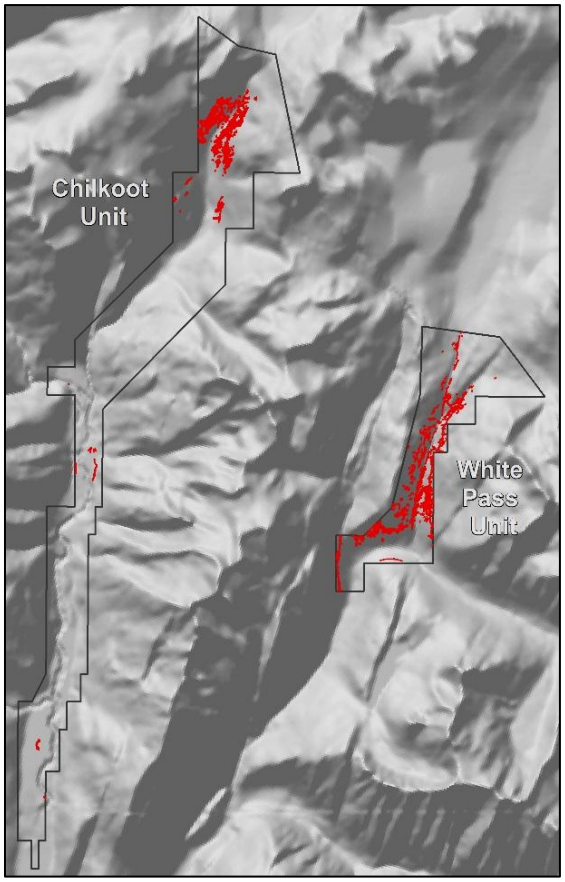




[8] Plant association plot only

Open Low Shrub Landcover Class





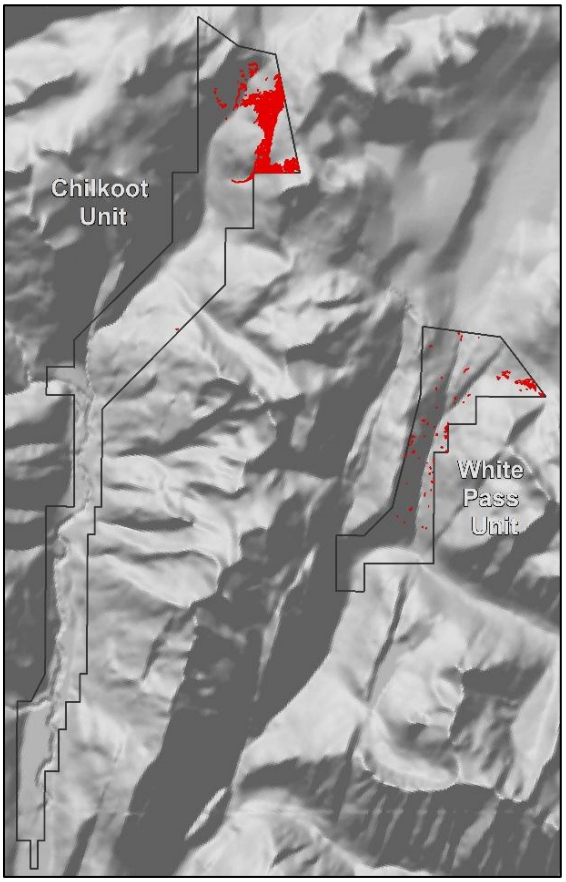
Number of Plots Sampled: 1 (3.06)
Map Area: 135.8 ha; 2.6%
Distribution: Small to large patch type; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs 20 cm to 1.5 m tall
Environment: Strongly associated with unstable landforms such as river bars and banks, talus fields, cliffs, rock walls along mountain sideslopes and fractured, exposed bedrock in the subalpine. In Dyea, this type occupies forests openings that are presumably relict from the gold rush era.
Vegetation: Although little plot data exists for this class, *Alnus viridis* ssp. *sinuata* and *Salix* species are presumed to be the dominant shrubs in natural environments and *Rosa nutkana* in human-disturbed environments. Ground cover ranges from sparse in riverine and mountain sideslope environments to a lush assemblage of forbs including *Chamerion angustifolium*, *Angelica lucida*, *Iris setosa* and *Achillea millefolium* var. *borealis* in human-disturbed environments. In riverine environments, towards the more active floodplain, vegetation grades to sparse cover often dominated by *Chamerion latifolium*; towards the less-active floodplain vegetation grades to closed thickets of *Alnus* and *Salix* species. Within talus fields vegetation grades from sparse cover often dominated by crustose lichen species to closed thickets (co)dominated by *Alnus viridis* ssp. *sinuata* and/or *Salix barclayi* at the more stable field margins. On mountain sideslope and subalpine bedrock landforms, vegetation grades to sparse or barren cover with increasing exposure. Across lower elevation mountain sideslopes, vegetation grades to open forests codominated by *Tsuga heterophylla* and *Betula papyrifera*; across higher elevation mountain sideslopes and in the subalpine, vegetation grades to open forests, dwarf forests or dwarf forest mosaics codominated by *Tsuga mertensiana* and *Abies lasiocarpa*.
Succession and Disturbance: early-seral; river flooding, avalanche, rock fall, anthropogenic
Plant Associations: None identified; often include culturally-modified assemblages

Dwarf Shrub Landcover Classes

Dwarf Shrub - Herbaceous Tundra Landcover Class

Number of Plots Sampled: 6 (15.01[9], [15.02[9]], 15.07[9], 15.10[9], 16.07, [21.06[9]])
Map Area: 11.9 ha; 0.2%
Distribution: Small patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy at least 60% of the ground surface; herbaceous species comprise at least 40% of the vegetated cover.
Environment: Sheltered, moist sites in the lower alpine; often areas of late-lying snow.
Vegetation: *Phyllodoce glanduliflora*, *Cassiope mertensiana* and *Luetkea pectinata* are the common dwarf shrubs. *Carex macrochaeta* is a common graminoid and *Cornus canadensis*, *Athyrium filix-femina*, *Veratrum viride*, *Lupinus nootkatensis* and *Artemisia arctica* are common forbs. *Leptarrhena pyrolifolia* is locally abundant in wet sites. With increasing exposure towards the high alpine, vegetation grades to a mosaic of dwarf shrub, herbaceous, rock and lichen cover where dwarf shrub cover is dominated by members of the Ericaceae family. In more protected areas at timberline, vegetation may grade to stands of dwarf *Tsuga mertensiana* and *Abies lasiocarpa* and mesic herbaceous meadows.





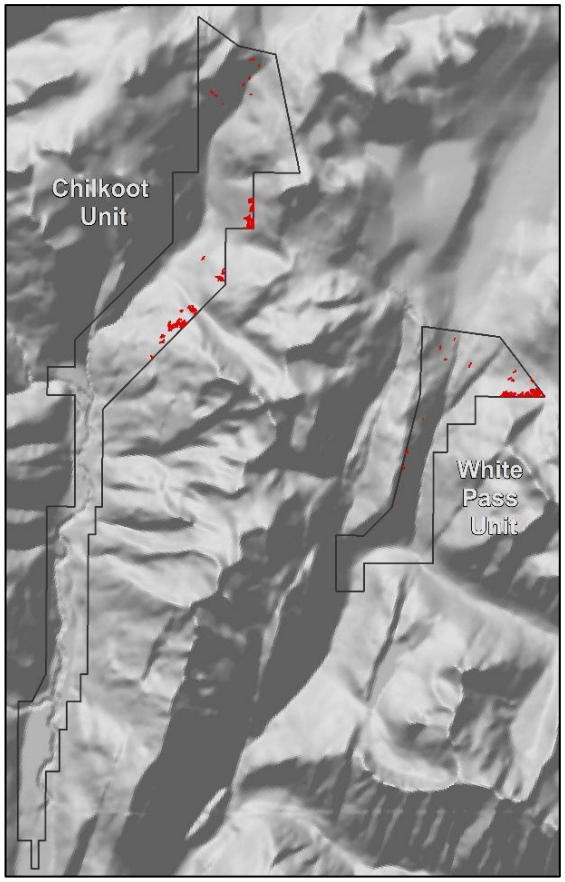


Succession and Disturbance: mid- to late-seral, avalanche, late-lying snow
Plant Associations:
Carex macrochaeta
Carex macrochaeta-Athyrium filix-femina-Veratrum viride
Luetkea pectinata/Leptarrhena pyrolifolia
Phyllodoce glanduliflora
Salix stolonifera-Carex macrochaeta

[9] Plant association plot only

Ericaceous Dwarf Shrub Tundra Landcover Class





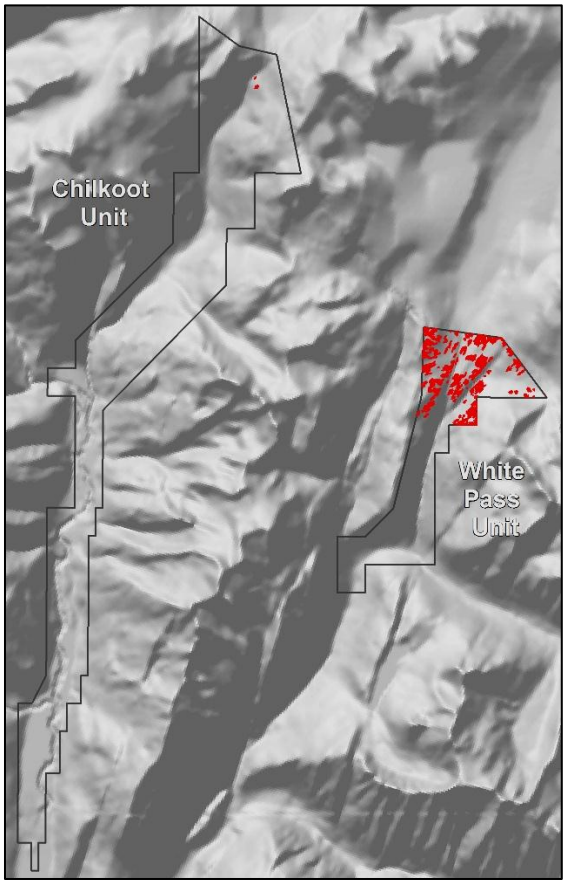
Number of Plots Sampled: 9 ([15.08[10]], [15.09[10]], 17.02, 17.03[10], [20.03], [21.11[10]], [23.06[10]], [50.02], [50.06])
Map Area: 27.6 ha; 0.5%
Distribution: Small patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy at least 60% of the ground surface; herbaceous species cover comprise less than 40% of the vegetated cover.
Environment: Sheltered, relatively moist sites in the upper alpine; often basins and troughs that retain snow in the spring and lake margins.
Vegetation: *Vaccinium uliginosum, Empetrum nigrum, Cassiope mertensiana, Harrimanella stelleriana, Phyllodoce glanduliflora* and *Luetkea pectinat*a are the dominant dwarf shrubs, which dominate the ground cover. Towards the high alpine, vegetation grades to a mosaic of dwarf shrub, lichen and rock cover. Towards the low alpine, vegetation grades to a mosaic of dwarf shrub and herbaceous cover.
Succession and Disturbance: late-seral, avalanche, late-lying snow
Plant Associations:
Cassiope mertensiana
Harrimanella stelleriana-Luetkea pectinata
Harrimanella stelleriana-Phyllodoce glanduliflora
Phyllodoce glanduliflora
Vaccinium uliginosum-Empetrum nigrum



[10] Plant association plot only

Ericaceous Dwarf Shrub - Lichen Tundra Landcover Class





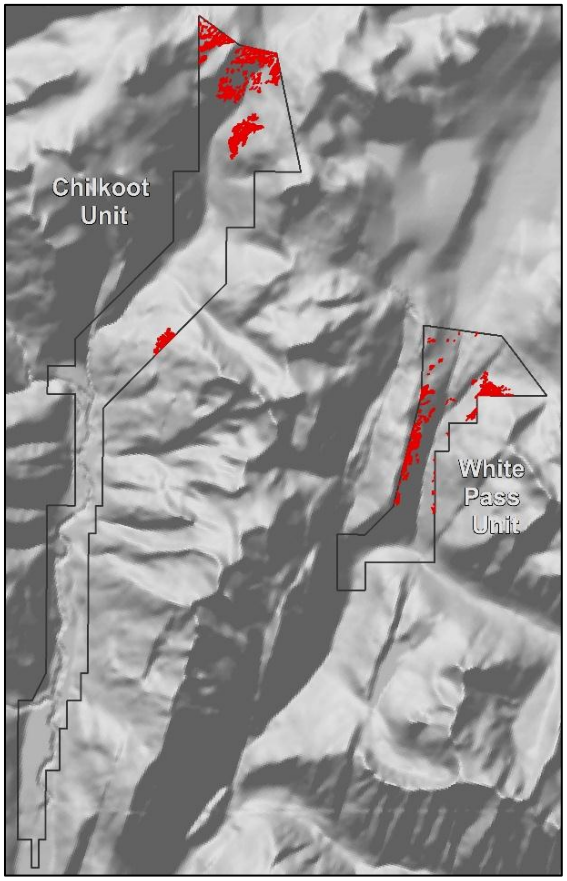
Number of Plots Sampled: 6 ([15.04[11]], 16.01, 16.03, 20.05, 20.08, 21.09, 23.05)
Map Area: 94.0 ha; 1.8%
Distribution: Small to medium patch type; uncommon in the Chilkoot Unit, common in the White Pass Unit.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy less than 60% of the ground surface; foliose and fruticose lichen dominates the ground not occupied by vascular plant species.
Environment: Sheltered, relatively moist sites in the high alpine.
Vegetation: *Empetrum nigrum, Vaccinium uliginosum, Harrimanella stelleriana* and *Phyllodoce glanduliflora* are common dwarf shrubs. *Cladina* species (*C. stellaris, C. mitis, and C. rangiferina*) dominate the lichen cover. With increasing exposure, vegetation grades to a mosaic of dwarf shrub, lichen and rock cover. Towards the lower alpine, vegetation grades to a mosaic of dwarf shrub and herbaceous cover.
Succession and Disturbance: late-seral; avalanche, wind scouring
Plant Associations:
Harrimanella stelleriana-Phyllodoce glanduliflora
Empetrum nigrum/*Cladina* species



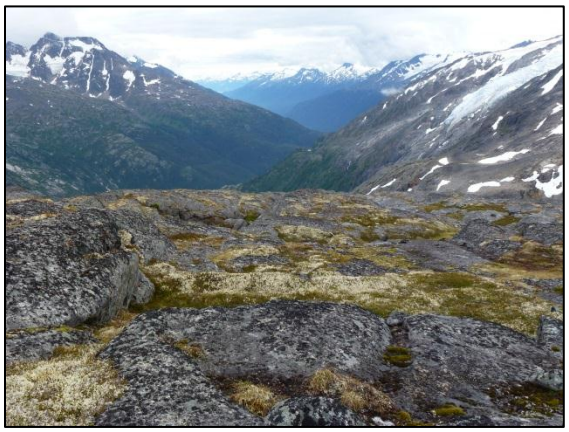
[11] Plant association plot only

Dwarf Shrub - Lichen - Rock Tundra Mosaic Landcover Class





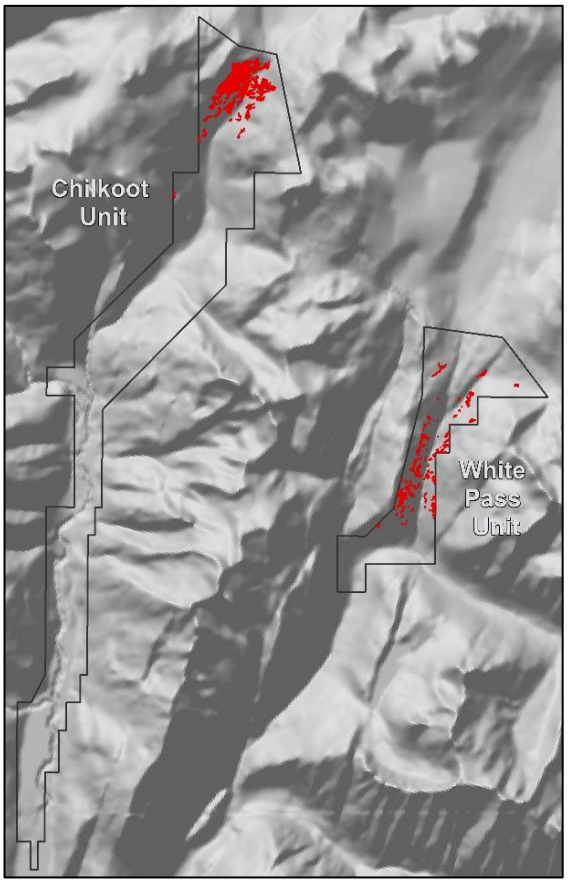
Number of Plots Sampled: 8 (17.01, 18.01, 18.02[12], 50.01, 50.03, 50.04, 50.05, 50.07)
Map Area: 179.7 ha; 3.4%
Distribution: Medium to large patch type; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy less than 60% of the ground surface; a mosaic of rock and lichen (crustose, foliose and fruticose) dominates the ground not occupied by vascular plant species,
Environment: Exposed, dry sites in the high alpine.
Vegetation: *Phyllodoce glanduliflora* and *Harrimanella stelleriana* are dominant dwarf shrubs. *Carex pyrenaica* ssp. *micropoda, Luzula arcuata* and *Luzula piperi* are common graminoids. *Cladina stellaris, C. rangiferina, C. mitis, Flavocetraria nivalis,* and *Stereocaulon* species are common lichens. The dry moss, *Dicranum fuscescens* is locally abundant. With increasing exposure, landcover grades to sparse and barren types. Towards the lower alpine, vegetation grades to a mosaic of dwarf shrub and lichen.
Succession and Disturbance: late-seral; avalanche, wind scouring
Plant Associations:
Carex pyrenaica ssp. *micropoda-Luzula* species-*Cladina* species
Harrimanella stelleriana- Cladina species
Luzula arcuata- Cladina species



[12] Plant association plot only

Dwarf Shrub - Herbaceous - Rock Tundra Mosaic Landcover Class





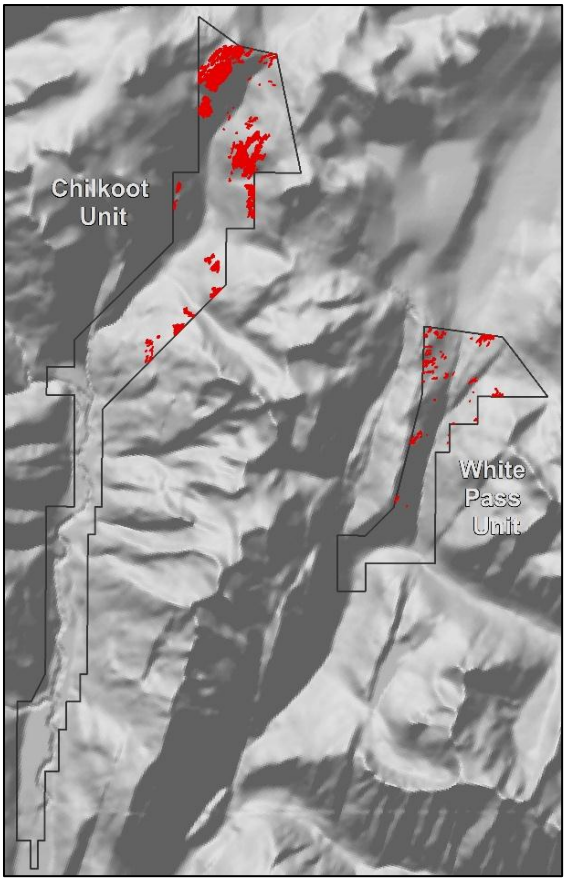
Number of Plots Sampled: 2 (16.04[13], 16.05)
Map Area: 104.4 ha; 2.0%
Distribution: Small to medium patch type; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy less than 60% of the ground surface; rock and crustose lichen dominate the ground not occupied by vascular plant species; herbaceous species comprise at least 40% of vascular plant cover.
Environment: Sheltered, moist sites in the lower alpine; often areas of late-lying snow.
Vegetation: *Empetrum nigrum* and *Salix stolonifera* are common dwarf shrubs. We to mesic bryophytes are common and herbaceous species including *Carex macrochaeta* are locally abundant. With increasing exposure towards the high alpine, vegetation grades to a mosaic of dwarf shrub, rock and lichen cover where dwarf shrub cover is dominated by members of the Ericaceae family. In more protected areas at timberline, vegetation may grade to stands of dwarf *Tsuga mertensiana* and *Abies lasiocarpa*, closed thickets of *Alnus viridis* ssp. *sinuata* and mesic herbaceous meadows.
Succession and Disturbance: mid- to late-seral; avalanche, late-lying snow
Plant Associations:
Carex macrochaeta
Empetrum nigrum-Mixed Dwarf Shrub/Rock



[13] Plant association plot only

Ericaceous Dwarf Shrub - Rock Tundra Mosaic Landcover Class





Number of Plots Sampled: 3 (18.03[14], 18.04)
Map Area: 185.8 ha; 3.5%
Distribution: Small to medium patch type; common in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees and at least 25% cover of shrubs less than 20 cm tall; patches of dwarf shrub and herbaceous species occupy less than 60% of the ground surface; rock and crustose lichen dominate the ground not occupied by vascular plant species; herbaceous species cover comprise less than 40% of vascular plant cover.
Environment: Sheltered, relatively moist sites in the upper alpine; often bedrock fissures and small troughs.
Vegetation: *Harrimanella stelleriana* is a common dwarf shrub. The rock moss, *Andreaea blyttii* is abundant on bedrock in areas of late snow melt. Towards the high alpine, vegetation grades to a mosaic of dwarf shrub, lichen and rock cover. Towards the low alpine, vegetation grades to a mosaic of dwarf shrub, herbaceous and rock cover.
Succession and Disturbance: late-seral; avalanche, wind scouring
Plant Associations:
Harrimanella stelleriana-Luetkea pectinata
Andreaea blyttii

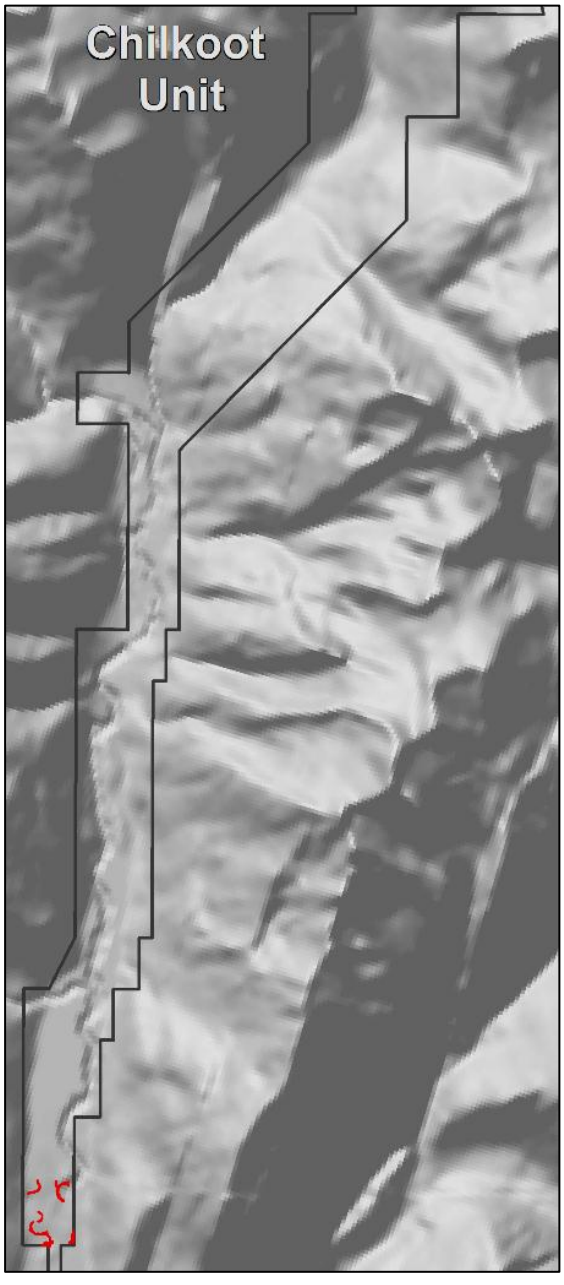


[14] Plant association plot only

Herbaceous Landcover Classes

Halophytic Herbaceous Wet Coastal Meadow Landcover Class





Number of Plots Sampled: 3 (1.01, 1.04[15], 1.12)
Map Area: 2.3 ha; <0.1%
Distribution: Small, often linear patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with less than 10% cover of trees, less than 25% cover of shrubs and at least 25% cover of herbaceous species; tidally-influenced, wet sites with semipermanent or standing water; vegetation is dominated by salt-tolerant species.
Environment: Tidally-influenced, wet sites with semipermanent or standing water; often where fresh water enters the ocean.
Vegetation: The flood- and salt-tolerant sedge, *Carex lyngbyei* forms near-monocultures in this type. Found adjacent to brackish water; moving landward, vegetation grades to coastal meadows dominated by the beach grass, *Leymus mollis*.
Succession and Disturbance: early-seral; daily to seasonal tidal flooding
Plant Associations:
Carex lyngbyei
Carex lyngbyei-Poa eminens

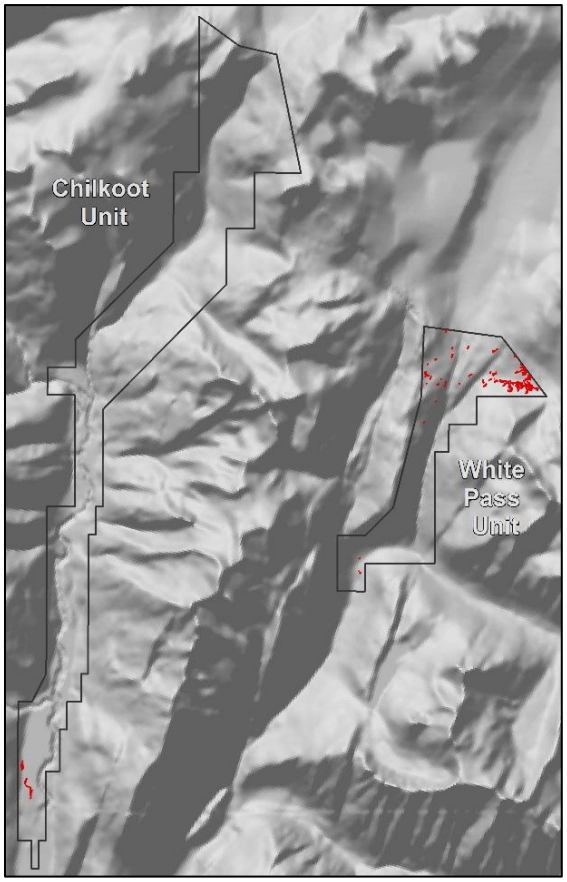


[15] Plant association plot only

Wet Herbaceous Meadow Landcover Class

Number of Plots Sampled: 5 (2.08, 20.09[16], 20.10, 21.03[16], 21.08[16])
Map Area: 12.0 ha; 0.2%
Distribution: Small patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees, less than 25% cover of shrubs and at least 25% cover of herbaceous species; wet sites with semipermanent or standing water; not tidally-influenced or supporting salt-tolerant species.
Environment: Noncoastal sites where topography pools water and soils or shallow bedrock impedes its drainage; standing water often present. Occurring as headwater fens in the subalpine and developing in abandoned floodplain channels and sloughs at lower elevations; fringing fresh waterbodies at any elevation.
Vegetation: *Carex anthoxanthea* and *Trichophorum cespitosum* are the dominant species in the subalpine; where drainage is improved, vegetation grades to a mosaic of dwarf shrub and herbaceous cover. At lower elevations a variety of flood-tolerant species colonize abandoned channels and sloughs. Common species include the riparian tree, *Alnus rubra* and the wetland shrub, *Myrica gale*; where drainage is improved, vegetation grades to open to closed forests codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*.
Succession and Disturbance: subalpine types typically late-seral and subject to seasonal flooding, lower-elevation sites typically mid-seral and subject to river flooding





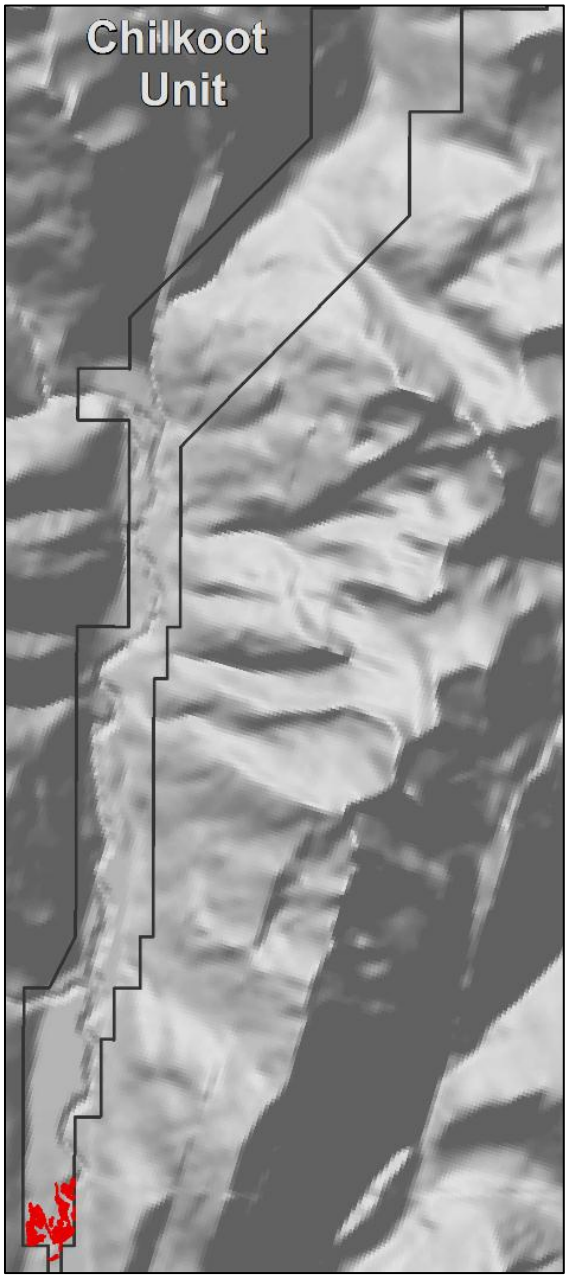
Plant Associations:
Alnus rubra/Myrica gale
Carex anthoxanthea
Trichophorum cespitosum



[16] Plant association plot only

American Dunegrass Coastal Meadow Landcover Class





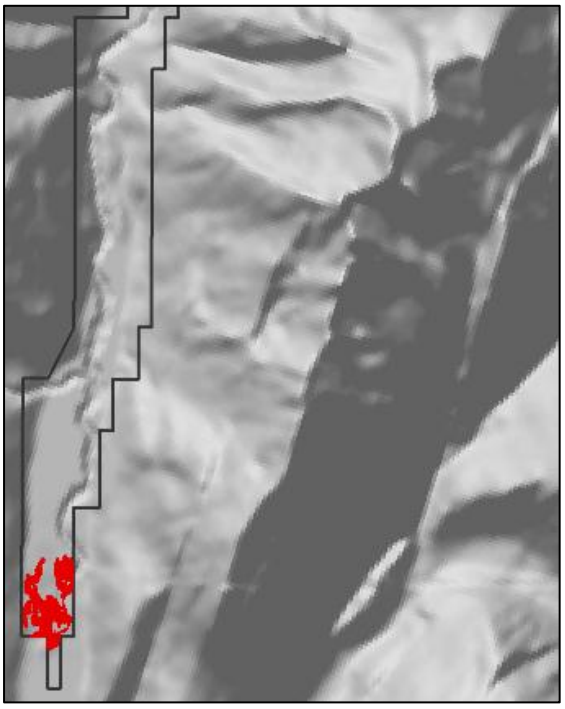
Number of Plots Sampled: 4 (1.02, 1.07, 1.08, 2.02)
Map Area: 18.9 ha; 0.4%
Distribution: Medium patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with less than 10% cover of trees, less than 25% cover of shrubs and at least 25% cover of herbaceous species; dry to mesic sites with little or no standing water where *Leymus mollis* covers at least 50% of the ground surface.
Environment: Sandy coastal sites above the intertidal zone.
Vegetation: The beach grass, *Leymus mollis* forms near-monocultures in this type. Along exposed coastlines, vegetation grades seaward to sparse cover of salt-tolerant grasses and herbs. Along more protected coastlines, vegetation grades to wet meadows dominated by salt-tolerant graminoids. Moving landward, vegetation grades to coastal meadows supporting diverse associations of salt-tolerant herbs.
Succession and Disturbance: early-seral; storm tidal flooding
Plant Associations:
Leymus mollis



Mesic Herbaceous Coastal Meadow Landcover Class







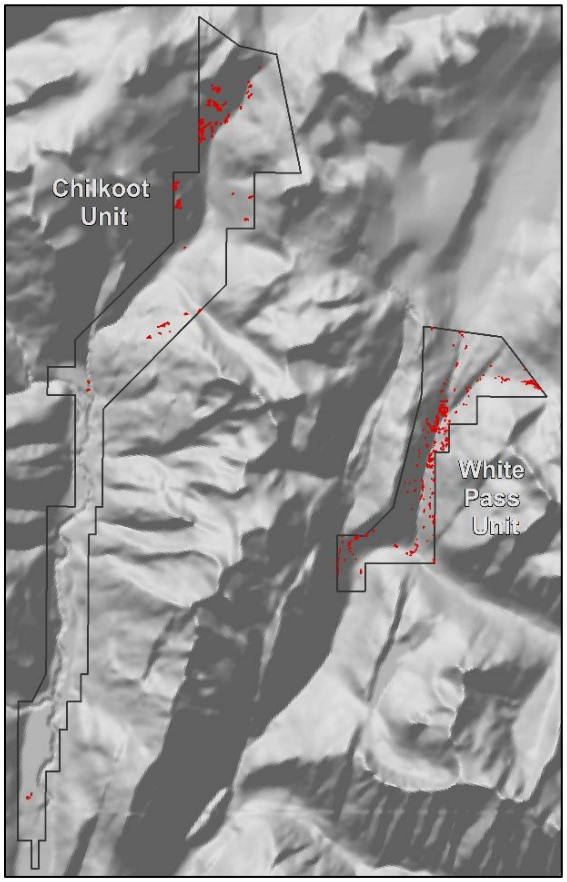
Number of Plots Sampled: 12 (1.03, 1.05, 1.06, 1.09[17], 1.10, 1.11, 1.13[17], 1.14, 2.01, 2.03[17], 2.04, 2.05[17])
Map Area: 34.9 ha; 0.7%
Distribution: Medium patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Vegetation with less than 10% cover of trees, less than 25% cover of shrubs and at least 25% cover of herbaceous species; dry to mesic sites with little or no standing water where *Leymus mollis* comprises less than 50% of the ground cover, coastal sites (i.e. currently or historically tidally-influenced); vegetation includes salt-tolerant species.
Environment: Uplifted tidal flats.
Vegetation: Supporting a diverse association of salt-tolerant herbs. *Lathyrus japonicus* var. *maritimus, Argentina egedii, Achillea millefolium* var. *borealis, Plantago maritima* and *Atriplex alaskensis* are common forbs; *Leymus mollis, Poa eminens* and *Deschampsia beringensis* are common grasses; the sedge, *Carex gmelinii* and the rush, *Juncus haenkei* are locally abundant. Vegetation grades seaward to near-monocultures of the beach grass, *Leymus mollis*. Across gentle topography vegetation grades landward to *Picea sitchensis* woodlands. Across steeper transitions out of tidal influence, vegetation grades to open to closed forests codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* or to closed forests codominated by *Tsuga heterophylla, Picea sitchensis* and *Betula papyrifera* where the uplifted tidal flats are truncated by bedrock.
Succession and Disturbance: early-seral; storm tidal flooding, anthropogenic
Plant Associations:
Argentina egedii-Festuca rubra
Carex gmelinii-Leymus mollis
Deschampsia beringensis
Festuca rubra
Leymus mollis-Achillea millefolium var. *borealis*
Leymus mollis-Lathyrus japonicus var. *maritimus*
Plantago maritima-Atriplex alaskensis
Poa eminens-Argentina egedii
Poa eminens-Juncus haenkei

[17] Plant association plot only

Mesic Herbaceous Meadow Landcover Class

Number of Plots Sampled: 2 (16.02[18], 21.01)
Map Area: 27.7 ha; 0.5%
Distribution: Small patch type; uncommon in both the Chilkoot and White Pass Units.
Classification: Vegetation with less than 10% cover of trees, less than 25% cover of shrubs and at least 25% cover of herbaceous species; dry to mesic sites with little or no standing water where *Leymus mollis* comprises less than 50% of the ground cover, sites not coastal, a common type in subalpine and alpine.
Environment: Noncoastal sites; forest openings on valley bottoms and lower mountain sideslopes, across gentle topography in the subalpine and protected sites in the alpine that retain snow late into the spring.
Vegetation: Supporting a diverse association of herbs. *Sanguisorba canadensis, Veratrum viride, Aconitum delphiniifolium* ssp. *delphiniifolium* and *Valeriana sitchensis* are common forbs. *Calamagrostis canadensis* and *Carex macrochaeta* are common graminoids. At low-elevations, this type most commonly grades to open or closed forests codominated by *Picea sitchensis, Tsuga heterophylla* or *Abies lasiocarpa*. In the subalpine, closed thickets of *Alnus viridis* ssp. *sinuata*, open forests dominated by *Abies lasiocarpa* or stands of dwarf *Tsuga mertensiana* and *Abies lasiocarpa* may adjoin this type. In the alpine, vegetation grades to a mosaic of dwarf shrub and herbaceous covers.
Succession and Disturbance: mid-seral, avalanche, late-lying snow





Plant Associations:
Calamagrostis canadensis-Carex macrochaeta
Mesic Herbaceous Alpine



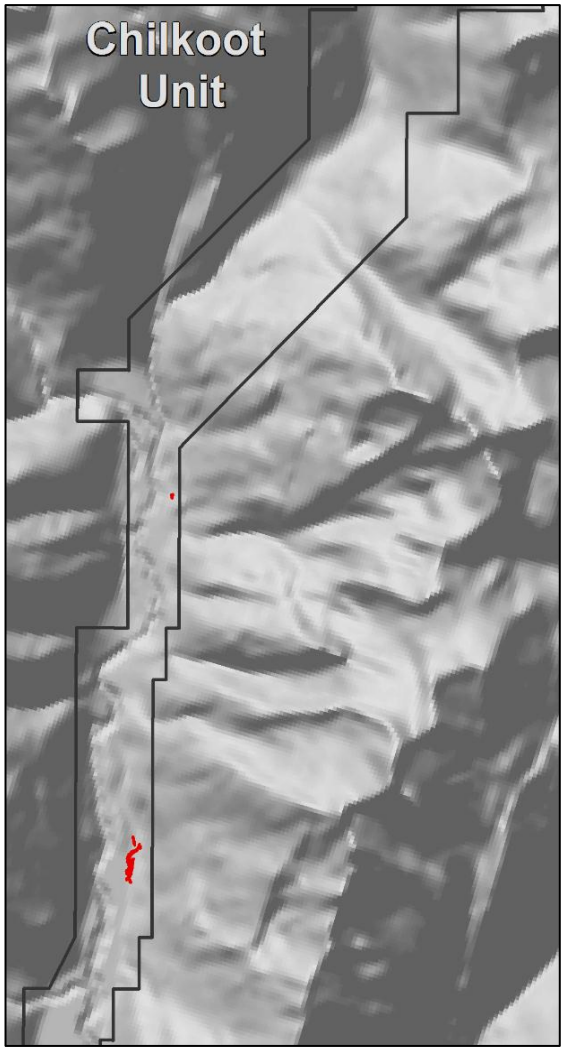
[18] Plant association plot only

Sparse and Barren Landcover Classes

Standing Dead Tree Landcover Class

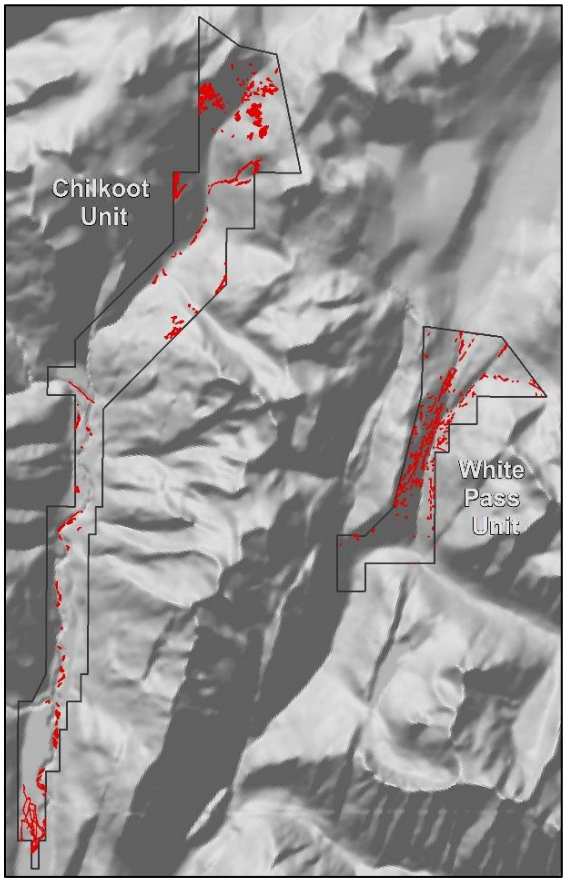
Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photograph is from the beaver ponds along the Chilkoot Trail
Map Area: 3.5 ha; 0.1%
Distribution: Small, often linear patch type; uncommon; occurrence restricted to the Chilkoot Unit.
Classification: Total vegetation cover is 10 to 24%; standing dead trees present in plot.
Environment: areas of recent flooding, standing water present. Abandoned floodplain channels, sloughs and beaver ponds; often along the toeslopes of mountainsides; common along the eastern margin of the Lower Taiya River Valley.
Vegetation: Standing or leaning dead trees; live *Alnus rubra* often present.
Succession and Disturbance: early-seral; river or seasonal flooding
Plant Associations: None identified





Sparse Vegetation Landcover Class





Number of Plots Sampled: 2 (14.02, 15.03[19])
Map Area: 129.0 ha; 2.5%
Distribution: Small to large patch type; common in both the Chilkoot and White Pass Units**.**
Classification: Total vegetation cover is 10 to 24%; standing dead trees not present in plot.
Environment: Tidal flats, river bars and banks, alluvial fans, talus slopes, exposed bedrock.
Vegetation: Pioneer species with wide ecological tolerances and N-fixing capabilities; nonvascular species often present, *Chamerion latifolium* is abundant along rivers.
Succession and Disturbance: early-seral; river and tidal flooding, landslide, rock fall, avalanche, wind scouring, exposure, anthropogenic
Plant Associations:
Chamerion latifolium
Cladonia species-*Cladina* species



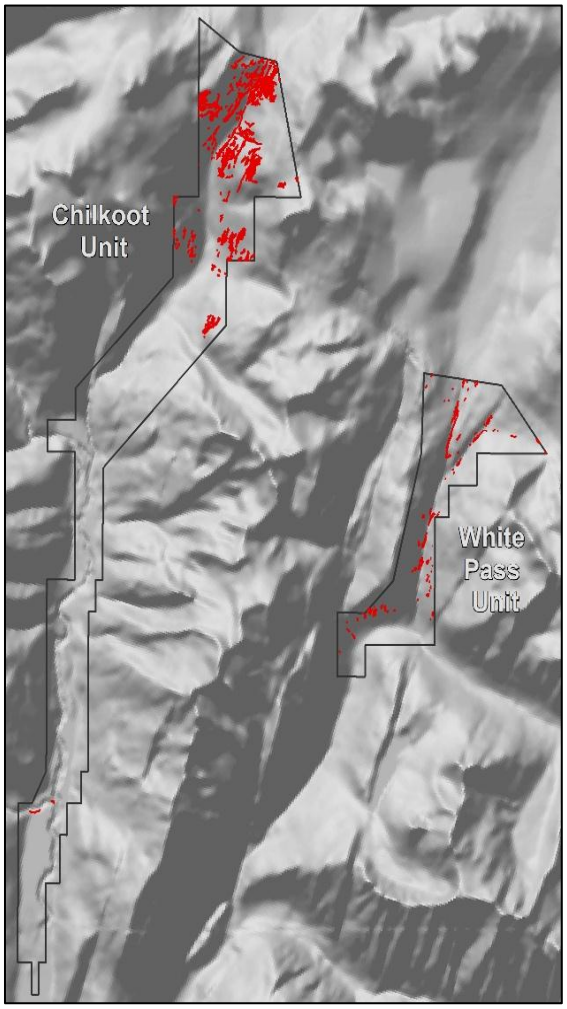
[19] Plant association plot only

Barren Landcover Class



Number of Plots Sampled: 1 (12.02)
Map Area: 260.2 ha; 5.0%
Distribution: Small to large patch type; common in both the Chilkoot and White Pass Units.
Classification: Total vegetation cover is less than 10%; barren ground dominates the landcover.
Environment: river banks and bars, alluvial fans, talus slopes, exposed bedrock
Vegetation: When vegetated, crustose lichen and dry moss species such as *Racomitrium lanuginosum* are common.
Succession and Disturbance: early- or late-seral; avalanche, rock fall, deglaciation, river flooding, wind scouring, exposure
Plant Associations:
Racomitrium lanuginosum-Crustose Lichen

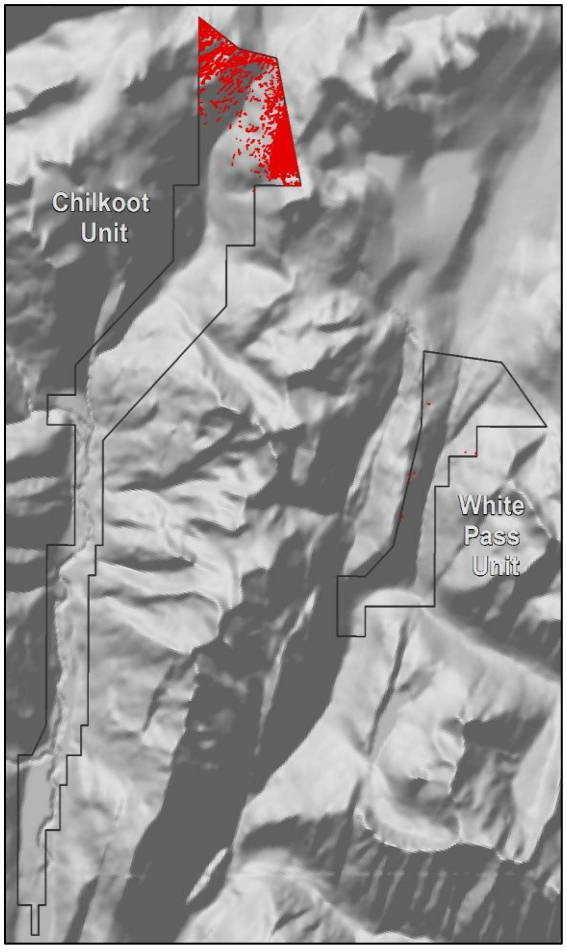




Snow / Ice Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the Chikoot Pass area
Map Area: 199.0 ha; 3.8%
Distribution: Spatiotemporally variable; at time of image collection was distributed as a small to large patch type; common in the Chilkoot Unit, uncommon in the White Pass Unit.
Classification: Total vegetation cover is less than 10%; perennial snow and/or ice dominate the landcover.
Environment: Alpine sites where annual snowfall exceeds melt.







Salt Water Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the flats at Dyea
Map Area: 17.4 ha; 0.3%
Distribution: Large patch type; uncommon; occurrence restricted to the Chilkoot Pass Unit.
Classification: Total vegetation cover is less than 10%; marine or tidally-influenced water dominates the landcover.
Environment: Marine waters of Lynn Canal; brackish in tidally-influenced reach. Division between fresh and saltwater was informed by the position of the drift line and the transition of adjoining vegetation from monocultures of *Leymus mollis* to coastal meadows supporting a diverse assemblage of herbs.





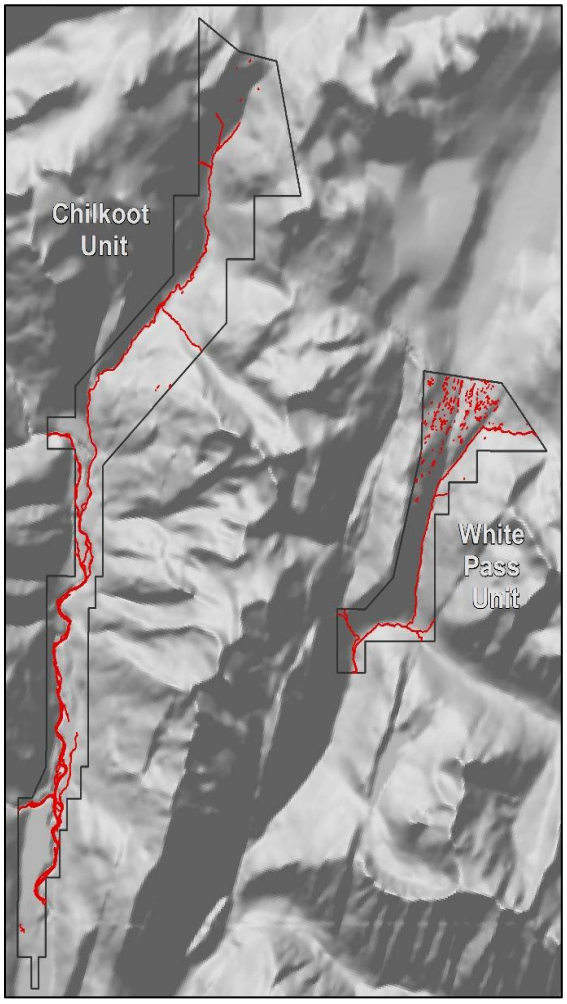


Fresh Water Landcover Class

Number of Plots Sampled: no plot data, class derived from interpretation of imagery, representative photographs are from the upper reaches of the Taiya River
Map Area: 140.9 ha; 2.7%
Distribution: Large, often linear patch type; common in both the Chilkoot and White Pass Units.
Classification: Total vegetation cover is less than 10%; fresh water (not marine or tidally-influenced) dominates the landcover.
Environment: Rivers and streams of the Taiya and Skagway River watersheds, lakes and ponds. Taiya River is brackish in tidally-influenced reach. Division between fresh and saltwater was informed by the position of the drift line and the transition of adjoining vegetation from monocultures of *Leymus mollis* to coastal meadows supporting a diverse assemblage of herbs.







Plant Associations

Key to Klondike Gold Rush National Historical Park Plant Associations

This dichotomous key can be used for the identification of plant associations from vegetation plot data collected within Klondike Gold Rush National Historical Park. For best results:

1. Locate a representative portion of the site in question. The vegetation and environment within the site should be relatively homogeneous.
2. Estimate the canopy cover for the diagnostic species used in the key.
3. Beginning with the Master Key, apply the couplets in sequential order to identify a plant association.
4. To ensure accuracy, compare the written description of the plant association with species composition, vegetation structure, and site characteristics. Ocular estimates can be imprecise, so, if the site description does not fit the classification, either revisit the key allowing a margin of +/- 5 percent in the cover cut levels, or review the undersampled plant associations that are listed at the end of the key for each physiognomic group.
5. For the purposes of this key, a species or life form is considered dominant when it comprises at least 75% cover within of a given vegetation stratum; species or life forms are considered codominant when each comprises 25-75% cover within a stratum.

Master Key

1a. Cultural vegetation: where vegetation displays a characteristic combination of dominant growth forms adapted to relatively intensive human manipulations ..... **Culturally-modified Plant Associations**

1b. Natural vegetation: where ecological processes primarily determine species and site characteristics 2

2a. Vegetation with at least 10% cover of trees 3

2b. Vegetation with less than 10% cover of trees 5

3a. At least 75% of tree cover contributed by needleleaf species ..... **Needleleaf Forest Plant Associations**

3b. Less than 75% of tree cover contributed by needleleaf species 4

4a. At least 75% of tree cover contributed by broadleaf species ..... **Broadleaf Forest Plant Associations**

4b. Broadleaf or needleleaf species contribute 25-75% of tree cover..... **Mixed Needleleaf/Broadleaf Forest Plant Associations**

5a. Shrub cover is at least 25% 6

5b. Shrub cover is less than 25% 7

6a. Average shrub height is at least 20 cm..... **Tall and Low Shrub Plant Associations**

6b. Average shrub height is less than 20 cm..... **Dwarf Shrub Plant Associations**

7a. Cover of vascular plant species is at least 25%.....**Herbaceous Plant Associations**

7b. Cover of vascular plant species is less than 25% ..... **Nonvascular Plant Associations**

Key to Needleleaf Forest Plant Associations

1a. *Picea sitchensis* is the dominant tree species 2
1b. *Picea sitchensis* is a codominant tree species 3
1c. *Picea sitchensis* is not a dominant or codominant tree species 10

2a. Woodland to open forests; seral herbs dominate the understory ..... ***Picea sitchensis*/Seral**
2b. Open to closed forests; feather mosses dominate the groundcover ..... ***Picea sitchensis*/*Hylocomium splendens***

3a. *Picea sitchensis* is codominant with *Tsuga heterophylla* 4
3b. *Picea sitchensis* is not codominant with *Tsuga heterophylla* 7

4a. *Oplopanax horridus* is a dominant understory species ..... ***Tsuga heterophylla-Picea sitchensis*/*Oplopanax horridus***
4b. *Oplopanax horridus* is not a dominant understory species 5

5a. *Menziesia ferruginea* is a dominant shrub ..... ***Tsuga heterophylla/Menziesia ferruginea***
5b. *Menziesia ferruginea* is not a dominant shrub 6

6a. *Gymnocarpium dryopteris* is a dominant understory species ..... ***Tsuga heterophylla-Picea sitchensis*/*Gymnocarpium dryopteris***
6b. *Gymnocarpium dryopteris* is not a dominant understory species; feather mosses dominate the groundcover ..... ***Tsuga heterophylla-Picea sitchensis*/*Hylocomium splendens***

7a. *Picea sitchensis* is codominant with *Abies lasiocarpa* ..... ***Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus***
7b. *Picea sitchensis* is not codominant with *Abies lasiocarpa* 8

8a. *Tsuga heterophylla* is the dominant tree species 9
8b. *Tsuga heterophylla* is a codominant tree species 11
8c. *Tsuga heterophylla* is not a dominant or codominant tree species 12

9a. *Menziesia ferruginea* dominates the shrub stratum ..... ***Tsuga heterophylla*/*Menziesia ferruginea***
9b. *Menziesia ferruginea* does not dominate the shrub stratum 10

10a. *Vaccinium ovalifolium* dominates the shrub stratum ..... ***Tsuga heterophylla*/*Vaccinium ovalifolium***
10b. *Vaccinium ovalifolium* does not dominate the shrub stratum; feather mosses dominate the understory ..... ***Tsuga heterophylla*/*Hylocomium splendens***

11a. *Tsuga heterophylla* is codominant with *Tsuga mertensiana*..... ..... ***Tsuga heterophylla-Tsuga mertensiana*/*Menziesia ferruginea***
11b. *Tsuga heterophylla* is codominant with *Abies lasiocarpa*..... .....***Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea***

12a. *Tsuga mertensiana* is the dominant tree species.....13
12b. *Tsuga mertensiana* and *Abies lasiocarpa* are the codominant tree species.....14
12c. *Tsuga mertensiana* is not a dominant or codominant tree species.....15

13a. *Vaccinium ovalifolium* dominates the understory..... .....***Tsuga mertensiana*/*Vaccinium ovalifolium***
13b. *Harrimanella stelleriana* is the dominant dwarf shrub..... .....***Tsuga mertensiana/Harrimanella stelleriana***

14a. *Menziesia ferruginea* dominates the shrub stratum ....***Tsuga mertensiana-Abies lasiocarpa*/*Menziesia ferruginea***
14b. *Menziesia ferruginea* does not dominate the shrub stratum; dwarf shrubs in the heath family comprise the understory..... ***Tsuga mertensiana-Abies lasiocarpa*/*Phyllodoce glanduliflora***

15a. *Abies lasiocarpa* is the dominant tree species.....16
15b. *Abies lasiocarpa* is not a dominant or codominant tree species; *Pinus contorta* var. *latifolia* the dominant tree species..... ***Pinus contorta* var. *latifolia*/*Cladina* species**

16a. *Harrimanella stelleriana* is a dominant or codominant dwarf shrub..... .....***Abies lasiocarpa*/*Harrimanella stelleriana***
16b. *Cassiope mertensiana* is a dominant or codominant dwarf shrub ....***Abies lasiocarpa/ Cassiope mertensiana***

Undersampled Needleleaf Plant Associations
Tsuga heterophylla-Picea sitchensis/Depauperate (7.02)
Tsuga heterophylla-Tsuga mertensiana / Depauperate (13.02)
Tsuga heterophylla-Tsuga mertensiana/ *Dryopteris expansa* (12.03)
Tsuga mertensiana-Picea sitchensis/Moss (10.02)
Tsuga mertensiana/*Vaccinium vitis-idaea* (13.01)

Key to Broadleaf Forest Plant Associations

1a. *Populus balsamifera* ssp. *trichocarpa* is the dominant tree species 2

1b. *Populus balsamifera* ssp. *trichocarpa* and *Betula papyrifera* are the codominant tree species ..
..... Populus balsamifera* ssp. *trichocarpa*/*Betula papyrifera/Cornus sericea* ssp. *sericea

1c. *Populus balsamifera* ssp. *trichocarpa* is not a dominant or codominant tree species; *Betula papyrifera* is the dominant tree species 4

2a. *Oplopanax horridus* is the dominant shrub.....
..... ***Populus balsamifera* ssp. *trichocarpa*/*Oplopanax horridus***

2b. *Oplopanax horridus* is not the dominant shrub 3

3a. *Alnus viridis* ssp. *sinuata* is the dominant shrub.....
..... ***Populus balsamifera* ssp. *trichocarpa*/*Alnus viridis* ssp. *sinuata***

3b. *Alnus viridis* ssp. *sinuata* is not the dominant shrub.....
..... ***Populus balsamifera* ssp. *trichocarpa*/*Cornus sericea* ssp. *sericea***

4a. *Menziesia ferruginea* is a dominant shrub species..... ***Betula papyrifera/Menziesia ferruginea***

4b. *Alnus viridis* ssp. *sinuata* is a dominant shrub species .....
.....***Betula papyrifera/Alnus viridis* ssp. *sinuata***

<u>Undersampled Broadleaf Plant Associations</u>

Alnus rubra/Myrica gale (2.08)

Populus balsamifera ssp. *trichocarpa*/*Gymnocarpium dryopteris* (4.04)

Key to Mixed Needleleaf/Broadleaf Forest Plant Associations

1a. *Populus balsamifera* ssp. *trichocarpa* is a codominant tree species.....2
1b. *Populus balsamifera* ssp. *trichocarpa* is not a codominant tree species 4

2a. *Alnus viridis* ssp. *sinuata* dominates the shrub stratum .....
.....***Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata***
2b. *Alnus viridis* ssp. *sinuata* does not dominate the shrub stratum 3

3a. *Oplopanax horridus* is a dominant or codominant shrub.....
.....***Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus***
3b. *Oplopanax horridus* is not a dominant or codominant shrub .....
.....***Picea sitchensis-Populus balsamifera* ssp. *trichocarpa*/*Cornus sericea ssp. sericea***

4a. *Picea sitchensis* is a codominant tree species 5
4b. *Picea sitchensis* is not a codominant tree species.....
.....***Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana*/*Menziesia ferruginea***

5a. *Menziesia ferruginea* is a dominant or codominant shrub.....
..... ***Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea***
5b. *Menziesia ferruginea* is not a dominant or codominant shrub; moss species dominate the groundcover ..... ***Betula papyrifera-Picea sitchensis/Hylocomium splendens***

<u>Undersampled Mixed Needleleaf-Broadleaf Plant Associations</u>

Betula papyrifera-Abies lasiocarpa-Pinus contorta var. *latifolia/Ledum groenlandicum* (19.06)
Betula papyrifera-Tsuga heterophylla/*Oplopanax horridus* (11.04)
Picea sitchensis-Betula papyrifera/Alnus incana ssp. *tenuifolia/Cornus sericea* ssp. *sericea* (4.03)
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cladina* species (5.07)
Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Rhytidiadelphus* species (2.07)
Picea sitchensis-Populus balsamifera ssp. *trichocarpa-Tsuga heterophylla/*Depauperate (5.01)
Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Cornus sericea ssp. *sericea* (6.04)
Tsuga heterophylla-Betula papyrifera-Pinus contorta var. *latifolia-Picea sitchensis*/Moss (32.02)

Key to Tall and Low Shrub Plant Associations

1a. *Salix barclayi* dominates the tallest shrub stratum.....***Salix barclayi*/Mixed Herb**
1b. *Salix barclayi* does not dominate the tallest shrub stratum.....2

2a. *Alnus viridis* ssp. *sinuata* dominates the tallest shrub stratum.....3
2b. *Alnus viridis* ssp. *sinuata* and *Salix alaxensis* codominate the tallest shrub stratum.....
.....***Alnus viridis* ssp. *sinuata*-*Salix alaxensis***

3a. *Dryopteris expansa* comprises at least 25% cover.....
.....***Alnus viridis* ssp. *sinuata*/*Dryopteris expansa***
3b. *Dryopteris expansa* comprises less than 25% cover.....4

4a. *Oplopanax horridus* comprises at least 5% cover.....
..... ***Alnus viridis* ssp. *sinuata*/*Oplopanax horridus***
4b. *Oplopanax horridus* comprises less than 5% cover.....***Alnus viridis* ssp. *sinuata***

<u>Undersampled Tall and Low Shrub Plant Associations</u>
Alnus incana ssp. *tenuifolia*-*Alnus viridis* ssp. *sinuata* (4.08)
Alnus viridis ssp. *sinuata*/*Menziesia ferruginea* (15.05)

Key to Dwarf Shrub Plant Associations

1a. *Empetrum nigrum* is the dominant dwarf shrub species; fruticose and/or foliose lichen cover is at least 35% ..... ***Empetrum nigrum*/*Cladina* species**
1b. *Empetrum nigrum* is not dominant 2

2a. *Empetrum nigrum* is codominant with *Vaccinium uliginosum* ..... ***Vaccinium uliginosum-Empetrum nigrum***
2b. *Empetrum nigrum* and *Vaccinium uliginosum* are not codominant 3

3a. *Cassiope mertensiana* is the dominant dwarf shrub species ..... ***Cassiope mertensiana***
3b. *Cassiope mertensiana* is not the dominant dwarf shrub species 4

4a. *Harrimanella stelleriana* is the dominant dwarf shrub species; fruticose and/or foliose lichen cover is at least 35% ..... ***Harrimanella stelleriana-Cladina* species**
4b. *Harrimanella stelleriana* is not the dominant dwarf shrub species 5

5a. *Phyllodoce glanduliflora* is the dominant dwarf shrub species ..... ***Phyllodoce glanduliflora***
5b. *Phyllodoce glanduliflora* is not the dominant dwarf shrub species 6

6a. *Luetkea pectinata* is the dominant dwarf shrub species; *Leptarrhena pyrolifolia* cover is at least 20% ..... ***Luetkea pectinata/Leptarrhena pyrolifolia***
6b. *Luetkea pectinata* is not the dominant dwarf shrub species 7

7a. *Harrimanella stelleriana* is codominant with *Luetkea pectinata* ..... ***Harrimanella stelleriana-Luetkea pectinata***
7b. *Harrimanella stelleriana* is codominant with *Phyllodoce glanduliflora* ..... ***Harrimanella stelleriana-Phyllodoce glanduliflora***

Undersampled Dwarf Shrub Plant Associations
Empetrum nigrum-Mixed Dwarf Shrub/Rock (16.05)
Salix stolonifera-Carex macrochaeta (21.06)

Key to Herbaceous Plant Associations

1a. Site is coastal (i.e. currently or historically tidally-influenced) 2
1b. Site is not coastal, commonly subalpine 7

2a. *Carex lyngbyei* is dominant ..... ***Carex lyngbyei***
2b. *Carex lyngbyei* is not dominant 3

3a. *Carex lyngbyei* is codominant with *Poa eminens* and *Argentina egedii* ..... ***Carex lyngbyei-Argentina egedii-Poa eminens***
3b. *Leymus mollis* is dominant ..... ***Leymus mollis***
3c. *Leymus mollis* is not dominant 4

4a. *Festuca rubra* is dominant or codominant 5
4b. *Festuca rubra* is not dominant or codominant 6

5a. *Festuca rubra* is dominant ..... ***Festuca rubra***
5b. *Festuca rubra* is codominant with *Argentina egedii* ..... ***Argentina egedii-Festuca rubra***

6a. *Argentina egedii* is codominant with *Poa eminens* ..... ***Poa eminens-Argentina egedii***
6b. *Argentina egedii* is codominant with *Deschampsia beringensis* ..... ***Deschampsia beringensis***

7a. *Chamerion latifolium* is dominant; floodplain gravel ..... ***Chamerion latifolium***
7b. *Chamerion latifolium* is not dominant 8

8a. *Carex macrochaeta* is dominant or codominant 9
8b. *Carex macrochaeta* is not dominant or codominant 10

9a. *Carex macrochaeta* is dominant ..... ***Carex macrochaeta***
9b. *Carex macrochaeta* is codominant with *Calamagrostis canadensis* ..... ***Calamagrostis canadensis-Carex macrochaeta***

10a. *Carex anthoxanthea* is dominant ..... ***Carex anthoxanthea***
10b. *Carex anthoxanthea* is not dominant 11

11a. *Trichophorum cespitosum* is dominant ..... ***Trichophorum cespitosum***
11b. *Trichophorum cespitosum* is not dominant 12

12a. *Carex pyrenaica* ssp. *micropoda* is dominant; *Luzula* and Lichen species are subdominant....
.....***Carex pyrenaica* ssp. *micropoda*-*Luzula* species- *Cladina* species**
12b. *Carex pyrenaica* ssp. *micropoda* is not dominant; *Luzula arcuata* is codominant with Lichen species.....***Luzula arcuata*- *Cladina* species**

Undersampled Herbaceous Plant Associations
Carex gmelinii-Leymus mollis Plant Association (1.10)
Carex macrochaeta - Athyrium filix-femina-Veratrum viride (15.07)
Leymus mollis-Achillea millefolium var. borealis (1.14)
Leymus mollis-Lathyrus japonicus var. *maritimus* 1.03)
Mesic Herbaceous Alpine (21.01)
Plantago maritima-Atriplex alaskensis (1.09)
Poa eminens-Juncus haenkei (1.13)

Key to Nonvascular Plant Associations

1a. *Andreaea blyttii* is dominant, upper elevation bedrock substrates..... ***Andreaea blyttii***

1b. *Andreaea blyttii* is not dominant.....2

2a. *Stereocaulon paschale* is dominant, lower elevation bedrock substrates .... ***Stereocaulon paschale***

2b. *Stereocaulon paschale* is not dominant; *Racomitrium lanuginosum* and crustose lichen species codominate, early-seral talus..... ***Racomitrium lanuginosum*-Crustose Lichen**

Description of Plant Association Fields

Scientific Name: scientific names of nominal taxa

The following rules apply to the scientific nomenclature:

- Taxa occurring in the same strata are separated by a hyphen (-)
- Taxa occurring in different strata are separated by a forward slash (/)
- Taxa included parenthetically occur in the plant association with less consistency
- Taxa occurring in the uppermost stratum are listed first, followed successively by those in lower strata. Within the same stratum, the order of names generally reflects decreasing levels of dominance, constancy or diagnostic value of the taxa.
- Taxonomy is given in accordance with nomenclature accepted by the USDA PLANTS Database (USDA, NRCS 2013)

Images: Photographic images were selected from the member or representative plots.

Rank: conservation status ranks estimate elimination risk posed to the plant association. Ranks range from 1 to 5 and consider the rarity, trend and threats to a given ecological community (1 - critically imperiled, 2 - imperiled, 3 - vulnerable, 4 - apparently secure, 5 - secure, NR - not ranked). Ranks are collaboratively designated by the conservation group, NatureServe and their partner organizations on global (G) and statewide (S) levels. Global ranks are taken from NatureServe; state ranks are taken from the Alaska Natural Heritage Program Plant Association database.

Number of Plots Sampled: number and site codes of plots sampled that represent the plant association. All plots listed were used to evaluate the association, however, landcover plots for which only coarse species composition data was collected, were not included in plant association analysis or constancy and cover tables. Landcover plots are footnoted.

Other Studies: author(s) and year of publication in which the plant association or equivalent plant association was described. Full citations are provided in the literature cited section.

Distribution: distribution of the plant association (local, scattered, widespread) within the Park including comments on patch size. Plot sizes are categorized as:

less than 100 m^2	very small
100 - 500 m^2	small
500 - 1,000 m^2	small-medium
1,000 - 5,000 m^2	medium
5,000 - 10,000 m^2	medium-large
greater than 10,000 m^2	large

Slope: the range of terrain slope values characterizing the plant association measured in degrees from level

Aspect: the range of terrain aspects characterizing the plant association measured in degrees from true North

Elevation: the range of elevations characterizing the plant association measured in meters above mean sea level

Hydrology: the range of hydrologic regimes characterizing the plant association

Landform: the types of landforms on which the plant association occurs

Vegetation: a summary of the floristic composition and physiognomy of the plant association including the dominant and subdominant taxa and the vertical strata in which these taxa occur. Average heights are given parenthetically for nominal or subdominant trees and shrubs; the range of heights is given when considerable variation in height exists for the species among plots. Indicator species, the influence of mesohabitat and the variability of inconstant (nondiagnostic) species may also be discussed.

Succession and Disturbance: a summary of the successional and disturbance regimes that influence the stability and within-stand pattern of the type.

Landcover Class: the landcover class(es) in which vegetation plots supporting the plant association are located. Note, this is not an exhaustive list of landcover classes in which a given plant association could occur; this data is also summarized in Appendix F.

Constancy and Cover Table: constancy is defined as the percentage of plots in which a species occurred. Average cover is defined as the average percent cover for a given species across all plots in the plant association. The range of cover lists the lowest and highest cover values recorded for a given species. All taxa with an average canopy cover of at least 1% across all plots in the plant association are included.

Culturally-modified Plant Assemblages

Rosa nutkana/Chamerion angustifolium Leymus mollis-Poa pratensis Rumex acetosella

Number of Plots Sampled: 4 (2.01[20], 2.04, 2.05, 3.06)
Rank: NA
Other Studies: NA
Distribution: small to medium patch; local distribution in both the Chilkoot and White Pass Units, occurrence coincident with areas of historic occupation and current use such as Dyea.
Slope: 0°
Aspect: NA
Elevation: 5 - 15 m
Hydrology: dry to mesic
Landform: Site characters vary depending on the purpose of development and may have been modified during the process of development. Development usually targets easily-accessed, flat ground close to water or natural travel corridors.
Vegetation: Upland, often coastal assemblages displaying a characteristic combination of dominant growth forms adapted to relatively intensive human manipulations. Dominant species are those remnant from the site's pre-disturbance conditions, but have been colonized by native ruderal (e.g. *Rosa nutkana*, *Chamerion angustifolium*) and nonnative (e.g. *Rumex acetosella*, *Taraxacum officinale* ssp. *officinalle* and *Poa pratensis* ssp. *irrigata*) plant species.
Succession and Disturbance: early-seral; human (current and historic)
Landcover Class: Low Shrub Open, Mesic Herbaceous Coastal



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Alnus rubra	25	3	-
Shrub			
Rosa nutkana	50	33	25-40
Rubus idaeus	25	7	-
Sambucus racemosa	25	7	-
Forb			
Achillea millefolium var. *borealis*	100	12	1-20
Angelica lucida	75	6	1-15
Athyrium filix-femina	25	8	-
Chamerion angustifolium	50	38	25-50
Equisetum arvense	25	3	-
Equisetum pratense	25	2	-
Fritillaria camschatcensis	25	1	-
Galium triflorum	25	5	-
Geranium erianthum	25	1	-
Geum macrophyllum	25	3	-
Honckenya peploides	25	7	-
Iris setosa	75	6	1-15
Lathyrus japonicus var. *maritimus*	50	2	-
Moehringia lateriflora	25	3	-
Plantago maritima	25	1	-
Rhinanthus minor	25	1	-
Rumex acetosella	25	10	-
Stellaria calycantha	25	1	-
Taraxacum officinale ssp. *officinale*	25	7	-
Trientalis europaea	75	12	5-20
Viola epipsila ssp. *repens*	25	5	-
Graminoid			
Calamagrostis canadensis	50	11	2-20
Deschampsia beringensis	25	1	-
Festuca rubra	50	5	4-5
Leymus mollis	75	13	3-30
Phleum alpinum	25	7	-
Poa palustris	50	4	3-5
Poa pratensis ssp. *irrigata*	50	25	5-45
Moss			
Moss sp.	25	5	-
Rhytidiadelphus triquetrus	25	15	-

[20] Landcover plot only

Needleleaf Forest Plant Associations

Abies lasiocarpa / Cassiope mertensiana

Number of Plots Sampled: 2 (21.02, 21.04[21])
Rank: GNR S2S3
Other Studies: none
Distribution: medium patch; scattered occurrence
Slope: 3-4°
Aspect: 192, 310°
Elevation: 1028 m
Hydrology: mesic
Landform: high-elevation valley bottoms, basins
Vegetation: An upland, subalpine, open forest where *Abies lasiocarpa* (1 - 8 m) is the dominant tree species. The harsh conditions approaching timberline encourages the growth of trees in dense stands and often limits peripheral growth to dwarf stature. Alpine indicator species such as *Cassiope mertensiana* and *Phyllodoce glanduliflora* commonly occur. A diversity of subalpine herbs occurs at low abundance.
Succession and Disturbance: late-seral; no significant disturbance
Landcover Class: Subalpine Fir Dwarf Tree Scrub, Subalpine Fir Open



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	50	-
Shrub			
Cassiope mertensiana	100	15	-
Harrimanella stelleriana	100	1	-
Luetkea pectinata	100	5	-
Phyllodoce glanduliflora	100	15	-
Vaccinium ovalifolium	100	1	-
Forb			
Aconitum delphiniifolium ssp. *delphiniifolium*	100	1	-
Anemone narcissiflora var. *monantha*	100	1	-
Arnica latifolia	100	2	-
Artemisia arctica	100	3	-
Chamerion angustifolium	100	1	-
Lupinus nootkatensis	100	5	-
Petasites frigidus var. *frigidus*	100	1	-
Rubus arcticus	100	1	-
Rubus pedatus	100	1	-
Sanguisorba canadensis	100	8	-
Senecio triangularis	100	3	-
Valeriana sitchensis	100	5	-
Veratrum viride	100	2	-
Viola glabella	100	2	-
Graminoid			
Calamagrostis canadensis	100	1	-
Carex macrochaeta	100	1	-
Vahlodea atropurpurea	100	2	-



[21] Landcover plot only

Abies lasiocarpa / Harrimanella stelleriana

Number of Plots Sampled: 1 (20.01)
Rank: GNR S2S3
Other Studies: none
Distribution: small patch; scattered occurrence
Slope: 28°
Aspect: 131°
Elevation: 1067 m
Hydrology: mesic
Landform: mountain sideslopes, benches, rounded mountain summits
Vegetation: An upland, subalpine, open dwarf forest where *Abies lasiocarpa* (1.4 m) is the dominant tree species. The harsh conditions at timberline limit trees to dwarf stature and often krummholz form. Alpine indicator species such as *Harrimanella stelleriana* commonly occur. The feather moss, *Pleurozium schreberi* and a diversity of lichen species, many representing the *Cladina* genus cover the ground not occupied by bedrock. Forbs are not represented and graminoid cover is sparse.
Succession and Disturbance: late-seral; no significant disturbance
Landcover Class: Subalpine Fir Dwarf Tree Scrub

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	60	-
Shrub			
Empetrum nigrum	100	10	-
Harrimanella stelleriana	100	15	-
Phyllodoce glanduliflora	100	2	-
Vaccinium ovalifolium	100	1	-
Vaccinium uliginosum	100	2	-
Graminoid			
Anthoxanthum monticola ssp. *alpinum*	100	1	-
Moss			
Pleurozium schreberi	100	25	-
Racomitrium lanuginosum	100	1	-
Lichen			
Cetraria islandica	100	2	-
Cladina rangiferina	100	1	-
Cladina stellaris	100	10	-
Cladonia sp.	100	1	-
Cladonia bellidiflora	100	1	-
Nephroma arcticum	100	3	-
Stereocaulon paschale	100	3	-
Thamnolia vermicularis	100	1	-
Umbilicaria	100	3	-





Abies lasiocarpa - Picea sitchensis / Menziesia ferruginea - Oplopanax horridus

Number of Plots Sampled: 3 (19.01, 19.02[22], 19.03[21])
Rank: GNR S2S3
Other Studies: none
Distribution: medium patch; local occurrence
Slope: 15-25°
Aspect: 112-135°
Elevation: 332 - 525 m
Hydrology: mesic
Landform: mountain sideslopes, benches
Vegetation: A lowland to upland, open to closed forest. *Abies lasiocarpa* (23.5 m) and *Picea sitchensis* (24.5 m) are the codominant tree species with *Tsuga heterophylla* (15 - 20 m) occurring as a minor associate. *Menziesia ferruginea* (1.5 m) and *Oplopanax horridus* (1.3 m) are the codominant shrubs. *Oplopanax horridus* indicates productive forests where subsurface flow is typically continuous (Banner et al. 1993); these wet soils might contribute to the mortality of *Abies lasiocarpa* observed at these sites. The fern *Gymnocarpium dryopteris*, which is consistently abundant also, indicates productive forests.
Succession and Disturbance: late-seral; historic logging, *Abies* mortality
Landcover Class: Subalpine Fir - Sitka Spruce Open, Sitka Spruce - Subalpine Fir Closed, Sitka Spruce - Subalpine Fir Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	30	-
Picea sitchensis	100	35	-
Tsuga heterophylla	100	5	-
Shrub			
Menziesia ferruginea	100	50	-
Oplopanax horridus	100	40	-
Vaccinium ovalifolium	100	5	-
Forb			
Aruncus dioicus var. *acuminatus*	100	1	-
Athyrium filix-femina	100	1	-
Cornus canadensis	100	1	-
Dryopteris expansa	100	15	-
Gymnocarpium dryopteris	100	50	-
Rubus pedatus	100	3	-
Streptopus amplexifolius	100	1	-
Moss			
Brachythecium hyalotapetum	100	5	-
Dicranum sp.	100	1	-
Plagiomnium sp.	100	2	-
Polytrichum sp.	100	2	-
Rhytidiadelphus loreus	100	1	-
Lichen			
Lobaria linita	100	1	-





[22] Landcover plot only

Picea sitchensis / Hylocomium splendens

Number of Plots Sampled: 4 (1.16[23], 2.09, 2.10, 5.04)
Rank: G5 S5
Other Studies: Shephard 1995, DeVelice et al. 1999, Boggs et al. 2008a
Distribution: medium-large to large patch; scattered occurrence
Slope: 0^{o}
Aspect: NA
Elevation: 20 - 40 m
Hydrology: dry-mesic to mesic
Landform: valley bottoms, inactive floodplains
Vegetation: An upland, low elevation, open forest. *Picea sitchensis* (7 - 35 m) is the dominant tree species and regeneration of needleleaf species is common. Deciduous trees such as *Betula papyrifera* (15 m) and shrubs such as *Alnus viridis* ssp. *sinuata* (6 m) occur as minor associates in canopy gaps. The low deciduous shrub, *Viburnum edule* (0.5 - 1.4 m) is constant at low cover. Herbaceous cover is diverse but poorly-developed; the forbs, *Geocaulon lividum* and *Orthilia secunda* are constant at low cover. With greater forest canopy closure shrubs and herbs become sparse. Feather mosses including *Hylocomium splendens* and fruticose lichen species represented by the *Cladina* genus cover the ground.
Succession and Disturbance: mid-seral; flooding, historic logging
Landcover Class: Sitka Spruce Open



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	33	8	-
Betula papyrifera	33	10	-
Picea sitchensis	100	42	30-55
Populus balsamifera ssp. *trichocarpa*	100	5	-
Tsuga heterophylla	100	5	2-10
Shrub			
Alnus viridis ssp. *sinuata*	33	20	-
Oplopanax horridus	33	1	-
Ribes lacustre	33	5	-
Ribes triste	33	5	-
Viburnum edule	100	4	1-10
Forb			
Chamerion angustifolium	33	2	-
Geocaulon lividum	100	5	2-10
Lycopodium annotinum	33	8	-
Moneses uniflora	33	1	-
Orthilia secunda	100	3	1-4
Pyrola asarifolia	33	6	-
Streptopus amplexifolius	67	1	-
Trientalis europaea	33	1	-
Graminoid			
Calamagrostis canadensis	33	5	-
Poa pratensis ssp. *pratensis*	33	5	-
Moss			
Dicranum scoparium	33	5	-
Hylocomium splendens	100	40	30-55
Moss sp.	67	8	5-10
Pleurozium schreberi	67	10	5-15
Ptilium crista-castrensis	67	8	1-15
Rhytidiadelphus loreus	67	12	4-20
Rhytidiadelphus triquetrus	33	15	-
Lichen			
Cladina mitis	33	6	-
Cladina rangiferina	33	5	-
Cladina stellaris	33	2	-
Cladonia amaurocraea	33	5	-
Nephroma arcticum	33	3	-
Peltigera leucophlebia	33	2	-
Stereocaulon sp.	33	7	-

[23] Landcover plot only

Picea sitchensis / Seral Herb

Number of Plots Sampled: 2 (1.15, 2.06)
Rank: G5 S5
Other Studies: del Moral and Watson 1978
Distribution: medium to medium-large patch; local occurrence
Slope: 0^{o}
Aspect: NA
Elevation: 10 - 13 m
Hydrology: dry-mesic
Landform: uplifted tidal flats
Vegetation: A coastal woodland where *Picea sitchensis* (6 - 13 m) is the dominant tree species. The rare and localized *Pinus contorta* var. *latifolia* also occurs with low cover. Ruderal native forbs such as *Achillea millefolium* var. *borealis* and *Chamerion angustifolium* and grasses *Leymus mollis* and *Festuca rubra* are common. Understory composition is variable and likely relates to differences in soil type and disturbance regime. The nonnative species *Rumex acetosella*, *Taraxacum officinale* ssp. *officinale*, *Poa pratensis* ssp. *irrigata* and *P. pratensis* ssp. *pratensis* may be relict from the gold rush-era, but have likely been reintroduced by modern-day use of the uplifted tidal flats at Dyea.
Succession and Disturbance: early-seral; isostatic rebound, human (historic and current)
Landcover Class: Sitka Spruce Woodland





Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	50	2	-
Picea sitchensis	100	18	15-20
Pinus contorta var. *latifolia*	50	3	-
Forb			
Achillea millefolium var. *borealis*	100	13	5-20
Angelica lucida	50	5	-
Castilleja unalaschcensis	50	3	-
Chamerion angustifolium	50	10	-
Honckenya peploides	50	20	-
Iris setosa	100	15	5-25
Moehringia lateriflora	50	5	-
Rhinanthus minor	50	2	-
Rumex acetosella	50	3	-
Taraxacum officinale ssp. *officinale*	50	2	-
Trientalis europaea	100	9	2-15
Graminoid			
Agrostis scabra	50	2	-
Carex gmelinii	50	8	-
Festuca rubra	50	10	-
Hierochloe odorata	50	10	-
Hordeum brachyantherum	50	2	-
Leymus mollis	100	13	10-15
Poa pratensis ssp. *irrigata*	50	10	-
Poa pratensis ssp. *pratensis*	50	3	-
Moss			
Dicranum scoparium	50	2	-
Hylocomium splendens	50	15	-
Moss sp.	50	1	-
Polytrichum juniperinum	50	5	-
Ptilium crista-castrensis	50	3	-
Rhytidiadelphus triquetrus	50	20	-
Lichen			
Cladina mitis	50	5	-
Cladina rangiferina	50	5	-
Cladonia bellidiflora	50	5	-
Cladonia gracilis	50	3	-
Lichen sp.	50	5	-
Peltigera leucophlebia	50	5	-
Stereocaulon paschale	50	12	-

Pinus contorta var. *latifolia* / *Cladina* species

Number of Plots Sampled: 1 (32.03)
Rank: GNR S2S3
Other Studies: Banner et al. 1993
Distribution: medium patch; local occurrence
Slope: 30°
Aspect: 234°
Elevation: 167 m
Hydrology: mesic
Landform: mountain sideslopes; knolls underlain by shallow bedrock
Vegetation: An upland, mid-elevation, open forest where *Pinus contorta* var. *latifolia* (12 m) is the dominant tree species and *Tsuga heterophylla* (1.2 m) and *Picea sitchensis* (0.9 m) saplings are present at low cover. A continuous mat of lichen species largely represented by members of the *Cladina* genus cover the ground; shrubs and herbaceous plant species are not well represented. This association is considered very rare in neighboring regions of British Columbia, where it is found only on the driest bedrock outcrops with thin soils (Banner et al. 1993).
Succession and Disturbance: late-seral; no significant disturbance
Landcover Class: Lodgepole Pine Open



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	1	-
Picea sitchensis	100	1	-
Pinus contorta var. *latifolia*	100	50	-
Salix scouleriana	100	1	-
Tsuga heterophylla	100	5	-
Moss			
Moss sp.	100	1	-
Polytrichum sp.	100	1	-
Lichen			
Cladina mitis	100	15	-
Cladina rangiferina	100	40	-
Cladina stellaris	100	5	-
Cladonia bellidiflora	100	3	-
Cladonia uncialis	100	10	-
Stereocaulon paschale	100	5	-



Tsuga heterophylla - Abies lasiocarpa / Menziesia ferruginea

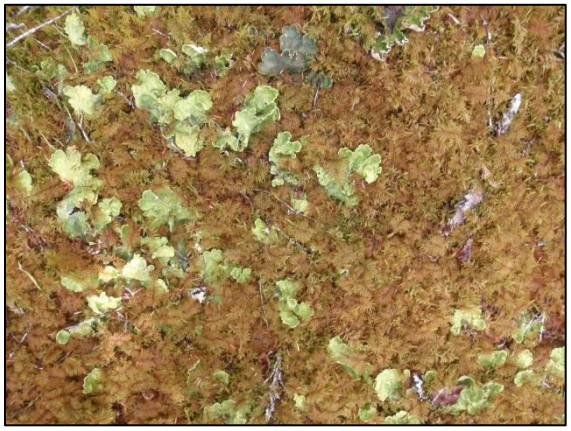
Number of Plots Sampled: 2 (19.05, 19.07)
Rank: GNR S2S3
Other Studies: none
Distribution: medium patch; local occurrence
Slope: 0 - 21°
Aspect: 94°
Elevation: 303 - 451 m
Hydrology: mesic
Landform: bedrock-controlled valley bottoms, mountain sideslopes
Vegetation: An upland, mid-elevation, closed forest where *Tsuga heterophylla* (25 m) and *Abies lasiocarpa* (25 m) are the codominant tree species; *Picea sitchensis* (25 - 31 m) is consistently subdominant. The presence of mature, full stature *Abies lasiocarpa* at low elevation is uncommon in Alaska and is likely favored by cold air drainage from White Pass. *Menziesia ferruginea* (1.4 m) is the dominant shrub, with *Vaccinium ovalifolium* (0.8 m) subdominant. Together, these shrubs are thought to indicate mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Hylocomium splendens* and *Pleurozium schreberi* cover the ground. Forbs are absent and graminoid cover is sparse.
Succession and Disturbance: late-seral
Landcover Class: Western Hemlock - Subalpine Fir Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	33	25-40
Picea sitchensis	100	18	15-20
Tsuga heterophylla	100	35	30-40
Shrub			
Menziesia ferruginea	100	45	40-50
Oplopanax horridus	50	1	-
Vaccinium ovalifolium	100	18	15-20
Forb			
Cornus canadensis	100	2	1-2
Dryopteris expansa	50	1	-
Rubus pedatus	100	1	-
Moss			
Dicranum sp.	100	2	1-3
Hylocomium splendens	100	48	40-55
Pleurozium schreberi	100	33	30-35
Ptilium crista-castrensis	100	3	1-5



Tsuga heterophylla / Hylocomium splendens

Number of Plots Sampled: 3 (8.01, 9.05, 30.01)
Rank: G5 S5
Other Studies: Banner et al. 1993, DeVelice et al. 1999
Distribution: small-medium to medium patch; scattered occurrence
Slope: 10-29^{o}
Aspect: 120-337^{o}
Elevation: 104 - 184 m
Hydrology: mesic
Landform: lower mountain sideslopes (smooth)
Vegetation: An upland, low-elevation, closed forest where *Tsuga heterophylla* (4 - 20 m) is the dominant tree species and *Picea sitchensis* (27 m) occurs as a minor associate. A typical suite of feather mosses including *Hylocomium splendens, Pleurozium schreberi* and *Rhytidiadelphus loreus* cover the ground; shrub and herbaceous layers are not well represented.
Succession and Disturbance: mid- to late-seral; historic logging
Landcover Class: Hemlock Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	33	5	-
Picea sitchensis	33	15	-
Salix scouleriana	33	2	-
Tsuga heterophylla	100	82	75-90
Shrub			
Menziesia ferruginea	100	2	1-4
Vaccinium ovalifolium	100	3	1-5
Forb			
Cornus canadensis	67	2	1-2
Moneses uniflora	33	1	-
Rubus pedatus	33	1	-
Moss			
Dicranum sp.	33	1	-
Hylocomium splendens	100	52	40-75
Moss sp.	33	2	-
Pleurozium schreberi	100	15	5-20
Rhytidiadelphus loreus	67	23	15-30
Rhytidiadelphus triquetrus	33	1	-
Sphagnum girgensohnii	33	1	-
Liverwort			
Ptilidium ciliare	33	10	-
Lichen			
Cladina mitis	33	5	-
Cladonia maxima	33	5	-
Icmadophila ericetorum	33	1	-
Nephroma arcticum	33	10	-
Stereocaulon paschale	33	5	-



Tsuga heterophylla / Menziesia ferruginea

Number of Plots Sampled: 6 (6.01, 7.05, 19.04, 30.03[24], 30.08, 31.01)
Rank: G5 S5
Other Studies: Stephens et al. 1969, Martin et al. 1995, Neiland 1971a, Boggs et al. 2008a
Distribution: medium to large patch; widespread occurrence
Slope: 0-25°
Aspect: 124-322°
Elevation: 79 - 342 m
Hydrology: mesic



Landform: mountain sideslopes, benches, hilltops
Vegetation: An upland, mid-elevation, closed forest where *Tsuga heterophylla* (12 - 25 m) is the dominant tree species and *Picea sitchensis* (13 - 27 m) occurs as a fairly constant, yet minor associate. *Menziesia ferruginea* (1.4 m) is the dominant shrub, with *Vaccinium ovalifolium* (0.9 m) subdominant. Together, these shrubs are thought to indicate nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Hylocomium splendens*, members of the *Rhytidiadelphus* genus and *Pleurozium schreberi* cover the ground. Herbaceous cover is sparse.
Succession and Disturbance: late-seral; no significant disturbance
Landcover Class: Sitka Spruce - Hemlock Closed, Hemlock Closed, Hemlock Open



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	20	6	-
Betula papyrifera	20	2	-
Picea sitchensis	80	10	2-25
Tsuga heterophylla	100	61	45-80
Shrub			
Menziesia ferruginea	100	30	15-45
Oplopanax horridus	60	1	1-2
Vaccinium ovalifolium	80	19	5-30
Vaccinium vitis-idaea	20	1	-
Forb			
Athyrium filix-femina	20	1	-
Cornus canadensis	80	2	1-3
Geocaulon lividum	20	5	-
Gymnocarpium dryopteris	60	3	2-3
Lycopodium annotinum	20	1	-
Orthilia secunda	20	1	-
Rubus pedatus	60	2	1-3
Streptopus amplexifolius	40	1	-
Graminiod			
Calamagrostis canadensis	20	1	-
Carex canescens	20	1	-
Moss			
Dicranum sp.	40	1	-
Dicranum scoparium	20	5	-
Hylocomium splendens	100	42	30-55
Moss sp.	40	6	3-8
Pleurozium schreberi	100	19	10-35
Ptilium crista-castrensis	60	3	1-5
Rhizomnium sp.	20	1	-
Rhytidiadelphus loreus	60	17	10-30
Rhytidiadelphus triquetrus	20	25	-
Sphagnum girgensohnii	60	8	3-15
Liverwort			
Lophozia sp.	20	5	-
Lichen			
Cladonia maxima	20	3	-
Lichen sp.	20	2	-
Nephroma arcticum	20	10	-
Peltigera sp.	20	1	-

[24] Landcover plot only

Tsuga heterophylla - Picea sitchensis / Gymnocarpium dryopteris

Number of Plots Sampled: 2 (6.05, 30.04)
Rank: GNR SNR
Other Studies: Banner et al. 1993
Distribution: medium to large patch; scattered occurrence
Slope: 0-8^{o}
Aspect: 270^{o}
Elevation: 71 - 244 m
Hydrology: mesic
Landform: mountain toeslopes, valley bottoms, floodplains, ancient floodplain terraces
Vegetation: An upland, low- to mid-elevation, closed forest where *Tsuga heterophylla* (26.5 m) and *Picea sitchensis* (30.5 m) are the codominant tree species. The fern *Gymnocarpium dryopteris*, which indicates productive forests, dominates the herbaceous layer. A typical suite feather mosses including *Hylocomium splendens*, *Pleurozium schreberi* and *Rhytidiadelphus loreus* cover the ground. The shrub layer is diverse yet poorly developed.
Succession and Disturbance: mid- to late seral; historic logging
Landcover Class: Sitka Spruce - Hemlock Closed





Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	20	6	-
Betula papyrifera	20	2	-
Picea sitchensis	80	10	2-25
Tsuga heterophylla	100	61	45-80
Shrub			
Menziesia ferruginea	100	30	15-45
Oplopanax horridus	60	1	1-2
Vaccinium ovalifolium	80	19	5-30
Vaccinium vitis-idaea	20	1	-
Forb			
Athyrium filix-femina	20	1	-
Cornus canadensis	80	2	1-3
Geocaulon lividum	20	5	-
Gymnocarpium dryopteris	60	3	2-3
Lycopodium annotinum	20	1	-
Orthilia secunda	20	1	-
Rubus pedatus	60	2	1-3
Streptopus amplexifolius	40	1	-
Graminiod			
Calamagrostis canadensis	20	1	-
Carex canescens	20	1	-
Moss			
Dicranum sp.	40	1	-
Dicranum scoparium	20	5	-
Hylocomium splendens	100	42	30-55
Moss sp.	40	6	3-8
Pleurozium schreberi	100	19	10-35
Ptilium crista-castrensis	60	3	1-5
Rhizomnium sp.	20	1	-
Rhytidiadelphus loreus	60	17	10-30
Rhytidiadelphus triquetrus	20	25	-
Sphagnum girgensohnii	60	8	3-15
Liverwort			
Lophozia sp.	20	5	-
Lichen			
Cladonia maxima	20	3	-
Lichen sp.	20	2	-
Nephroma arcticum	20	10	-
Peltigera sp.	20	1	-

Tsuga heterophylla - Picea sitchensis / Hylocomium splendens

Number of Plots Sampled: 2 (7.03, 9.04)
Rank: GNR SNR
Other Studies: Banner et al. 1993
Distribution: medium-large to large patch; scattered occurrence
Slope: 24-30^{o}
Aspect: 285-300^{o}
Elevation: 98 - 194 m
Hydrology: mesic
Landform: mountain sideslopes (broken)
Vegetation: An upland, low- to mid-elevation, closed forest where *Tsuga heterophylla* (14 - 20 m) *Picea sitchensis* (18 m) are the codominant tree species and *Betula papyrifera* (15.5 m) occurs as a constant, yet minor associate. A typical suite of feather mosses including *Hylocomium splendens,* and members of the *Rhytidiadelphus* genus cover the ground; shrubs and herbaceous species are not well represented.
Succession and Disturbance: mid- to late-seral; historic logging
Landcover Class: Sitka Spruce - Hemlock Closed

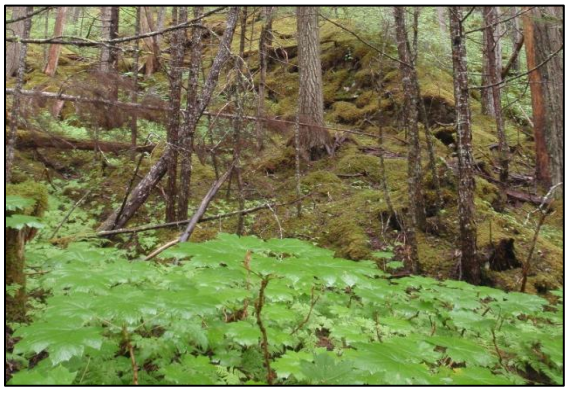
Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	8	6-10
Picea sitchensis	100	25	24-25
Tsuga heterophylla	100	50	-
Moss			
Dicranum scoparium	100	2	1-3
Hylocomium splendens	100	43	40-45
Moss sp.	100	3	2-4
Pleurozium schreberi	50	5	-
Rhytidiadelphus loreus	100	18	15-21
Rhytidiadelphus triquetrus	50	21	-





Tsuga heterophylla - Picea sitchensis / Oplopanax horridus

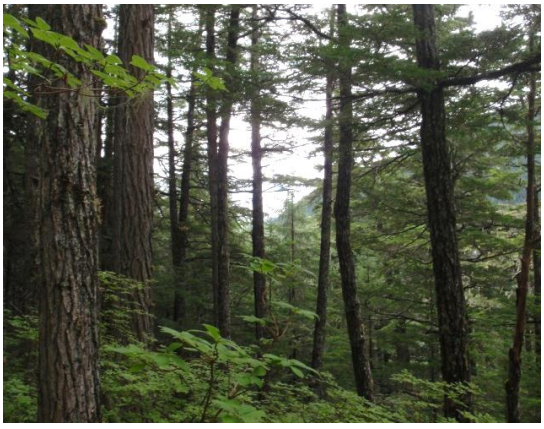
Number of Plots Sampled: 3 (9.01, 9.03, 52.01)
Rank: G4 S4
Other Studies: DeVelice et al. 1999, DeMeo et al. 1992, Martin et al. 1995
Distribution: medium to large patch; widespread occurrence
Slope: 3-35^{o}
Aspect: 230-330^{o}
Elevation: 134 - 287 m
Hydrology: mesic
Landform: mountain sideslopes, toeslopes, benches
Vegetation: A lowland to upland, low- to mid-elevation, closed forest where *Picea sitchensis* (28 - 31 m) and *Tsuga heterophylla* (17 - 24 m) are the codominant tree species and *Betula papyrifera* (12 - 20 m) is a constant yet minor associates. *Oplopanax horridus* (1.2 m) which typically occurs in productive forests where subsurface flow is continuous is the dominant shrub (Banner et al. 1993). The fern *Gymnocarpium dryopteris*, which also indicates productive forests, is consistently abundant. Additional ferns, *Dryopteris expansa* and *Athyrium filix-femina* are locally abundant. A typical suite of feather mosses including *Hylocomium splendens*, *Pleurozium schreberi* and members of the *Rhytidiadelphus* genus cover the ground.
Succession and Disturbance: late-seral; historic logging
Landcover Class: Sitka Spruce - Hemlock Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	5	-
Picea sitchensis	100	43	20-60
Populus balsamifera ssp. *trichocarpa*	33	10	-
Tsuga heterophylla	100	23	15-30
Tsuga mertensiana	33	5	-
Shrub			
Alnus viridis ssp. *sinuata*	67	3	1-5
Menziesia ferruginea	100	8	5-15
Oplopanax horridus	100	23	15-40
Ribes lacustre	67	3	1-4
Vaccinium ovalifolium	67	6	4-8
Viburnum edule	67	5	3-6
Forb			
Actaea rubra	33	1	-
Aruncus dioicus var. *acuminatus*	33	2	-
Athyrium filix-femina	33	10	-
Cornus canadensis	33	5	-
Dryopteris expansa	67	16	7-25
Equisetum arvense	33	5	-
Galium sp.	33	2	-
Geocaulon lividum	33	1	-
Gymnocarpium dryopteris	100	27	25-30
Heuchera glabra	33	1	-
Moneses uniflora	33	2	-
Polystichum setigerum	33	1	-
Rubus pedatus	100	6	3-10
Streptopus amplexifolius	100	2	1-3
Tiarella trifoliata	100	4	3-5
Trientalis europaea	33	1	-
Moss			
Dicranum scoparium	33	2	-
Heterocladium procurrens	33	1	-
Hylocomium splendens	100	22	5-35
Moss sp.	33	10	-
Plagiomnium sp.	33	3	-
Plagiomnium medium	33	5	-
Pleurozium schreberi	33	20	-
Polytrichum sp.	33	5	-
Ptilium crista-castrensis	33	5	-
Rhytidiadelphus loreus	100	28	20-40
Rhytidiadelphus triquetrus	67	23	5-40
Sphagnum sp.	33	5	-
Lichen			
Lichen sp.	33	2	-

Tsuga heterophylla - Tsuga mertensiana / Menziesia ferruginea

Number of Plots Sampled: 5 (9.02, 10.03, 10.04, 11.03, 12.04)
Rank: GNR SNR
Other Studies: DeVelice et al. 1999, Boggs et al. 2008a
Distribution: medium to medium-large patch; widespread occurrence
Slope: 5-36°
Aspect: 220-325°
Elevation: 230 - 540 m
Hydrology: mesic
Landform: mountain sideslopes, alluvial fans, ancient floodplain terraces
Vegetation: An upland, open to closed forest where *Tsuga heterophylla* (11 - 18 m) and *Tsuga mertensiana* (7 - 19 m) are the codominant tree species; *Picea sitchensis* (22 - 28 m) and *Betula papyrifera* (6 - 9 m) are associated species whose presence increases
on more stable or cliffy sites, respectively. This association is considered transitional between mid-elevation *Tsuga heterophylla*-dominated forests and subalpine *Tsuga mertensiana*-dominated forests. *Menziesia ferruginea* (0.5 - 1.4 m) is the dominant shrub, with *Vaccinium ovalifolium* (0.8 - 1.4 m) subdominant. Together, these shrubs are thought to indicate mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Hylocomium splendens*, *Rhytidiadelphus loreus*, *Pleurozium schreberi* and *Dicranum* species cover the ground. The forb layer is diverse yet poorly-developed. Graminoids are not represented.



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	60	6	5-8
Picea sitchensis	60	9	5-15
Salix scouleriana	20	5	-
Tsuga heterophylla	80	44	30-55
Tsuga mertensiana	100	26	12-60
Shrub			
Alnus viridis ssp. *sinuata*	20	10	-
Menziesia ferruginea	100	38	15-85
Oplopanax horridus	40	4	3-5
Ribes lacustre	20	2	-
Ribes laxiflorum	20	1	-
Sorbus sitchensis	20	3	-
Vaccinium ovalifolium	100	12	3-25
Viburnum edule	20	5	-
Forb			
Boschniakia rossica	20	1	-
Cornus canadensis	80	5	2-10
Dryopteris expansa	40	3	1-5
Gymnocarpium dryopteris	40	3	1-5
Moneses uniflora	80	2	1-2
Orthilia secunda	40	3	1-4
Platanthera obtusata	20	2	-
Rubus pedatus	80	3	1-5
Streptopus amplexifolius	40	1	-
Moss			
Dicranum fuscescens	20	2	-
Dicranum scoparium	40	6	2-10
Hylocomium splendens	100	44	20-60
Pleurozium schreberi	80	10	5-15
Ptilium crista-castrensis	20	2	-
Rhytidiadelphus loreus	60	22	10-32
Rhytidiadelphus triquetrus	40	9	3-14
Sphagnum sp.	20	5	-
Sphagnum girgensohnii	40	5	1-8
Lichen			
Peltigera sp.	20	2	-

Succession and Disturbance: late-seral; historic logging, avalanche, landside
Landcover Class: Sitka Spruce - Hemlock Closed,
Hemlock Closed

Tsuga heterophylla / Vaccinium ovalifolium

Number of Plots Sampled: 1 (30.02)
Rank: G5 S5
Other Studies: Fox 1983, DeMeo et al. 1992, Banner et al. 1993 Martin et al. 1995, Shephard 1995, DeVelice et al. 1999
Distribution: small to medium patch; widespread occurrence
Slope: 5°
Aspect: 30°
Elevation: 274 m
Hydrology: mesic
Landform: mountain sideslopes, benches
Vegetation: An upland, mid-elevation, closed forest where *Tsuga heterophylla* (20 m) is the dominant tree species. *Vaccinium ovalifolium* is the dominant shrub with *Menziesia ferruginea* subdominant. Together, these shrubs are thought to indicate mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Hylocomium splendens*, *Rhytidiadelphus loreus* and *Pleurozium schreberi* cover the ground; herbaceous species are poorly represented.
Succession and Disturbance: late-seral; blowdown
Landcover Class: Hemlock Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Tsuga heterophylla	100	70	-
Tsuga mertensiana	100	5	-
Shrub			
Menziesia ferruginea	100	20	-
Vaccinium ovalifolium	100	30	-
Forb			
Cornus canadensis	100	5	-
Rubus pedatus	100	3	-
Moss			
Dicranum sp.	100	3	-
Hylocomium splendens	100	50	-
Pleurozium schreberi	100	10	-
Rhytidiadelphus loreus	100	20	-
Sphagnum girgensohnii	100	3	-



Tsuga mertensiana - Abies lasiocarpa / Menziesia ferruginea

Number of Plots Sampled: 3 (14.05, 14.06, 14.07)
Rank: GNR S2S3
Other Studies: none
Distribution: small to medium patch; scattered occurrence
Slope: 11-18^{o}
Aspect: 147-290^{o}
Elevation: 397 - 460 m
Hydrology: mesic
Landform: mountain sideslopes, toeslopes, topographic highs on valley bottoms
Vegetation: An upland, mid-elevation to subalpine, closed forest where *Tsuga mertensiana* (10 - 14 m) and *Abies lasiocarpa* (12 - 16 m) are the codominant tree species, with the presence of *Picea sitchensis* (18 m) and *Tsuga heterophylla* (13 m) increasing at lower elevations. *Menziesia ferruginea* (1.2 m) is the dominant shrub; the trailing forb *Rubus pedatus* is constant at moderate cover. *Menziesia ferruginea* is thought to indicate mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Rhytidiadelphus loreus*, *Hylocomium splendens*, *Pleurozium schreberi* and *Dicranum scoparium* cover the ground.
Succession and Disturbance: late-seral; no significant disturbance
Landcover Class: Mountain Hemlock - Subalpine Fir Closed, Mountain Hemlock - Subalpine Fir Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	25	20-30
Betula papyrifera	67	3	-
Picea sitchensis	33	12	-
Tsuga heterophylla	33	10	-
Tsuga mertensiana	100	35	20-50
Shrub			
Alnus viridis ssp. *sinuata*	33	1	-
Menziesia ferruginea	100	24	12-30
Oplopanax horridus	100	2	1-5
Sorbus sitchensis	33	3	-
Vaccinium ovalifolium	100	9	8-10
Forb			
Cornus canadensis	100	4	1-7
Dryopteris expansa	100	6	2-10
Gymnocarpium dryopteris	33	5	-
Lycopodium annotinum	67	2	1-2
Rubus pedatus	100	10	3-25
Streptopus amplexifolius	67	2	-
Trientalis europaea	33	1	-
Moss			
Dicranum scoparium	100	12	5-20
Hylocomium splendens	100	17	10-25
Moss sp.	33	3	-
Pleurozium schreberi	100	13	10-15
Polytrichum sp.	33	5	-
Ptilium crista-castrensis	67	3	1-5
Rhytidiadelphus loreus	67	19	2-35
Sphagnum sp.	33	5	-
Lichen			
Lobaria sp.	67	2	-





Tsuga mertensiana - Abies lasiocarpa / Phyllodoce glanduliflora

Number of Plots Sampled: 6 (20.04, 20.07, 21.05, 21.07[25], 23.01, 23.04[25])
Rank: GNR SNR
Other Studies: Harris 1965, Worley and Jaques 1973
Distribution: medium to large patch; widespread occurrence
Slope: 5-42°
Aspect: 98-220°
Elevation: 884 - 1020 m
Hydrology: mesic
Landform: mountain sideslopes, benches, basins
Vegetation: An upland, subalpine, open to closed dwarf forest where *Abies lasiocarpa* (0.6 - 5 m) and *Tsuga mertensiana* (0.9 - 3 m) are the codominant tree species. The harsh conditions at timberline limit trees to dwarf stature and often krummholz form. Alpine indicator species such as *Phyllodoce glanduliflora* and *Harrimanella stelleriana* are constant and abundant; *Cassiope mertensiana* is locally abundant. A diversity of nonvascular species covers the ground surface that is not occupied by bedrock. The herbaceous layer is diverse yet poorly developed.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Dwarf Tree - Dwarf Shrub - Lichen - Rock, Mountain Hemlock - Subalpine Fir Closed, Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	39	20-50
Tsuga mertensiana	100	30	20-40
Shrub			
Cassiope mertensiana	50	13	5-20
Empetrum nigrum	75	6	3-10
Harrimanella stelleriana	100	10	3-15
Phyllodoce glanduliflora	100	19	15-20
Salix arctica	25	1	-
Vaccinium ovalifolium	75	2	1-3
Forb			
Artemisia arctica	50	2	1-2
Chamerion latifolium	25	1	-
Cornus canadensis	25	1	-
Geum calthifolium	25	1	-
Lupinus nootkatensis	25	1	-
Rubus pedatus	75	1	-
Graminoid			
Anthoxanthum monticola ssp. *Alpinum*	25	1	-
Calamagrostis canadensis	25	1	-
Carex macrochaeta	25	1	-
Moss			
Dicranum sp.	75	1	1-2
Moss sp.	50	3	-
Pleurozium schreberi	75	11	1-30
Polytrichum sp.	25	1	-
Racomitrium lanuginosum	25	2	-
Liverwort			
Lophozia sp.	25	10	-
Ptilidium sp.	25	1	-
Lichen			
Cladina rangiferina	75	2	1-2
Cladina stellaris	50	4	2-5
Cladonia sp.	50	2	1-2
Flavocetraria nivalis	25	1	-
Nephroma arcticum	50	3	1-5



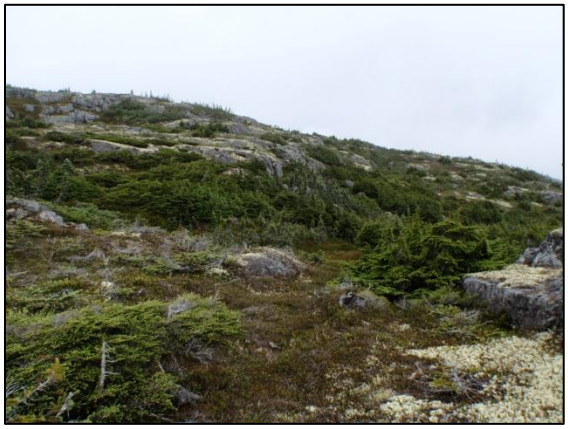


[25] Landcover plot only

Tsuga mertensiana / Harrimanella stelleriana

Number of Plots Sampled: 1 (20.02)
Rank: G5 S5
Other Studies: Boggs et al. 2008b
Distribution: medium patch; scattered occurrence
Slope: 25°
Aspect: 142°
Elevation: 1062 m
Hydrology: mesic
Landform: mountain sideslopes, benches, basins
Vegetation: An upland, subalpine, open to closed dwarf forest where *Tsuga mertensiana* (1.2 m) is the dominant tree species and *Abies lasiocarpa* (1 m) occurs as a minor associate. The harsh conditions at timberline limit trees to dwarf stature and often krummholz form. Alpine indicator species such as *Harrimanella stelleriana* and *Phyllodoce glanduliflora* commonly occur. *Pleurozium schreberi* and a diversity of lichen species, many representing the *Cladina* genus cover the ground not occupied by bedrock. Herbaceous species are not represented.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	1	-
Tsuga mertensiana	100	90	-
Shrub			
Empetrum nigrum	100	1	-
Harrimanella stelleriana	100	5	-
Luetkea pectinata	100	1	-
Phyllodoce glanduliflora	100	3	-
Vaccinium ovalifolium	100	1	-
Moss			
Dicranum sp.	100	3	-
Pleurozium schreberi	100	5	-
Lichen			
Cladonia sp.	100	1	-

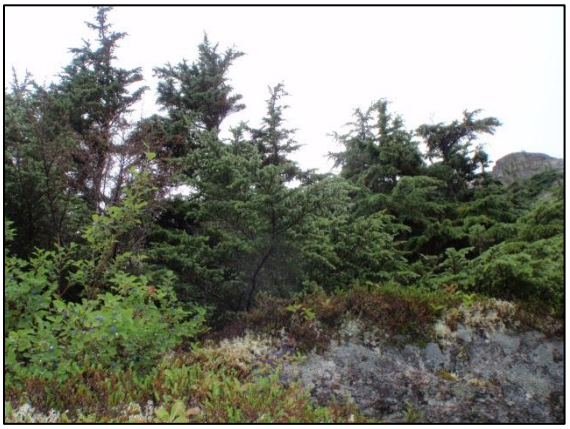


Tsuga mertensiana / Vaccinium ovalifolium

Number of Plots Sampled: 2 (10.01, 15.06)
Rank: G5 S5
Other Studies: Fox 1983, DeVelice et al. 1999, Boggs et al. 2008b
Distribution: very small to small patch; scattered occurrence
Slope: 2-6°
Aspect: 186-220°
Elevation: 664 - 709 m
Hydrology: mesic to mesic-wet
Landform: mountain sideslopes, benches
Vegetation: An upland, subalpine, open to closed, forest where *Tsuga mertensiana* (4 - 12 m) is the dominant tree species. *Abies lasiocarpa* (1.5 m) and *Picea sitchensis* (15 m) are minor associates at sites that approach or are further removed from the alpine, respectively. *Vaccinium ovalifolium* (0.4 m) is the dominant shrub and the trailing forb *Rubus pedatus* is constant at moderate abundance. *Vaccinium ovalifolium* occurs on moist, nitrogen-poor soils (Klinka et al. 1989). The fern *Gymnocarpium dryopteris* may also be present. The feather moss, *Pleurozium schreberi* occurs consistently and species of *Dicranum* may be locally abundant.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Hemlock Closed, Hemlock Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	50	10	-
Picea sitchensis	50	8	-
Tsuga mertensiana	100	49	22-75
Shrub			
Cassiope mertensiana	50	8	-
Harrimanella stelleriana	50	2	-
Luetkea pectinata	100	7	3-10
Menziesia ferruginea	100	3	1-5
Phyllodoce glanduliflora	100	5	1-8
Sorbus sitchensis	100	2	1-2
Vaccinium ovalifolium	100	28	10-45
Forb			
Dryopteris expansa	50	1	-
Gymnocarpium dryopteris	50	10	-
Listera cordata	50	5	-
Rubus pedatus	100	9	2-15
Veratrum viride	100	1	-
Graminoid			
Carex macrochaeta	50	1	-
Cinna latifolia	50	1	-
Moss			
Dicranum sp.	50	10	-
Dicranum fuscescens	50	25	-
Hylocomium splendens	50	15	-
Moss sp.	100	4	3-5
Pleurozium schreberi	100	10	-
Sphagnum girgensohnii	100	16	2-30
Lichen			
Cladina stellaris	50	2	-
Nephroma sp.	50	1	-
Peltigera sp.	50	1	-





Broadleaf Forest Plant Associations

Betula papyrifera / Alnus viridis ssp. *sinuata*

Number of Plots Sampled: 1 (14.09)
Rank: GNR SNR
Other Studies: Buckley and Libby 1957, Lutz 1956, Viereck 1975, DeVelice et al. 1999
Distribution: small patch; scattered occurrence
Slope: 9°
Aspect: 250°
Elevation: 342 m
Hydrology: mesic
Landform: mountain toeslopes
Vegetation: An upland, low-elevation, open forest where *Betula papyrifera* (12 m) is the dominant tree species and *Salix scouleriana* (12 m) is a minor associate. *Alnus viridis* ssp. *sinuata* (4 m) is the dominant tall shrub, with *Rubus idaeus* and *Sambucus racemosa* abundant in the lower shrub strata. The ferns *Gymnocarpium dryopteris* and *Athyrium filix-femina,* which indicate moist, nitrogen-rich soil dominate the herbaceous layer (Klinka et al. 1989). Litter is common; graminoid and nonvascular cover is sparse. This type has been described for the Chugach National Forest where it often includes *Viburnum edule* in the shrub stratum and abundant *Calamagrostis canadensis* in the understory (DeVelice et al. 1999).
Succession and Disturbance: mid-seral; rockfall
Landcover Class: Paper Birch Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	30	-
Salix scouleriana	100	10	-
Shrub			
Alnus viridis ssp. *sinuata*	100	20	-
Oplopanax horridus	100	3	-
Ribes laxiflorum	100	5	-
Rubus idaeus	100	30	-
Sambucus racemosa	100	10	-
Forb			
Athyrium filix-femina	100	10	-
Dryopteris expansa	100	5	-
Gymnocarpium dryopteris	100	20	-
Streptopus amplexifolius	100	5	-
Graminoid			
Calamagrostis canadensis	100	2	-
Moss			
Moss sp.	100	5	-





Betula papyrifera / Menziesia ferruginea

Number of Plots Sampled: 1 (12.01)
Rank: GNR SNR
Other Studies: DeVelice et al. 1999
Distribution: medium-large patch; scattered occurrence
Slope: 11°
Aspect: 230°
Elevation: 385 m
Hydrology: mesic
Landform: mountain sideslopes, benches
Vegetation: An upland, low-elevation, open forest where *Betula papyrifera* (13 m) is the dominant tree species and *Salix scouleriana* (8 m) occurs as a minor associate. The vigorous shrub layer is dominated by *Menziesia ferruginea* (1.4 m) with *Vaccinium ovalifolium* (1.2 m) as the subdominant species. Together, these shrubs are thought to indicate mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). With the exception of the feather moss, *Hylocomium splendens*, herbaceous and nonvascular cover is sparse. Litter covers much of the ground surface. This type has been described for the Chugach National Forest where it often includes *Sambucus racemosa* in the shrub stratum and *Cornus canadensis* and *Calamagrostis canadensis* in the understory (DeVelice et al. 1999).
Succession and Disturbance: mid-seral; rockfall
Landcover Class: Paper Birch Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	40	-
Picea sitchensis	100	2	-
Salix scouleriana	100	13	-
Tsuga heterophylla	100	5	-
Shrub			
Menziesia ferruginea	100	60	-
Oplopanax horridus	100	5	-
Sorbus sitchensis	100	1	-
Vaccinium ovalifolium	100	30	-
Viburnum edule	100	3	-
Forb			
Athyrium filix-femina	100	1	-
Chamerion angustifolium	100	1	-
Dryopteris expansa	100	3	-
Lycopodium annotinum	100	2	-
Rubus pedatus	100	1	-
Moss			
Dicranum sp.	100	3	-
Hylocomium splendens	100	10	-
Moss sp.	100	1	-
Pleurozium schreberi	100	3	-
Rhytidiadelphus loreus	100	3	-





Populus balsamifera ssp. *trichocarpa* / *Alnus viridis* ssp. *sinuata*

Number of Plots Sampled: 5 (4.07, 5.05, 8.02, 8.06, 30.05)
Rank: G5 S5
Other Studies: DeVelice et al. 1999, Boggs 2000, Boggs et al. 2008b
Distribution: medium to medium-large patch; widespread occurrence
Slope: 0-5°
Aspect: 90°
Elevation: 22 - 245 m
Hydrology: mesic to wet
Landform: active floodplains
Vegetation: A low-elevation, riparian woodland to open forest. *Populus balsamifera* ssp. *trichocarpa* (12 - 39 m) is the dominant tree species and *Picea sitchensis* (1.8 - 15 m) is a fairly constant, yet minor associate. *Alnus viridis* ssp. *sinuata* (6.5 m) is the dominant tall shrub; *Viburnum edule* (1.4 m) fairly constant at moderate cover in the lower shrub strata. *Oplopanax horridus* is thought to occur within the more mature sites of this type, whereas *Salix* species are more common in immature sites (DeVelice et al. 1999). Moist site herbs such as *Pyrola asarifolia, Aruncus dioicus* var. *acuminatus, Galium triflorum, Calamagrostis canadensis* and *Elymus glaucus* ssp. *glaucus* are constant at low cover. Litter covers much of the ground surface.
Succession and Disturbance: early-seral; river flooding
Landcover Class: Black Cottonwood Open, Black Cottonwood Woodland



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	20	1	-
Picea sitchensis	60	7	1-15
Populus balsamifera ssp. *trichocarpa*	100	30	20-40
Tsuga heterophylla	20	3	-
Shrub			
Alnus viridis ssp. *sinuata*	100	49	30-80
Cornus sericea ssp. *sericea*	40	8	5-10
Oplopanax horridus	20	10	-
Ribes lacustre	40	1	-
Rubus idaeus	20	1	-
Salix alaxensis	20	5	-
Salix sitchensis	20	5	-
Vaccinium ovalifolium	20	1	-
Viburnum edule	80	15	4-25
Forb			
Artemisia tilesii	20	2	-
Aruncus dioicus var. *acuminatus*	80	4	1-10
Boschniakia rossica	40	1	-
Chamerion angustifolium	20	10	-
Cornus canadensis	20	1	-
Dryopteris expansa	40	2	1-2
Equisetum arvense	20	10	-
Equisetum pratense	40	2	1-2
Galium triflorum	80	2	1-3
Gymnocarpium dryopteris	20	60	-
Heracleum maximum	20	1	-
Heuchera glabra	20	1	-
Orthilia secunda	40	1	-
Osmorhiza purpurea	40	1	-
Pyrola asarifolia	100	8	1-25
Streptopus amplexifolius	60	1	1-2
Trientalis europaea	60	1	-
Graminoid			
Calamagrostis canadensis	100	5	1-10
Carex macrochaeta	20	2	-
Cinna latifolia	40	2	1-3
Elymus glaucus ssp. *glaucus*	80	2	1-5
Poa leptocoma	20	2	-
Poa pratensis ssp. *irrigata*	20	2	-
Poa pratensis ssp. *pratensis*	20	3	-
Moss			
Brachythecium salebrosum	20	7	-
Hylocomium splendens	20	5	-
Moss sp.	60	3	1-5
Plagiomnium sp.	60	2	1-5
Rhytidiadelphus loreus	40	8	5-10
Rhytidiadelphus triquetrus	40	2	1-2

Populus balsamifera ssp. *trichocarpa* - *Betula papyrifera* / *Cornus sericea* ssp. *sericea*

Number of Plots Sampled: 2 (3.05[26], 3.08)
Rank: GNR SNR
Other Studies: none
Distribution: medium patch; scattered occurrence
Slope: 0°
Aspect: NA
Elevation: 38 - 42 m
Hydrology: mesic
Landform: valley bottoms
Vegetation: A lowland, often riparian, closed forest. *Betula papyrifera* (20 m) and *Populus balsamifera* ssp. *trichocarpa* (29.5 m) are the dominant tree species with *Salix scouleriana* (20 m), *Alnus rubra* (13 m) and *Picea sitchensis* (15 - 27 m) occurring as minor associates. *Cornus sericea* ssp. *sericea* (2.8 m), which indicates very moist to wet, nitrogen-rich soils, and friable forest floors (Klinka et al. 1989), is the dominant low shrub. The fern *Gymnocarpium dryopteris*, which indicates productive forests, is constant at high cover. Litter covers much of the ground surface.
Succession and Disturbance: early to- mid-seral; human
Landcover Class: Black Cottonwood - Paper Birch Closed, Black Cottonwood - Paper Birch - Sitka Spruce Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Alnus rubra	100	12	-
Betula papyrifera	100	25	-
Picea sitchensis	100	10	-
Populus balsamifera ssp. *trichocarpa*	100	20	-
Salix scouleriana	100	18	-
Shrub			
Cornus sericea ssp. *sericea*	100	20	-
Oplopanax horridus	100	2	-
Ribes lacustre	100	2	-
Ribes triste	100	1	-
Viburnum edule	100	7	-
Forb			
Actaea rubra	100	5	-
Athyrium filix-femina	100	2	-
Dryopteris expansa	100	1	-
Equisetum arvense	100	3	-
Equisetum pratense	100	1	-
Gymnocarpium dryopteris	100	35	-
Streptopus amplexifolius	100	2	-
Moss			
Plagiomnium sp.	100	1	-





[26] Landcover plot only

Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* ssp. *sericea*

Number of Plots Sampled: 2 (3.07, 4.09)
Rank: GNR SNR
Other Studies: none
Distribution: medium to medium-large patch; widespread occurrence
Slope: 0°
Aspect: NA
Elevation: 18 - 26 m
Hydrology: mesic
Landform: valley bottoms, floodplains
Vegetation: A low-elevation, riparian, open forest where *Populus balsamifera* ssp. *trichocarpa* (30 m) is the dominant tree species and *Picea sitchensis* (8 - 32 m) occurs as a minor associate. Annual flooding and a prolonged elevated water table are thought to inhibit conifer establishment (Banner et al. 1993). A vigorous shrub layer is codominated by *Cornus sericea* ssp. *sericea* (2.5 m), which indicates very moist to wet, nitrogen-rich soils, and friable forest floors (Klinka et al. 1989). *Viburnum edule* (1.5 - 2 m) and members of the *Alnus* genus (5 - 10 m) are also constant at high cover. The fern *Gymnocarpium dryopteris*, which indicates productive forests, is constant at high cover, while moist site forbs such as *Streptopus amplexifolius* and *Trientalis europaea* are constant at low cover. Nonvascular cover is sparse or lacking. Litter covers much of the ground surface.
Succession and Disturbance: early- to mid-seral; river flooding
Landcover Class: Black Cottonwood Closed

Scientific Name	Constancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	50	5	-
Picea sitchensis	100	7	3-10
Populus balsamifera ssp. *trichocarpa*	100	63	55-70
Shrub			
Alnus incana ssp. *tenuifolia*	50	15	-
Alnus viridis ssp. *sinuata*	50	10	-
Cornus sericea ssp. *sericea*	100	24	18-30
Oplopanax horridus	50	2	-
Ribes lacustre	100	2	1-2
Ribes triste	50	2	-
Viburnum edule	100	31	12-50
Forb			
Actaea rubra	50	2	-
Aruncus dioicus var. *acuminatus*	50	5	-
Athyrium filix-femina	50	20	-
Circaea alpina	50	2	-
Dryopteris expansa	50	2	-
Equisetum arvense	50	3	-
Equisetum pratense	50	2	-
Galium triflorum	50	1	-
Gymnocarpium dryopteris	100	21	2-40
Pyrola asarifolia	50	2	-
Streptopus amplexifolius	100	2	1-2
Trientalis europaea	100	1	-
Graminoid			
Calamagrostis canadensis	50	1	-
Moss			
Hylocomium splendens	50	1	-
Moss sp.	50	1	-
Rhytidiadelphus triquetrus	50	1	-





Populus balsamifera ssp. *trichocarpa* / *Oplopanax horridus*

Number of Plots Sampled: 4 (4.06, 11.02, 11.06, 14.04)
Rank: G5 S5
Other Studies: Shephard 1995, DeVelice et al. 1999
Distribution: small to medium patch; widespread occurrence
Slope: 0-6°
Aspect: 210°
Elevation: 19 - 488 m
Hydrology: mesic to wet
Landform: valley bottoms, floodplains, ancient floodplain terraces
Vegetation: A low-elevation, riparian, open forest where *Populus balsamifera* ssp. *trichocarpa* (1.6 - 27 m) is the dominant tree species. Dominance is shared in the vigorous shrub layer by members of the *Alnus* genus (3.5 - 13 m) and *Oplopanax horridus* (1.2 m), which typically occurs in productive forests where subsurface flow is continuous (Banner et al. 1993). The ferns *Gymnocarpium dryopteris* and *Athyrium filix-femina*, which are indicators of moist, nitrogen-rich soils, are constant at moderate cover (Klinka et al. 1989). Nonvascular cover is sparse, with litter covering much of the ground surface.
Succession and Disturbance: early- to mid-seral; river flooding
Landcover Class: Black Cottonwood Closed, Black Cottonwood Open





Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Picea sitchensis	50	3	1-5
Populus balsamifera ssp. *trichocarpa*	100	49	40-65
Tsuga heterophylla	25	1	-
Shrub			
Alnus incana ssp. *tenuifolia*	25	15	-
Alnus viridis ssp. *sinuata*	75	55	45-60
Cornus sericea ssp. *sericea*	25	5	-
Menziesia ferruginea	25	2	-
Oplopanax horridus	100	33	15-60
Ribes laxiflorum	50	1	-
Salix commutata	25	5	-
Salix sitchensis	25	10	-
Sambucus racemosa	50	4	2-5
Vaccinium ovalifolium	25	1	-
Viburnum edule	50	8	5-10
Forb			
Aconitum delphiniifolium	25	1	-
Aruncus dioicus var. *acuminatus*	50	5	-
Athyrium filix-femina	100	10	2-20
Chamerion angustifolium	25	2	-
Circaea alpina	25	1	-
Dryopteris expansa	75	5	-
Equisetum arvense	50	2	-
Galium triflorum	50	2	1-2
Gymnocarpium dryopteris	100	16	2-40
Heracleum maximum	25	2	-
Moneses uniflora	25	1	-
Orthilia secunda	50	2	1-2
Prenanthes alata	25	1	-
Pyrola asarifolia	50	1	-
Pyrola asarifolia ssp. *asarifolia*	25	4	-
Streptopus amplexifolius	100	2	1-3
Veratrum viride	25	2	-
Graminoid			
Calamagrostis canadensis	25	1	-
Carex macrochaeta	25	5	-
Moss			
Moss sp.	50	4	2-5

Mixed Needleleaf/Broadleaf Forest Plant Associations

Betula papyrifera - Picea sitchensis / Hylocomium splendens

Number of Plots Sampled: 3 (3.01, 4.02, 32.01)
Rank: GNR SNR
Other Studies: none
Distribution: medium to large patch; scattered occurrence
Slope: 30-34°
Aspect: 136-198°
Elevation: 38 - 171 m
Hydrology: mesic
Landform: mountain sideslopes (broken)
Vegetation: An upland, mid-elevation, open to closed forest. *Betula papyrifera* (13 - 18 m) and *Picea sitchensis* (12 - 26 m) are the codominant tree species, with *Tsuga heterophylla* (11 - 22 m) or *T. mertensiana* (16 m) abundant on sites that are removed from or approach the subalpine, respectively. Shrub and forb layers are poorly developed; graminoids are absent. Atypical suite of feather mosses including *Hylocomium splendens* and members of the *Rhytidiadelphus* genus cover the ground.
Succession and Disturbance: mid-seral; historic logging
Landcover Class: Sitka Spruce - Paper Birch Open, Hemlock - Paper Birch - Sitka Spruce Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Acer glabrum var. *douglasii*	33	2	-
Betula papyrifera	100	32	25-35
Picea sitchensis	100	22	20-25
Pinus contorta var. *latifolia*	67	3	1-4
Populus balsamifera ssp. *trichocarpa*	33	3	-
Salix scouleriana	67	2	1-2
Tsuga heterophylla	67	19	8-30
Tsuga mertensiana	33	30	-
Shrub			
Alnus viridis ssp. *sinuata*	100	4	1-6
Cornus sericea ssp. *sericea*	33	3	-
Menziesia ferruginea	33	1	-
Viburnum edule	67	1	-
Forb			
Cornus canadensis	33	1	-
Gymnocarpium dryopteris	33	1	-
Orthilia secunda	33	1	-
Polypodium glycyrrhiza	67	1	-
Moss			
Dicranum sp.	33	1	-
Dicranum scoparium	33	5	-
Hylocomium splendens	100	40	35-45
Moss sp.	67	5	3-6
Pleurozium schreberi	33	5	-
Polytrichum sp.	67	6	1-10
Rhytidiadelphus loreus	67	12	3-20
Rhytidiadelphus triquetrus	67	28	20-35
Lichen			
Cladina rangiferina	33	1	-
Cladina stellaris	33	1	-
Lichen sp.	33	2	-
Lobaria linita	33	1	-
Nephroma arcticum	33	1	-
Peltigera sp.	33	2	-
Stereocaulon paschale	33	1	-

Betula papyrifera - Tsuga heterophylla - Tsuga mertensiana / Menziesia ferruginea

Number of Plots Sampled: 3 (3.02, 13.03, 13.04)
Rank: GNR SNR
Other Studies: DeVelice et al. 1999
Distribution: medium to medium-large patch; scattered occurrence
Slope: 5-20°
Aspect: 78-247°
Elevation: 118 - 446 m
Hydrology: mesic
Landform: mountain sideslopes (broken)
Vegetation: An upland, mid-elevation, open to closed forest. *Betula papyrifera* (12.5 m) *Tsuga heterophylla* (13.5 m) and *T. mertensiana* (12 - 20 m) are the codominant tree species, with *Picea sitchensis* (13 - 20 m) occurring as a minor associate. This association is considered transitional between mid-elevation *Tsuga heterophylla*-dominated forests and subalpine *Tsuga mertensiana*-dominated forests. *Menziesia ferruginea* (1.25 m) is the dominant shrub, with *Alnus viridis* ssp. *sinuata* (1.5 - 3 m) subdominant. *Menziesia ferruginea* indicates mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). A typical suite of feather mosses including *Hylocomium splendens* and *Rhytidiadelphus loreus* cover the ground. The forb layer is diverse yet poorly developed; graminoids are not represented.
Succession and Disturbance: mid- to late-seral; rockfall, avalanche
Landcover Class: Hemlock - Paper Birch Closed, Hemlock - Paper Birch Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	37	30-50
Picea sitchensis	100	8	1-18
Tsuga heterophylla	100	21	10-32
Tsuga mertensiana	100	15	5-30
Shrub			
Alnus viridis ssp. *sinuata*	100	10	5-15
Menziesia ferruginea	100	30	10-70
Oplopanax horridus	100	2	1-4
Rubus spectabilis	33	5	-
Sambucus racemosa	33	1	-
Sorbus sitchensis	33	10	-
Vaccinium ovalifolium	33	1	-
Viburnum edule	33	2	-
Forb			
Athyrium filix-femina	33	1	-
Dryopteris expansa	67	3	2-3
Gymnocarpium dryopteris	67	4	3-4
Lycopodium annotinum	33	1	-
Orthilia secunda	33	1	-
Rubus pedatus	33	1	-
Moss			
Hylocomium splendens	67	33	5-60
Moss sp.	100	4	2-5
Pleurozium schreberi	33	3	-
Ptilium crista-castrensis	33	3	-
Rhytidiadelphus loreus	67	12	3-20



Picea sitchensis - Populus balsamifera ssp. *trichocarpa / Alnus viridis* ssp. *sinuata*

Number of Plots Sampled: 3 (7.04, 8.04, 8.05)
Rank: G5 S5
Other Studies: Shephard 1995, DeVelice et al. 1999
Distribution: medium to medium-large patch; local occurrence
Slope: 0-2°
Aspect: 126°
Elevation: 75 - 104 m
Hydrology: dry to mesic
Landform: active and inactive floodplains
Vegetation: An upland, low-elevation, open forest. *Populus balsamifera* ssp. *trichocarpa* (11 - 15 m) and *Picea sitchensis* (9 - 16 m) are the dominant tree species; however this seral type appears to be indicated by a constant, yet low cover of *Abies lasiocarpa* saplings and young trees (1.2 - 10 m). The patchy shrub layer is dominated by *Alnus viridis* ssp. *sinuata* (3 - 6 m) with *Viburnum edule* (1.8 m) constant at low cover. A diversity of herbs occurs at low cover; only *Chamerion angustifolium* and *Orthilia secunda* are constant among the sites. The nonvascular layer is comparably diverse with the mosses *Hylocomium splendens* and *Rhytidiadelphus triquetrous* and fruticose lichen species represented by the *Cladina* genus constant at moderate to low cover.
Succession and Disturbance: mid-seral; river flooding, historic logging
Landcover Class: Sitka Spruce - Black Cottonwood Open



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	100	2	1-2
Betula papyrifera	33	1	-
Picea sitchensis	100	19	7-30
Populus balsamifera ssp. *trichocarpa*	100	20	15-25
Tsuga heterophylla	67	2	1-3
Shrub			
Alnus viridis ssp. *sinuata*	100	17	15-20
Empetrum nigrum	33	1	-
Ribes lacustre	33	1	-
Vaccinium ovalifolium	33	1	-
Viburnum edule	100	3	1-5
Forb			
Boschniakia rossica	67	1	-
Chamerion angustifolium	100	2	1-3
Dryopteris expansa	67	1	-
Galium triflorum	33	1	-
Geocaulon lividum	67	5	3-7
Lycopodium annotinum	67	2	1-2
Lycopodium complanatum	67	2	1-3
Orthilia secunda	100	1	-
Polypodium glycyrrhiza	67	1	-
Pyrola asarifolia	67	4	3-5
Graminoid			
Calamagrostis canadensis	67	4	1-7
Elymus glaucus ssp. *glaucus*	67	2	1-2
Festuca rubra	33	1	-
Phleum alpinum	33	1	-
Poa leptocoma	67	2	1-3
Poa pratensis ssp. *pratensis*	33	4	-
Trisetum spicatum	33	3	-
Moss			
Dicranum sp.	67	2	1-3
Hylocomium splendens	100	13	10-20
Moss sp.	67	4	3-5
Pleurozium schreberi	67	13	5-20
Polytrichum sp.	33	1	-
Polytrichum juniperinum	33	7	-
Ptilium crista-castrensis	67	4	2-5
Rhytidiadelphus loreus	33	5	-
Rhytidiadelphus triquetrus	100	6	3-10
Liverwort			
Ptilidium sp.	33	1	-
Lichen			
Cladina mitis	67	2	1-3
Cladina rangiferina	67	6	1-10
Cladina stellaris	33	10	-
Cladonia sp.	67	3	1-5
Lichen sp.	33	3	-
Peltigera sp.	67	1	-
Peltigera leucophlebia	33	5	-
Stereocaulon paschale	33	2	-

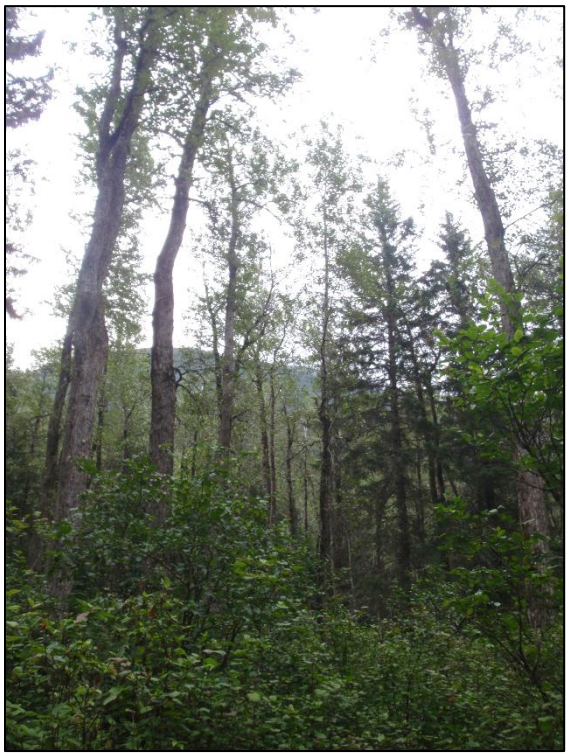
Picea sitchensis - Populus balsamifera ssp. *trichocarpa* / *Cornus sericea* ssp. *sericea*

Number of Plots Sampled: 9 (3.04, 4.01, 4.05, 5.02, 5.03[27], 5.06[27], 6.02, 6.03, 7.01)
Rank: GNR SNR
Other Studies: Banner et al. 1993, MacKenzie and Moran 2004
Distribution: small-medium to large patch; widespread occurrence
Slope: 0-6°
Aspect: 27-290°
Elevation: 13 - 66 m
Hydrology: mesic to wet
Landform: valley bottoms, active and inactive floodplains
Vegetation: An upland, low-elevation, open to closed forest where *Populus balsamifera* ssp. *trichocarpa* (17 - 32 m) and *Picea sitchensis* (9 - 29 m) are the codominant tree species. The vigorous shrub layer is codominated by *Cornus sericea* ssp. *sericea* (2 - 4 m), *Viburnum edule* (1.3 - 2.5 m) and *Alnus viridis* ssp. *sinuata* (4 - 8 m). *Cornus sericea* ssp. *sericea* is thought to indicate very moist to wet, nitrogen-rich soils, and friable forest floors (Klinka et al. 1989). The herbaceous layer can be sparse or developed depending on recent flooding history (MacKenzie and Moran 2004). A diversity of herbs occurs at low cover with *Streptopus amplexifolius* the only species constant among sites. The fern *Gymnocarpium dryopteris*, which indicates productive forests, is fairly constant at moderate cover. Nonvascular cover is sparse. Litter covers much of the ground surface.
Succession and Disturbance: mid-seral; river flooding, historic logging
Landcover Class: Sitka Spruce - Black Cottonwood Closed, Sitka Spruce - Black Cottonwood Open, Sitka Spruce - Black Cottonwood - Western Hemlock Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	14	1	-
Alnus rubra	14	10	-
Betula papyrifera	29	8	5-10
Picea sitchensis	100	22	12-40
Populus balsamifera ssp. *trichocarpa*	100	36	20-60
Tsuga heterophylla	57	8	2-20
Shrub			
Alnus viridis ssp. *crispa*	14	2	-
Alnus viridis ssp. *sinuata*	86	15	5-30
Cornus sericea ssp. *sericea*	100	21	15-30
Oplopanax horridus	43	7	2-10
Ribes lacustre	57	4	1-10
Ribes laxiflorum	29	2	1-2
Ribes triste	29	8	1-15
Salix alaxensis	14	1	-
Sambucus racemosa	14	1	-
Viburnum edule	86	21	3-40
Pyrola asarifolia	57	6	1-12
Streptopus amplexifolius	100	2	1-3
Trientalis europaea	43	3	1-5
Viola epipsila ssp. *repens*	14	3	-
Viola renifolia	14	1	-
Graminoid			
Calamagrostis canadensis	57	2	1-5
Moss			
Brachythecium nelsonii	14	2	-
Hylocomium splendens	43	2	1-3
Moss sp.	29	6	5-6
Plagiomnium sp.	29	3	1-5
Plagiomnium medium	14	5	-
Pleurozium schreberi	14	2	-
Rhytidiadelphus loreus	57	6	2-15
Rhytidiadelphus triquetrus	29	11	1-20
Lichen			
Lichen sp.	14	2	-

[27] Landcover plot only

Picea sitchensis - Populus balsamifera* ssp. *trichocarpa* / *Cornus sericea* ssp. *sericea (continued).







Picea sitchensis - Populus balsamifera ssp. *trichocarpa / Oplopanax horridus*

Number of Plots Sampled: 3 (6.06, 11.05, 30.07[28])
Rank: G4 S4
Other Studies: Shephard 1995
Distribution: small to large patch; widespread occurrence
Slope: 0°
Aspect: NA
Elevation: 92 - 303 m
Hydrology: mesic to wet
Landform: inactive floodplains; mountain toeslopes
Vegetation: An upland to riparian, low-elevation, open to closed forest where *Populus balsamifera* ssp. *trichocarpa* (27 - 33 m) and *Picea sitchensis* (18 - 28 m) are the codominant tree species. *Oplopanax horridus* (1.4 m) dominates the shrub layer with *Viburnum edule* (1.6 m) constant at low cover. *Oplopanax horridus* typically occurs in productive forests where subsurface flow is continuous (Banner et al. 1993). The fern *Gymnocarpium dryopteris*, which also indicates productive forests, is constant at high cover (Klinka et al. 1989). Other moist site forbs such as *Aruncus dioicus* var. *acuminatus, Pyrola asarifolia* and *Streptopus amplexifolius* and the fern *Athyrium filix-femina* are constant at low cover. Graminoids are absent and nonvascular cover is sparse. Litter covers much of the ground surface.
Succession and Disturbance: mid-seral; river flooding, historic logging
Landcover Class: Sitka Spruce - Black

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Picea sitchensis	100	22	15-30
Populus balsamifera ssp. *trichocarpa*	100	43	40-50
Tsuga heterophylla	33	5	-
Shrub			
Alnus viridis ssp. *sinuata*	67	13	5-20
Cornus sericea ssp. *sericea*	33	25	-
Oplopanax horridus	100	45	35-60
Ribes lacustre	33	2	-
Sorbus sitchensis	33	1	-
Vaccinium ovalifolium	33	1	-
Viburnum edule	100	8	5-10
Forb			
Actaea rubra	33	2	-
Aruncus dioicus var. *acuminatus*	100	5	1-10
Athyrium filix-femina	100	2	2-3
Circaea alpina	33	1	-
Dryopteris expansa	67	6	1-10
Equisetum arvense	67	5	-
Galium triflorum	67	1	-
Gymnocarpium dryopteris	100	27	10-50
Heracleum maximum	33	2	-
Orthilia secunda	33	1	-
Pyrola asarifolia	100	2	1-2
Streptopus amplexifolius	100	2	-
Trientalis europaea	33	1	-
Moss			
Hylocomium splendens	33	18	-
Moss sp.	33	3	-
Plagiomnium	33	3	-
Rhytidiadelphus loreus	67	7	1-12
Lichen			
Lobaria sp.	33	2	-



Cottonwood Closed, Sitka Spruce - Black Cottonwood Open



[28] Plant association plot only

Tsuga heterophylla - Betula papyrifera - Picea sitchensis / Menziesia ferruginea

Number of Plots Sampled: 2 (30.09, 51.01)
Rank: GNR SNR
Other Studies: none
Distribution: medium patch; scattered occurrence
Slope: 0-5°
Aspect: 175°
Elevation: 278 m
Hydrology: mesic
Landform: valley bottoms, ancient floodplain terraces, mountain sideslopes, benches
Vegetation: An upland, low to mid-elevation, closed forest where *Tsuga heterophylla* (12 - 25 m) *Betula papyrifera* (13 - 25 m) and *Picea sitchensis* (14 - 33 m) are the codominant tree species. This association is considered transitional between mid-elevation *Tsuga heterophylla*-dominated forests and subalpine *Tsuga mertensiana*-dominated forests. *Menziesia ferruginea* (1.4 m) is the dominant shrub, with *Oplopanax horridus* (0.9 m) and *Vaccinium ovalifolium* (0.5 - 1.2 m) constant at low cover. *Menziesia ferruginea* indicates mesic, nitrogen-poor soils on water-shedding sites (Klinka et al. 1989). The fern *Gymnocarpium dryopteris*, which indicates productive forests, dominates the herbaceous layer; *Cornus canadensis* and *Rubus pedatus* are constant at low cover. Graminoids are absent. A typical suite of feather mosses including *Hylocomium splendens* and *Rhytidiadelphus loreus* cover much of the ground, however litter is also prevalent.
Succession and Disturbance: mid-seral; historic logging
Landcover Class: Hemlock - Paper Birch - Sitka Spruce Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	25	-
Picea sitchensis	100	20	-
Salix scouleriana	50	3	-
Tsuga heterophylla	100	33	30-35
Shrub			
Alnus viridis ssp. *sinuata*	50	2	-
Menziesia ferruginea	100	18	10-25
Oplopanax horridus	100	4	2-5
Vaccinium ovalifolium	100	4	2-5
Viburnum edule	50	1	-
Forb			
Athyrium filix-femina	50	10	-
Cornus canadensis	100	4	3-5
Dryopteris expansa	50	5	-
Equisetum arvense	50	3	3-3
Gymnocarpium dryopteris	100	30	-
Lycopodium annotinum	50	1	-
Rubus pedatus	100	6	2-10
Streptopus amplexifolius	50	1	-
Tiarella trifoliata	50	1	-
Moss			
Dicranum fuscescens	50	3	-
Hylocomium splendens	100	10	5-15
Moss sp.	50	5	-
Plagiomnium sp.	50	5	-
Pleurozium schreberi	50	3	-
Rhizomnium glabrescens	50	1	-
Rhytidiadelphus loreus	100	10	5-15
Rhytidiadelphus triquetrus	50	5	-
Sphagnum girgensohnii	50	2	-



Tall and Low Shrub Plant Associations

Alnus viridis ssp. *sinuata*

Number of Plots Sampled: 1 (30.06)
Rank: G5 S5
Other Studies: Cooper 1942, Palmer 1942, Young and Racine 1978, Batten et al. 1978, Boggs et al. 2008b
Distribution: medium patch; scattered occurrence
Slope: 0°
Aspect: NA
Elevation: 266 m
Hydrology: mesic
Landform: valley bottoms, floodplains, mountain sideslopes (broken), alluvial fans, avalanche chutes
Vegetation: An upland to riparian, low- to mid-elevation, closed shrubland. *Alnus viridis* ssp. *sinuata* (3.5 m), which is a common component of well-drained but periodically disturbed sites, is the dominant shrub (MacKenzie and Moran 2004). Regular disturbance and/or cold prevent mature trees from establishing and affect understory development (Batten et al. 1978). In this instance, the forb and graminoid strata are diverse but poorly developed. Moss cover is sparse and lichens are not represented.
Succession and Disturbance: early- to late-seral; river flooding, avalanche, mass-wasting of rock and soil
Landcover Class: Sitka Spruce - Black Cottonwood Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Picea sitchensis	100	3	-
Populus balsamifera ssp. *trichocarpa*	100	5	-
Shrub			
Alnus viridis ssp. *sinuata*	100	90	-
Ribes lacustre	100	1	-
Salix sitchensis	100	5	-
Forb			
Aruncus dioicus var. *acuminatus*	100	1	-
Athyrium filix-femina	100	1	-
Chamerion latifolium	100	1	-
Galium triflorum	100	1	-
Gymnocarpium dryopteris	100	3	-
Heracleum maximum	100	1	-
Orthilia secunda	100	3	-
Streptopus amplexifolius	100	1	-
Graminoid			
Calamagrostis canadensis	100	2	-
Carex macrochaeta	100	1	-
Cinna latifolia	100	1	-
Brachythecium nelsonii	100	10	-
Moss			
Moss sp.	100	5	-
Polytrichum	100	1	-



Alnus viridis ssp. *sinuata / Dryopteris expansa*

Number of Plots Sampled: 5 (8.03, 11.01, 13.05, 16.06, 23.02)
Rank: G5 S5
Other Studies: DeVelice et al. 1999, Boucher et al. 2012
Distribution: small to medium patch; widespread occurrence
Slope: 1-36°
Aspect: 86-290°
Elevation: 111-891m
Hydrology: mesic
Landform: valley bottoms, floodplains, mountain sideslopes (broken), alluvial fans, avalanche chutes
Vegetation: An upland to riparian, low- to mid-elevation, closed shrubland. *Alnus viridis* ssp. *sinuata* (1.6 - 5 m), which is a common component of well-drained but periodically disturbed sites, is the dominant shrub (MacKenzie and Moran 2004). Regular disturbance and/or cold prevent mature trees from establishing and affect understory development (Batten et al. 1978), the fern *Dryopteris expansa*, which is an indicator of moist, nitrogen-rich soil, dominates the herbaceous layer (Klinka et al. 1989).
Succession and Disturbance: early- to late-seral; river flooding, avalanche, mass-wasting of rock and
Landcover Class: Black Cottonwood Woodland, Tall Sitka Alder Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	20	1	-
Betula papyrifera	20	10	-
Shrub			
Alnus viridis ssp. *sinuata*	100	78	65-90
Oplopanax horridus	60	4	2-5
Ribes hudsonianum	20	1	-
Ribes laxiflorum	60	2	1-3
Rubus idaeus	20	2	-
Sambucus racemosa	80	4	1-7
Spiraea stevenii	20	2	-
Vaccinium ovalifolium	20	1	-
Viburnum edule	20	20	-
Forb			
Aconitum delphiniifolium	20	2	-
Aruncus dioicus var. *acuminatus*	20	5	-
Athyrium filix-femina	60	3	2-5
Chamerion angustifolium	40	1	1-1
Dryopteris expansa	100	50	28-80
Gymnocarpium dryopteris	60	4	3-5
Heuchera glabra	20	2	-
Lycopodium annotinum	20	1	-
Phegopteris connectilis	40	4	2-5
Rubus pedatus	20	25	-
Stellaria borealis ssp. *borealis*	20	2	-
Streptopus amplexifolius	60	5	2-10
Trientalis europaea	80	1	1-2
Veratrum viride	20	1	-
Viola epipsila ssp. *repens*	20	1	-
Graminoid			
Calamagrostis canadensis	60	1	1-2
Carex macrochaeta	20	2	-
Moss			
Brachythecium nelsonii	20	10	-
Dicranum	20	1	-
Moss sp.	40	3	2-3
Polytrichum juniperinum	20	3	-
Rhytidiadelphus triquetrus	20	1	-
Lichen			
Cladonia sp.	20	1	-
Lobaria linita	20	1	-



Alnus viridis ssp. *sinuata / Oplopanax horridus*

Number of Plots Sampled: 2 (14.03, 14.08)
Rank: G4 S4
Other Studies: DeVelice et al. 1999
Distribution: small to medium patch; widespread occurrence
Slope: 6-17°
Aspect: 260-342°
Elevation: 366 - 614 m
Hydrology: mesic
Landform: valley bottoms, floodplains, mountain sideslopes (broken), alluvial fans, avalanche chutes
Vegetation: An upland to riparian, low- to mid-elevation, closed shrubland. *Alnus viridis* ssp. *sinuata* (1.6 - 5 m), is the dominant tall shrub with *Oplopanax horridus* (1.2 m) dominating the lower shrub stratum and *Sambucus racemosa* (1.4 m) constant at low cover. *Alnus viridis* ssp. *sinuata* is a common component of well-drained but periodically disturbed sites (MacKenzie and Moran 2004) and *Oplopanax horridus* is thought to occur in productive shrublands where subsurface flow is typically continuous (Banner et al. 1993). Regular disturbance prevents mature trees from establishing and affects understory development (Batten et al. 1978). The ferns *Dryopteris expansa* and *Athyrium filix-femina*, which are indicators of moist, nitrogen-rich soils, dominate the herbaceous layer (Klinka et al. 1989). Moss and litter cover the ground surface.
Succession and Disturbance: early-seral; river flooding, avalanche, mass-wasting of rock and soil
Landcover Class: Tall Sitka Alder Closed, Tall Sitka Alder - Willow Closed

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Alnus viridis ssp. *sinuata*	100	63	40-85
Oplopanax horridus	100	28	10-45
Salix alaxensis	50	5	-
Salix barclayi	50	10	-
Salix sitchensis	50	10	-
Sambucus racemosa	100	3	2-3
Forb			
Athyrium filix-femina	100	14	8-20
Dryopteris expansa	100	18	10-25
Epilobium hornemannii ssp. *hornemannii*	50	2	-
Galium triflorum	50	2	-
Gymnocarpium dryopteris	50	5	-
Heuchera glabra	50	10	-
Orthilia secunda	50	1	-
Phegopteris connectilis	50	2	-
Stellaria borealis ssp. *borealis*	50	1	-
Streptopus amplexifolius	100	4	3-4
Trientalis europaea	50	1	-
Graminoid			
Calamagrostis canadensis	50	5	-
Carex macrochaeta	50	5	-
Vahlodea atropurpurea	50	2	-
Moss			
Brachythecium nelsonii	50	5	-
Moss sp.	100	17	3-30
Pleurozium schreberi	50	5	-



Alnus viridis ssp. *sinuata - Salix alaxensis*

Number of Plots Sampled: 1 (14.01)
Rank: G4 S4
Other Studies: DeVelice et al. 1999
Distribution: medium patch; local occurrence
Slope: 16°
Aspect: 253°
Elevation: 723 m
Hydrology: mesic-wet
Landform: valley bottoms, floodplains, mountain sideslopes (broken), alluvial fans, avalanche chutes
Vegetation: A riparian to upland, low- to mid-elevation, closed shrubland. *Alnus viridis* ssp. *sinuata* (3.5 m), which is a common component of well-drained but periodically disturbed sites, and *Salix alaxensis* (3.5 m), which is a colonizer of disturbed riparian habitat, are the codominant shrubs (MacKenzie and Moran 2004). Regular disturbance prevents mature trees from establishing and affects understory development (Batten et al. 1978). In this instance, the forb and graminoid strata are diverse but poorly developed. Moss cover is sparse and lichens are not represented.
Succession and Disturbance: early-seral; river flooding, avalanche, mass-wasting of rock and soil
Landcover Class: Tall Sitka Alder - Willow Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Populus balsamifera ssp. *trichocarpa*	100	1	-
Shrub			
Alnus viridis ssp. *sinuata*	100	35	-
Salix alaxensis	100	35	-
Salix barclayi	100	2	-
Salix sitchensis	100	3	-
Forb			
Arnica latifolia	100	1	-
Athyrium filix-femina	100	7	-
Chamerion latifolium	100	3	-
Dryopteris expansa	100	2	-
Epilobium hornemannii ssp. *hornemannii*	100	1	-
Heuchera glabra	100	1	-
Ranunculus	100	1	-
Saxifraga nelsoniana ssp. *nelsoniana*	100	1	-
Stellaria calycantha	100	1	-
Graminoid			
Calamagrostis canadensis	100	3	-
Carex macrochaeta	100	8	-
Vahlodea atropurpurea	100	2	-
Moss			
Moss sp.	100	5	-
Pleurozium schreberi	100	5	-
Sanionia uncinata	100	10	-



Salix barclayi / Mixed Herb

Number of Plots Sampled: 1 (21.10, 23.03)
Rank: G5 S5
Other Studies: Hultén 1960, Shephard 1995, Boggs et al. 2003
Distribution: small patch; local occurrence
Slope: 0-2°
Aspect: 205°
Elevation: 880 - 883 m
Hydrology: mesic to mesic-wet
Landform: high elevation valley bottoms
Vegetation: A wet, closed shrubland where *Salix barclayi* (1.5 m), which commonly occurs on cold, moist to wet soils, is the dominant shrub species. Standing water is typically not present but subirrigation is common (MacKenzie and Moran 2004). The herb layer is diverse, well-developed and dominated by subalpine forbs such as *Athyrium filix-femina, Anemone richardsonii, Sanguisorba canadensis, Petasites frigidus* var. *frigidus, Chamerion angustifolium* and *Viola epipsila.* The graminoids, *Calamagrostis canadensis* and *Carex macrochaeta* are constant at low cover. This plant association is variably referred to as *Salix barclayi* (Hultén 1960), Salix barclayi/mixed herb (Shephard 1995) and *Salix barclayi*/Mixed herbaceous (Boggs et al. 2003); the composition of this association should be reviewed and consistently named.
Succession and Disturbance: early to mid-seral; seasonal flooding
Landcover Class: Tall Willow Closed



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Alnus viridis ssp. *sinuata*	50	1	-
Salix alaxensis	50	3	-
Salix barclayi	100	78	75-80
Salix commutata	50	1	-
Salix sitchensis	50	3	-
Forb			
Achillea millefolium var. *borealis*	50	1	-
Aconitum delphiniifolium	50	3	-
Anemone richardsonii	100	13	10-15
Athyrium filix-femina	50	15	-
Chamerion angustifolium	100	4	2-5
Dodecatheon sp.	50	2	-
Epilobium hornemannii ssp. *hornemannii*	50	1	-
Equisetum arvense	50	10	-
Erigeron peregrinus	50	1	-
Heracleum maximum	50	3	-
Parnassia palustris	50	2	-
Petasites frigidus var. *frigidus*	100	7	3-10
Rubus arcticus	50	2	-
Sanguisorba canadensis	100	13	10-15
Senecio triangularis	50	1	-
Viola epipsila	100	3	1-5
Graminoid			
Calamagrostis canadensis	100	4	2-5
Carex macrochaeta	100	4	2-5
Vahlodea atropurpurea	50	10	-
Moss			
Rhizomnium sp.	50	2	-

Dwarf Shrub Plant Associations

Cassiope mertensiana

Number of Plots Sampled: 4 (15.08, 20.03, 21.11, 23.06)
Rank: G4 S4
Other Studies: Boggs et al. 2008a
Distribution: small to medium patch; scattered occurrence
Slope: 8-15°
Aspect: 49-166°
Elevation: 700 - 1040 m
Hydrology: mesic
Landform: mountain sideslopes (smooth), benches, concave mesotopography, areas of late-lying snow
Vegetation: A mesic, subalpine to alpine heath where *Cassiope mertensiana* is the dominant dwarf shrub and *Harrimanella stelleriana, Phyllodoce glanduliflora* and *Luetkea pectinata* are minor associates. *Cassiope mertensiana* occurs in moist, nitrogen-poor, water-shedding sites (Klinka et al. 1989). The tree, forb, graminoid and nonvascular strata are diverse, yet poorly-developed. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, late-lying snow
Landcover Class: Dwarf Shrub - Herbaceous, Dwarf Tree - Dwarf Shrub - Lichen - Rock, Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub



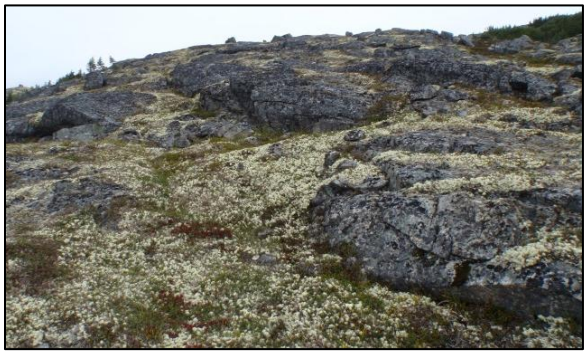
Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Abies lasiocarpa	25	1	-
Tsuga mertensiana	50	1	-
Shrub			
Cassiope mertensiana	100	58	40-75
Harrimanella stelleriana	100	13	5-30
Luetkea pectinata	100	10	1-20
Phyllodoce glanduliflora	100	10	5-15
Vaccinium ovalifolium	25	1	-
Forb			
Anemone richardsonii	25	1	-
Arnica latifolia	75	1	-
Caltha sp.	25	1	-
Chamerion latifolium	25	1	-
Erigeron peregrinus	25	1	-
Leptarrhena pyrolifolia	25	1	-
Lupinus nootkatensis	75	4	3-5
Sanguisorba canadensis	50	1	-
Veratrum viride	25	1	-
Graminoid			
Carex anthoxanthea	25	1	-
Carex macrochaeta	75	1	1-2
Carex pyrenaica ssp. *micropoda*	25	1	-
Moss			
Dicranum sp.	50	1	-
Moss sp.	50	1	-
Pleurozium schreberi	50	2	1-3
Racomitrium lanuginosum	25	1	-
Lichen			
Cetraria ericetorum	25	1	-
Cladina sp.	25	1	-
Cladina mitis	25	1	-
Cladina rangiferina	25	1	-
Cladina stellaris	75	4	1-10
Cladonia sp.	25	1	-



Empetrum nigrum - Cladina species

Number of Plots Sampled: 6 (15.04, 16.03, 20.05, 20.08, 21.09, 23.05)

Rank: G5 S5
Other Studies: Boucher et al. 2012
Distribution: small to large patch; widespread occurrence
Slope: 5-20^{o}
Aspect: 100-320^{o}
Elevation: 623 - 1037 m
Hydrology: mesic
Landform: mountain sideslopes, benches, ridges, convex mesotopography
Vegetation: A mesic, subalpine to alpine heath where *Empetrum nigrum* is the dominant dwarf shrub and dwarf *Vaccinium* species are minor associates. The cooccurrence of *Empetrum nigrum* and *Vaccinium uliginosum* indicates nitrogen-poor soils (Klinka et al. 1989). A diverse and well-developed lichen mat is dominated by fruticose species such as *Cladina rangiferina* and *C. stellaris*. Tree, forb, graminoid and bryophyte strata are diverse, yet poorly-developed. The grass, *Anthoxanthum monticola* ssp. *alpinum* is constant at low cover. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Ericaceous Dwarf Shrub - Lichen, Ericaceous Dwarf Shrub - Lichen, Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub



Scientific Name	Constancy	Cover (%) Ave.	Range
Tree			
Abies Lasiocarpa	17	3	-
Picea sitchensis	17	1	-
Tusga meriensiana	17	2	-
Shrub			
Dryas ocopetala	17	2	-
Empetrum nigrum	100	23	15-30
Harrimanella Stelleriana	33	8	5-10
Loiseleuria procumbens	33	2	1-3
Salix arctica	17	1	-
Salix polaris	17	1	-
Salix reticulate	17	10	-
Salix stolnifera	50	4	1-10
Spirea stevenii	50	1	1-2
Vaccinium uliginosum	100	7	7-25
Vaccinium vitis-idaea	83	2	1-5
Forb			
Antennaria monocephala ssp. Moncephela	17	1	-
Arnica lessingii	17	1	-
Artemesia arctica	50	2	1-3
Cornus Canadensis	17	5	-
Epilobium lactiflorum	17	1	-
Kumlienia cooleyae	17	1	-
Linnaea borealis	17	2	-
Lupinus clavatum	67	1	1-2
Polygonum viviparum	17	1	-
Silene acaulis	17	4	-
Trientalis europaea	17	1	-
Graminoid			
Anthoxarthum monticola ssp. Alpinum	100	2	1-3
Calamagrostis Canadensis	17	1	-
Carex macrochaeta	67	3	1-8
Carex microchaeta	33	2	1-2
Festuca altaica	17	2	-
Luzula arcuate	17	2	-
Poa arctica spp. Lanata	17	1	-
Moss			
Dicranum sp.	33	3	1-5
Hylocomium splendens	17	25	-
Moss sp.	17	6	-
Pleurozium schreberi	17	10	-
Polytrichum sp.	17	3	-
Racomitrium lanuginosum	33	1	-

Empetrum nigrum - Cladina species (continued)



(continued)	Con-	Cover (%)	
Scientific Name	**stancy**	**Ave.**	**Range**
Liverwort			
Anthelia juratzkana	17	2	-
Ptilidium sp.	17	1	-
Lichen			
Bryoria sp.	17	1	-
Cetraria ericetorum	50	1	-
Cladina mitis	50	12	5-20
Cladina rangiferina	100	4	1-10
Cladina stellaris	100	28	10-40
Cladonia sp.	33	3	2-3
Cladonia bellidiflora	17	1	-
Flavocetraria nivalis	33	1	-
Lichen sp.	50	4	3-5
Lichen, crustose	33	7	3-10
Lobaria sp.	17	2	-
Solorina crocea	17	2	-
Stereocaulon sp.	17	10	-
Thamnolia vermicularis	83	1	1-2
Umbilicaria sp.	17	5	-

Harrimanella stelleriana - Cladina species

Number of Plots Sampled: 3 (18.01, 50.03, 50.07)
Rank: GNR SNR
Other Studies: Boggs et al 2008a
Distribution: very small to medium patch; scattered occurrence
Slope: 5-30°
Aspect: 58-250°
Elevation: 1119 - 1283 m
Hydrology: mesic
Landform: mountain sideslopes, benches, ridges
Vegetation: A mesic, high-alpine heath where *Harrimanella stelleriana* is the dominant dwarf shrub. Within its natural range, *Harrimanella stelleriana* occurs in moist, nitrogen-poor, water-shedding sites (Klinka et al. 1989) and occurs in similarly impoverished conditions on convex slopes and benches in Klondike Gold Rush NHP. A diverse and well-developed lichen mat is dominated by fruticose lichen species represented by members of the *Cladina* genus with *Cladina stellaris* constant at high cover. *Thamnolia vermicularis* and *Umbilicaria* species are also constant, but at low cover. The graminoids, *Carex pyrenaica* ssp. *micropoda* and *Luzula arcuata* are constant at low cover. Forb and moss cover is sparse. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Dwarf Shrub - Lichen - Rock



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Harrimanella stelleriana	100	25	20-30
Phyllodoce glanduliflora	33	1	-
Salix stolonifera	33	3	3-3
Forb			
Huperzia selago	33	1	-
Saxifraga ferruginea	33	1	-
Sibbaldia procumbens	33	1	-
Graminoid			
Anthoxanthum monticola	33	1	-
Carex lachenalii	33	1	-
Carex macrochaeta	33	1	-
Carex pyrenaica ssp. *micropoda*	100	2	2-3
Luzula arcuata	100	2	1-3
Moss			
Andreaea rupestris	33	1	-
Dicranum sp.	33	5	-
Dicranum fuscescens	33	2	-
Moss sp.	33	3	-
Polytrichastrum alpinum	33	3	-
Sphagnum compactum	33	1	-
Liverwort			
Ptilidium pulcherrimum	33	1	-
Lichen			
Cetraria nivalis	67	1	-
Cladina sp.	33	10	-
Cladina mitis	67	10	-
Cladina rangiferina	67	3	1-5
Cladina stellaris	100	20	5-30
Cladonia sp.	33	3	-
Flavocetraria nivalis	33	1	-
Lichen, crustose	33	5	-
Solorina crocea	33	1	-
Stereocaulon sp.	33	1	-
Stereocaulon condensatum	33	2	-
Thamnolia vermicularis	100	3	1-5
Umbilicaria sp.	100	10	1-20



Harrimanella stelleriana - Luetkea pectinata

Number of Plots Sampled: 2 (18.04, 50.02[29])
Rank: G5 S5
Other Studies: DeVelice et al. 1999, Boggs et al. 2008b, Boucher et al. 2012
Distribution: small to small-medium patch; scattered occurrence
Slope: 0-3°
Aspect: 200°
Elevation: 1072 - 1211 m
Hydrology: mesic to mesic-wet
Landform: mountain sideslopes, benches, convex mesotopography, areas of late-lying snow
Vegetation: A mesic to wet, subalpine to alpine heath where *Harrimanella stelleriana* and *Luetkea pectinata* are the codominant dwarf shrubs. The cooccurrence of *Harrimanella stelleriana* and *Luetkea pectinata* indicates moist, nitrogen-medium, water- receiving sites (Klinka et al. 1989). The dwarf shrub layer often forms a continuous mat where herbaceous and nonvascular strata are poorly-developed. *Huperzia selago* is the only nonwoody species that consistently occurs, albeit at low cover. The moss *Dicranum fuscescens* and the liverwort, *Scapania curta* may be abundant in areas of late-lying snow. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, late-lying snow
Landcover Class: Ericaceous Dwarf Shrub - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Harrimanella stelleriana	100	40	30-50
Luetkea pectinata	100	38	35-40
Phyllodoce glanduliflora	50	2	-
Forb			
Huperzia selago	100	1	-
Saxifraga ferruginea	50	1	-
Graminoid			
Carex nigricans	50	5	-
Carex pyrenaica ssp. *micropoda*	50	2	-
Moss			
Andreaea blyttii	50	1	-
Andreaea rupestris	50	1	-
Dicranum fuscescens	50	20	-
Lichen			
Cladonia sp.	50	1	-
Cladonia bellidiflora	100	1	-
Stereocaulon sp.	50	1	-
Liverwort			
Scapania curta	50	20	-





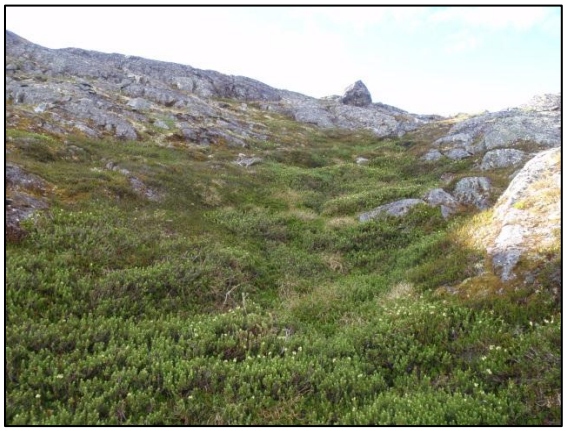
[29] Plant association plot only

Harrimanella stelleriana - Phyllodoce glanduliflora

Number of Plots Sampled: 2 (16.01, 17.02)
Rank: GNR SNR
Other Studies: none
Distribution: small to small-medium patch; scattered occurrence
Slope: 15-23°
Aspect: 120-290°
Elevation: 828 - 1121 m
Hydrology: mesic
Landform: valley bottoms, mountain sideslopes, benches, basins, ridges
Vegetation: A mesic, subalpine to alpine heath where *Harrimanella stelleriana*, *Phyllodoce glanduliflora* and *Luetkea pectinata* are the dominant dwarf shrubs. The cooccurrence of *Harrimanella stelleriana* and *Phyllodoce glanduliflora* indicates nitrogen-poor, water-shedding sites (Klinka et al. 1989). The sedges, *Carex nigricans* and *Carex pyrenaica* ssp. *micropoda* are constant at low cover. A diverse and locally-developed lichen mat is dominated by fruticose lichen species represented by the *Cladina* and *Cladonia* genera. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, late-lying snow
Landcover Class: Ericaceous Dwarf Shrub, Ericaceous Dwarf Shrub - Lichen

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Cassiope mertensiana	50	5	-
Harrimanella stelleriana	100	35	30-40
Luetkea pectinata	100	15	-
Phyllodoce glanduliflora	100	30	-
Salix stolonifera	50	5	-
Forb			
Lycopodium alpinum	50	2	-
Graminoid			
Carex anthoxanthea	50	2	-
Carex macrochaeta	50	2	-
Carex nigricans	100	4	2-5
Carex pyrenaica ssp. *micropoda*	100	1	-
Luzula arcuata	50	2	-
Moss			
Dicranum muehlenbeckii	50	5	-
Moss sp.	100	9	2-15
Lichen			
Cetraria sp.	50	1	-
Cladina sp.	50	2	-
Cladina mitis	50	15	-
Cladina stellaris	50	20	-
Cladonia bellidiflora	100	3	1-4
Lichen sp.	100	8	1-14
Stereocaulon sp.	50	1	-





Luetkea pectinata - Leptarrhena pyrolifolia

Number of Plots Sampled: 1 (15.02)
Rank: GNR SNR
Other Studies: Hasselbach 1995 (listed but not sampled), Boucher et al. 2012
Distribution: very small patch; local occurrence
Slope: 7°
Aspect: 207°
Elevation: 733 m
Hydrology: mesic-wet
Landform: streamsides, concave mesotopography
Vegetation: A wet, subalpine to alpine, forb-rich heath where *Luetkea pectinata* is the dominant dwarf shrub and *Leptarrhena pyrolifolia* is the dominant forb. *Leptarrhena pyrolifolia* commonly occurs in nonforested, water-receiving sites (Klinka eta l. 1989). Other wet site herbs such as *Carex macrochaeta, Saxifraga lyallii* ssp. *hultenii, Saxifraga nelsoniana, Ranunculus eschscholtzii, Heuchera glabra* and *Epilobium anagallidifolium* occur at moderate to low cover. Nonvascular cover is sparse.
Succession and Disturbance: mid-seral; seasonal flooding, avalanche
Landcover Class: Dwarf Shrub - Herbaceous - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Cassiope mertensiana	100	2	-
Luetkea pectinata	100	30	-
Phyllodoce glanduliflora	100	1	-
Forb			
Epilobium anagallidifolium	100	2	-
Heuchera glabra	100	2	-
Leptarrhena pyrolifolia	100	20	-
Ranunculus eschscholtzii	100	2	-
Sanguisorba canadensis	100	1	-
Saxifraga lyallii ssp. *hultenii*	100	5	-
Saxifraga nelsoniana ssp. *carlottae*	100	5	-
Saxifraga nelsoniana ssp. *nelsoniana*	100	2	-
Graminoid			
Carex macrochaeta	100	10	-
Moss			
Moss sp.	100	3	-
Lichen			
Lichen, crustose	100	1	-





Phyllodoce glanduliflora

Number of Plots Sampled: 4 (15.01, 16.07, 17.03, 50.06)
Rank: GNR SNR
Other Studies: none
Distribution: very small to small patch; scattered occurrence
Slope: 23-43°
Aspect: 120-200°
Elevation: 760 - 974 m
Hydrology: mesic
Landform: mountain sideslopes, benches, ridges
Vegetation: A mesic, subalpine to alpine heath where a diversity of dwarf shrubs including *Luetkea pectinata*, *Harrimanella stelleriana*, *Empetrum nigrum* and *Salix stolonifera* occur, but *Phyllodoce glanduliflora*, which commonly occurs on nitrogen-poor, water-shedding sites (Klinka et al. 1889), is dominant. In the forb layer, *Lycopodium alpinum* consistently occurs at low cover, while *Cornus canadensis* and *Lupinus nootkatensis* may be locally abundant. The sedge, *Carex macrochaeta* is constant at low cover. The nonvascular layer is moderately diverse and abundant.
Succession and Disturbance: late-seral; rockfall, avalanche
Landcover Class: Dwarf Shrub - Herbaceous, Dwarf Shrub – Herbaceous, Ericaceous Dwarf Shrub, Ericaceous Dwarf Shrub - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Tsuga mertensiana	25	1	-
Shrub			
Cassiope mertensiana	50	6	2-10
Empetrum nigrum	50	11	1-20
Harrimanella stelleriana	25	20	-
Loiseleuria procumbens	25	2	-
Luetkea pectinata	75	22	15-30
Phyllodoce glanduliflora	100	45	25-60
Salix stolonifera	25	10	-
Spiraea stevenii	50	2	1-2
Vaccinium ovalifolium	25	1	-
Vaccinium vitis-idaea	25	5	-

(Continued)

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Arnica latifolia	25	2	-
Artemisia arctica	50	6	1-10
Chamerion angustifolium	25	2	-
Cornus canadensis	50	28	15-40
Gymnocarpium dryopteris	50	3	1-5
Heuchera glabra	25	1	-
Hieracium triste	25	2	-
Kumlienia cooleyae	25	2	-
Linnaea borealis	25	1	-
Lupinus nootkatensis	25	20	-
Lycopodium alpinum	100	2	1-2
Lycopodium annotinum	25	1	-
Lycopodium clavatum	25	2	-
Lycopodium sabinifolium	25	2	-
Phegopteris connectilis	25	1	-
Rubus chamaemorus	25	2	-
Trientalis europaea	25	1	-
Viola langsdorffii	25	1	-
Graminoid			
Calamagrostis canadensis	50	1	-
Carex macrochaeta	100	3	1-5
Festuca altaica	25	1	-
Luzula arctica	25	1	-
Vahlodea atropurpurea	25	2	-
Moss			
Dicranum sp.	50	4	2-5
Moss sp.	75	7	5-10
Pleurozium schreberi	50	6	5-6
Lichen			
Cladina mitis	25	4	-
Cladina rangiferina	25	1	-
Cladina stellaris	25	6	-
Cladonia bellidiflora	25	2	-
Lichen sp.	50	4	2-5
Lobaria linita	25	1	-
Stereocaulon sp.	25	4	-



Vaccinium uliginosum - Empetrum nigrum

Number of Plots Sampled: 1 (15.09)
Rank: G5 S5
Other Studies: Hultén 1962, Talbot and Talbot 1994, DeVelice et al. 1999, Boggs et al 2008b, Boucher et al. 2012
Distribution: small patch; scattered occurrence
Slope: 50°
Aspect: 194°
Elevation: 766 m
Hydrology: mesic
Landform: mountain sideslopes, benches
Vegetation: A mesic, subalpine to alpine heath where *Vaccinium uliginosum* and *Empetrum nigrum* are the dominant dwarf shrubs. The dwarf shrub layer often forms a continuous mat; herbaceous and nonvascular layers are absent or poorly-developed. The forb, *Cornus canadensis* may be locally abundant.
Succession and Disturbance: late-seral; avalanche
Landcover Class: Dwarf Shrub - Herbaceous - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Cassiope mertensiana	100	1	-
Empetrum nigrum	100	35	-
Juniperus communis	100	1	-
Loiseleuria procumbens	100	1	-
Vaccinium uliginosum	100	65	-
Forb			
Cornus canadensis	100	10	-
Lycopodium alpinum	100	1	-
Moss			
Moss sp.	100	1	-
Racomitrium lanuginosum	100	1	-
Lichen			
Cladina sp.	100	1	-
Cladina rangiferina	100	2	-
Cladina stellaris	100	2	-





Herbaceous Plant Associations

Argentina egedii - Festuca rubra

Number of Plots Sampled: 1 (1.05)
Rank: GNR SNR
Other Studies: del Moral and Watson 1978, Boucher et al. 2012
Distribution: small-medium patch; local occurrence
Slope: 0°
Aspect: NA
Elevation: 2 m
Hydrology: brackish-wet
Landform: upper tidal flat
Vegetation: A mesic to wet, coastal meadow where the forb *Argentina egedii* and the grass *Festuca rubra* are the dominant, nominal species. Multiple species share dominance in the herbaceous layer including the forbs *Dodecatheon pulchellum* ssp. *macrocarpum* and *Lathyrus japonicus* var. *maritimus* as well as the grasses *Poa eminens, Deschampsia beringensis* and *Leymus mollis.* Moss cover is sparse and lichens are not represented. Litter covers much of the ground surface.
Succession and Disturbance: early-seral; tidal flooding
Landcover Class: Mesic Herbaceous Coastal

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Argentina egedii	100	35	-
Chrysanthemum arcticum	100	8	-
Dodecatheon pulchellum ssp. *macrocarpum*	100	18	-
Lathyrus japonicus	100	15	-
Parnassia palustris	100	2	-
Graminoid			
Deschampsia cespitosa	100	10	-
Festuca rubra	100	30	-
Juncus haenkei	100	2	-
Leymus mollis	100	10	-
Poa eminens	100	25	-
Moss			
Tetraplodon mnioides	100	5	-





Calamagrostis canadensis - Carex macrochaeta

Number of Plots Sampled: 1 (16.02)
Rank: GNR SNR
Other Studies: Hanson 1951, Boucher et al. 2012
Distribution: small patch; local occurrence
Slope: 30°
Aspect: 275°
Elevation: 827 m
Hydrology: mesic to wet
Landform: mountain sideslopes
Vegetation: A mesic, subalpine to alpine meadow where *Calamagrostis canadensis* and *Carex macrochaeta* are the codominant species. The fern, *Dryopteris expansa* and the wet site forb, *Epilobium lactiflorum* achieve the highest covers in the diverse, yet poorly-developed forb layer. Nonvascular species are not represented. Litter covers much of the ground surface.
Succession and Disturbance: mid-seral; avalanche
Landcover Class: Mesic Herbaceous

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Argentina egedii	100	35	-
Chrysanthemum arcticum	100	8	-
Dodecatheon pulchellum ssp. *macrocarpum*	100	18	-
Lathyrus japonicus	100	15	-
Parnassia palustris	100	2	-
Graminoid			
Deschampsia cespitosa	100	10	-
Festuca rubra	100	30	-
Juncus haenkei	100	2	-
Leymus mollis	100	10	-
Poa eminens	100	25	-
Moss			
Tetraplodon mnioides	100	5	-





Carex anthoxanthea

Number of Plots Sampled: 3 (20.09, 20.10, 21.03)
Rank: GNR SNR
Other Studies: none
Distribution: very small patch; local occurrence
Slope: 1°
Aspect: 63-226
Elevation: 966 - 1026 m
Hydrology: wet to very wet
Landform: seeps, headwater fens
Vegetation: A wet, subalpine to alpine meadow where the sedge *Carex anthoxanthea* dominates a diverse assemblage of wet site herbs. The forbs, *Caltha leptosepala*, *Leptarrhena pyrolifolia* and *Sanguisorba canadensis*, and the sedges, *Carex bicolor* and *Carex macrochaeta*, whose growth is favored by moist to wet site conditions, are constant at low cover. Likely due to the alpine environment opposed to site hydrology, the dwarf shrub *Cassiope mertensiana* is also constant at low cover. Nonvascular cover is sparse and inconstant with respect to species. Litter covers much of the ground surface and standing water is often present.
Succession and Disturbance: mid- to late-seral; seasonal flooding
Landcover Class: Wet Herbaceous





Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Cassiope mertensiana	100	1	-
Empetrum nigrum	33	5	-
Kalmia microphylla	33	2	-
Loiseleuria procumbens	33	1	-
Luetkea pectinata	67	1	-
Salix stolonifera	67	9	8-10
Vaccinium uliginosum	33	3	-
Forb			
Caltha leptosepala	100	2	1-3
Epilobium anagallidifolium	33	1	-
Erigeron peregrinus	67	2	1-3
Geum calthifolium	67	1	-
Leptarrhena pyrolifolia	100	2	1-3
Lupinus nootkatensis	33	1	-
Parnassia palustris	67	1	-
Petasites frigidus var. *frigidus*	67	5	3-7
Polygonum viviparum	67	3	1-5
Sanguisorba canadensis	100	2	1-3
Saxifraga lyallii ssp. *hultenii*	33	2	2-2
Graminoid			
Calamagrostis canadensis	67	1	-
Carex anthoxanthea	100	20	15-25
Carex bicolor	100	2	1-3
Carex macrochaeta	100	2	1-3
Carex nigricans	67	2	1-2
Carex saxatilis	33	5	-
Eriophorum angustifolium	67	2	1-3
Juncus biglumis	33	1	-
Juncus drummondii	33	1	-
Juncus mertensianus	67	3	2-3
Trichophorum cespitosum	33	3	-
Moss			
Campylium stellatum var. *protensum*	33	3	-
Dicranoweisia crispula	67	2	1-3
Dicranum sp.	33	1	-
Philonotis fontana	33	3	-
Sphagnum sp.	33	2	-
Sphagnum teres	67	1	-
Liverwort			
Anthelia juratzkana	33	5	-
Lichen			
Cladina mitis	33	2	-

Carex lyngbyei

Number of Plots Sampled: 2 (1.01, 1.12)
Rank: G4 S5
Other Studies: Griggs 1936, Hanson 1951, Frohne 1953, Klein 1965, Stephens and Billings 1967, Crow 1968, Neiland 1971b, Streveler et al. 1973, Streveler and Worley 1977, Crow and Koppen 1977, Scheierl and Meyer 1977, del Moral and Watson 1978, Batten et al. 1978, McCormick and Pichon 1978, Racine and Anderson 1979, Ritchie et al. 1981, Friedman 1984, Wibbenmeyer et al. 1982, Vince and Snow 1984, Byrd 1984, Rosenberg 1986, Craighead et al. 1988, Stone 1993, Shephard 1995, DeVelice et al. 1999, Boggs 2000, Boggs et al. 2003, Boggs et al. 2008a, Turner 2010
Distribution: small-medium to medium patch; local occurrence
Slope: 1°
Aspect: 180-230° °
Elevation: 5 - 6 m
Hydrology: brackish - very wet
Landform: tidal flats, tidal sloughs
Vegetation: A coastal marsh dominated by *Carex*. This salt- and flood-tolerant clonal sedge forms dense stands where there are strong, diurnal fluctuations of brackish water and active sedimentation (MacKenzie and Moran 2004). Herbaceous species diversity is low and woody and nonvascular species are not represented. Sand and standing water are often present.
Succession and Disturbance: early-seral; tidal flooding
Landcover Class: Halophytic Herbaceous Wet Meadow

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Argentina egedii	50	3	-
Glaux maritima	50	2	-
Honckenya peploides	50	3	-
Plantago maritima	50	5	-
Triglochin palustris	50	8	-
Graminiod			
Carex lyngbyei	100	53	20-85
Eleocharis kamtschatica	50	2	-
Puccinellia pumila	50	7	-





Carex lyngbyei - Argentina egedii - Poa eminens

Number of Plots Sampled: 1 (1.04)
Rank: GNR SNR
Other Studies: Crow 1977, Boucher et al. 2012
Distribution: small patch; local occurrence
Slope: 1°
Aspect: 250°
Elevation: 4 m
Hydrology: brackish - very wet
Landform: tidal slough
Vegetation: A wet, coastal meadow where the salt- and flood tolerant forb, *Argentina egedii*, the sedge, *Carex lyngbyei* and the beach grass, *Poa eminens* are the codominant species. This association occurs in a narrow band between seaward stands of *Carex lyngbyei* and inland mesic coastal herbaceous plant associations. Plant species diversity is generally low; nonvascular species are not represented. Litter covers much of the ground surface.
Succession and Disturbance: early-seral; tidal flooding
Landcover Class: Halophytic Herbaceous Wet Meadow

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Argentina egedii	100	65	-
Conioselinum gmelinii	100	1	-
Triglochin maritima	100	2	-
Graminoid			
Carex lyngbyei	100	40	-
Deschampsia beringensis	100	5	-
Festuca rubra	100	5	-
Leymus mollis	100	5	-
Poa eminens	100	25	-





Carex macrochaeta

Number of Plots Sampled: 2 (15.10, 16.04)
Rank: G4 S4
Other Studies: DeVelice et al. 1999, Boggs et al. 2008a, Boggs et al. 2008b
Distribution: very small to small patch; local occurrence
Slope: 25-45°
Aspect: 182-270°
Elevation: 929 - 935 m
Hydrology: mesic to wet
Landform: mountain sideslopes
Vegetation: A mesic, subalpine to alpine meadow where *Carex macrochaeta* is the dominant species. The forbs, *Oxyria digyna*, *Epilobium hornemannii* ssp. *hornemannii* and *Artemisia arctica* are constant at low cover, while the streamside indicators (Klinka et al. 1989), *Arnica latifolia* and *Parnassia fimbriata* are locally abundant. The wet site mosses *Campylium stellatum* and *Rhytidiadelphus squarrosus* can also achieve local abundance. Lichens are sparse to absent. Litter and standing water may be present.
Succession and Disturbance: mid-seral; runoff, rockfall, avalanche
Landcover Class: Dwarf Shrub - Herbaceous, Dwarf Shrub - Herbaceous - Rock



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Luetkea pectinata	50	50	-
Phyllodoce glanduliflora	50	1	-
Salix stolonifera	50	2	-
Forb			
Aconitum delphiniifolium	50	2	-
Anemone sp.	50	1	-
Arnica latifolia	50	20	-
Arnica lessingii	50	3	-
Artemisia arctica	100	1	-
Athyrium filix-femina	50	3	-
Chamerion latifolium	50	4	-
Epilobium hornemannii ssp. *hornemannii*	100	2	1-2
Leptarrhena pyrolifolia	50	4	-
Oxyria digyna	100	3	1-4
Parnassia fimbriata	50	8	-
Prenanthes alata	50	2	-
Rhodiola integrifolia	50	2	-
Rubus arcticus	50	1	-
Graminoid			
Calamagrostis canadensis	50	1	-
Carex macrochaeta	100	55	40-70
Luzula sp.	50	1	-
Luzula parviflora	50	1	-
Vahlodea atropurpurea	50	5	-
Moss			
Campylium stellatum	50	15	-
Moss sp.	50	10	-
Rhytidiadelphus squarrosus	50	15	-



Carex pyrenaica ssp. *micropoda - Luzula* species - *Cladina* species

Number of Plots Sampled: 3 (18.02, 50.01, 50.04)
Rank: GNR SNR
Other Studies: none
Distribution: very small to medium patch; local occurrence
Slope: 0-8°
Aspect: 200-206°
Elevation: 1071 - 1282 m
Hydrology: mesic
Landform: mountain sideslopes, benches
Vegetation: A mesic, high-alpine type where the graminoids, *Carex pyrenaica* ssp. *micropoda, Luzula arcuata* and *L. piperi* are dominant. A diverse and well-developed lichen mat is dominated by fruticose lichen species represented by members of the *Cladina* genus with *Cladina stellaris* constant at high cover and *C. mitis* locally abundant. The foliose lichen genus *Umbilicaria* is also constant, but at lower cover. The dwarf shrub, *Harrimanella stelleriana* is constant at low cover and *Salix stolonifera* achieves local abundance. The moss layer is diverse but poorly-developed. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: late-seral; avalanche, wind
Landcover Class: Dwarf Shrub - Lichen - Rock



Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Empetrum nigrum	33	1	-
Harrimanella stelleriana	100	3	2-5
Luetkea pectinata	33	1	-
Phyllodoce glanduliflora	33	2	-
Salix stolonifera	67	6	1-10
Vaccinium vitis-idaea	33	1	-
Forb			
Arnica lessingii	33	2	-
Artemisia arctica ssp. *arctica*	33	1	-
Huperzia selago	67	1	-
Kumlienia cooleyae	67	1	-
Lycopodium alpinum	33	1	-
Saxifraga ferruginea	67	2	1-2
Sibbaldia procumbens	67	1	-
Silene acaulis	67	2	1-2
Graminoid			
Anthoxanthum monticola	67	4	3-5
Carex lachenalii	33	2	-
Carex macrochaeta	67	3	1-5
Carex pyrenaica ssp. *micropoda*	100	14	3-30
Luzula arcuata	67	7	3-10
Luzula piperi	33	10	-
Moss			
Andreaea rupestris	33	1	-
Dicranum fuscescens	67	5	-
Hamatocaulis vernicosus	33	3	-
Hylocomium splendens	33	5	-
Moss sp.	33	2	-
Pleurozium schreberi	33	3	-
Polytrichastrum alpinum	33	2	-
Polytrichum juniperinum	33	1	-
Racomitrium lanuginosum	33	1	-
Liverwort			
Anthelia juratzkana	33	5	-
Lichen			
Cetraria islandica	67	1	-
Cladina mitis	67	15	10-20
Cladina rangiferina	67	3	1-5
Cladina stellaris	100	14	3-30
Cladonia sp.	100	2	1-3
Cladonia bellidiflora	33	1	-
Flavocetraria nivalis	33	1	-
Lichen, crustose	33	10	-
Solorina crocea	33	1	-
Stereocaulon	33	1	-
Stereocaulon condensatum	33	1	-
Umbilicaria sp.	33	10	-
Umbilicaria angulata	67	6	1-10

Chamerion latifolium

Number of Plots Sampled: 1 (15.03)
Rank: G5 S5
Other Studies: Webber et al. 1978, Boggs 2000 (undersampled), DeVelice et al. 1999 (undersampled), Boggs et al. 2001, Boggs et al. 2008a, Boggs et al. 2008b
Distribution: medium patch; scattered occurrence
Slope: 2°
Aspect: 220°
Elevation: 640 m
Hydrology: dry-mesic
Landform: gravel bar
Vegetation: An upland or riparian, low- to mid-elevation sparse type where the forb, *Chamerion latifolium* is the dominant species. *Chamerion latifolium* commonly occurs on water-receiving sites with nitrogen rich, mineral soils (Klinka et al. 1989). In Klondike, this association is seral on gravel river bars and includes a diversity of species at low to trace[30] cover. Much of the ground cover is exposed alluvium.
Succession and Disturbance: early-seral; river flooding
Landcover Class: Sparse Vegetation

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Alnus viridis ssp. *sinuata*	100	1	-
Forb			
Chamerion latifolium	100	20	-
Saxifraga nelsoniana ssp. *nelsoniana*	100	1	-
Graminoid			
Carex macrochaeta	100	1	-
Festuca brachyphylla	100	1	-
Moss			
Hylocomium splendens	100	1	-
Moss sp.	100	3	-
Stereocaulon sp.	100	1	-





[30] Species detected at less than 1% cover (trace) are not included in the constancy and cover table for this plant association.

Deschampsia beringensis

Number of Plots Sampled: 1 (2.03)
Rank: G5 S5
Other Studies: Hanson 1951, Stephens and Billings 1967, Seguin 1977, Batten et al. 1978, Ritchie et al. 1981, Boggs 2000, DeVelice et al. 1999, Boggs et al. 2008a
Distribution: medium patch; local occurrence
Slope: 6°
Aspect: 19°
Elevation: 3 m
Hydrology: mesic-wet
Landform: uplifted tidal flats, tidal sloughs
Vegetation: A mesic, coastal meadow where *Deschampsia beringensis* is the dominant graminoid and *Poa eminens* is subdominant. *Argentina egedii* is the dominant forb, with *Parnassia palustris* subdominant. The wet site moss, *Campylium hispidulum* dominates the ground cover. Species diversity is generally low.
Succession and Disturbance: early-seral; storm-tide flooding.
Landcover Class: Mesic Herbaceous Coastal

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Alnus viridis ssp. *sinuata*	100	1	-
Forb			
Chamerion latifolium	100	20	-
Saxifraga nelsoniana ssp. *nelsoniana*	100	1	-
Graminoid			
Carex macrochaeta	100	1	-
Festuca brachyphylla	100	1	-
Moss			
Hylocomium splendens	100	1	-
Moss sp.	100	3	-
Stereocaulon sp.	100	1	-



Festuca rubra

Number of Plots Sampled: 1 (1.11)
Rank: GNR SNR
Other Studies: Talbot et al. 1984, Boggs 2008a
Distribution: medium-large patch; local occurrence
Slope: 0°
Aspect: NA
Elevation: 7 m
Hydrology: dry-mesic
Landform: uplifted tidal flat
Vegetation: A mesic, coastal meadow where *Festuca rubra* is the dominant graminoid. Ruderal native species such as the forbs *Achillea millefolium* var. *borealis*, grasses in the *Agrostis* genus and the moss, *Ceratodon purpureus* are common. The nonnative species *Poa pratensis* ssp. *irrigata* and *Rumex acetosella* and the nuisance species *Hordeum jubatum* may be relict from the gold rush-era, but have likely been reintroduced by modern-day use of the uplifted tidal flats at Dyea.
Succession and Disturbance: early-seral; storm-tidal flooding; human
Landcover Class: Mesic Herbaceous Coastal

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Achillea millefolium var. *borealis*	100	10	-
Lathyrus japonicus	100	3	-
Plantago maritima	100	2	-
Rumex acetosella	100	5	-
Graminoid			
Agrostis exarata	100	8	-
Agrostis scabra	100	10	-
Festuca rubra	100	30	-
Hordeum jubatum	100	2	-
Leymus mollis	100	1	-
Poa pratensis ssp. *irrigata*	100	19	-
Moss			
Ceratodon purpureus	100	25	-
Polytrichum juniperinum	100	5	-





Leymus mollis

Number of Plots Sampled: 4 (1.02, 1.07, 1.08, 2.02)
Rank: G5 S5
Other Studies: Griggs 1936, Hanson 1951, 1953, Bank 1951, Klein 1959, Spetzman 1959, Johnson et al. 1966, Stephens and Billings 1967, Shacklette et al. 1969, Young 1971, Ugolini and Walters 1974, George et al. 1977, Batten et al. 1978, Racine and Anderson 1979, Meyers 1985, Rosenberg 1986, Talbot et al. 1984, DeVelice et al. 1999, Boggs 2000
Distribution: small medium to medium patch; local occurrence
Slope: 0-2°
Aspect: 90-230°
Elevation: 3 - 10 m
Hydrology: brackish - mesic to mesic
Landform: upper tidal flats, beach berms and dunes, uplifted tidal flats
Vegetation: A mesic, coastal meadow comprised of salt- and flood tolerant species. The beach grass, *Leymus mollis* is the dominant species; the forb, *Lathyrus japonicus* var. *maritimus* is constant and abundant, while *Achillea millefolium* var. *borealis*, *Argentina egedii* and *Honckenya peploides* achieve local abundance. Species diversity is generally low. The moss layer is represented by a single species, *Brachythecium albicans*, which commonly occurs on sand and in coastal dune settings (BBS 2010). Lichens are absent. Litter covers much of the ground surface.
Succession and Disturbance: early-seral; salt spray, storm-tidal flooding
Landcover Class: American Dunegrass Coastal

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Achillea millefolium var. borealis	25	15	-
Argentina egedii	75	14	1-20
Conioselinum gmelinii	75	6	5-7
Glaux maritima	25	1	-
Honckenya peploides	25	10	-
Lathyrus japonicus var. *maritimus*	100	29	20-40
Plantago maritima	25	2	-
Graminoid			
Festuca rubra	25	5	-
Leymus mollis	100	65	60-70
Poa eminens	25	1	-
Moss			
Brachythecium albicans	25	5	-





Luzula arcuata - Cladina species

Number of Plots Sampled: 2 (17.01, 50.05)
Rank: GNR SNR
Other Studies: see Boucher et al. 2012
Distribution: small patch; local occurrence
Slope: 6-45^{o}
Aspect: 45-300^{o}
Elevation: 1107 - 1119 m
Hydrology: mesic to dry-mesic
Landform: mountain sideslopes, knobs with exposed or shallow bedrock
Vegetation: A mesic to dry, high-alpine type where *Luzula arcuata* is the dominant vascular species. A diverse and well-developed lichen mat is generally dominated by fruticose lichen species and specifically by members of the *Cladina* genus with *Cladina stellaris* and *C. mitis* constant at high cover and *C. rangiferina* locally abundant. Additional lichen species belonging to the *Stereocaulon* genus and *Thamnolia vermicularis* are constant at low abundance; *Flavocetraria nivalis* is locally abundant. The forb and moss strata are diverse but poorly-developed. The forb, *Silene acaulis* is constant at low cover and the moss, *Dicranum fuscescens* achieves local abundance. Exposed, lichen-encrusted bedrock is common.
Succession and Disturbance: early- to mid-seral; avalanche, wind
Landcover Class: Dwarf Shrub - Lichen - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Salix stolonifera	50	4	-
Forb			
Campanula lasiocarpa	50	1	-
Cardamine bellidifolia	50	1	-
Huperzia selago	50	3	-
Saxifraga bronchialis	50	1	-
Saxifraga ferruginea	50	2	-
Silene acaulis	100	1	-
Graminoid			
Anthoxanthum monticola ssp. *alpinum*	100	2	1-2
Carex microchaeta	50	2	-
Festuca brevissima	50	1	-
Luzula arcuata	100	18	6-30
Moss			
Andreaea rupestris	50	2	-
Dicranum fuscescens	50	10	-
Moss sp.	50	1	-
Polytrichum sp.	50	2	-
Racomitrium lanuginosum	50	2	-
Liverwort			
Scapania sp.	50	2	-
Lichen			
Cetraria sp.	50	4	-
Cetraria islandica	50	1	-
Cladina sp.	50	3	-
Cladina mitis	100	9	7-10
Cladina rangiferina	50	18	-
Cladina stellaris	100	14	5-22
Cladonia bellidiflora	50	4	-
Flavocetraria nivalis	50	10	-
Lichen sp.	50	5	-
Stereocaulon sp.	100	6	1-10
Thamnolia vermicularis	100	2	1-3





Poa eminens - Argentina egedii

Number of Plots Sampled: 1 (1.06)
Rank: G4 S4
Other Studies: Crow 1977, Ritchie et al. 1981
Distribution: small-medium patch; local occurrence
Slope: 1°
Aspect: 230°
Elevation: 7 m
Hydrology: brackish - mesic
Landform: upper tidal flats
Vegetation: A mesic, coastal meadow where the salt- and flood-tolerant forbs *Argentina egedii* and *Lathyrus japonicus* var. *maritimus* and the grass *Poa eminens* are the dominant, nominal species. Woody and nonvascular species are not represented; species diversity is generally low. Litter covers much of the ground surface.
Succession and Disturbance: early-seral; storm-tidal flooding
Landcover Class: Mesic Herbaceous Coastal

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Forb			
Argentina egedii	100	35	-
Conioselinum gmelinii	100	3	-
Lathyrus japonicus	100	25	-
Graminoid			
Poa eminens	100	65	-





Trichophorum cespitosum

Number of Plots Sampled: 1 (21.08)
Rank: G5 S5
Other Studies: Shephard 1995, DeVelice et al. 1999, Boggs et al. 2008a, Boggs et al. 2008b
Distribution: small patch; local occurrence
Slope: 1°
Aspect: 218°
Elevation: 999 m
Hydrology: very wet
Landform: headwater fen
Vegetation: A wet, subalpine to alpine meadow where the rush, *Trichophorum cespitosum* is dominant and the sedges *Carex anthoxanthea* and *C. macrochaeta* are subdominant. This association occurs as a headwater fen over base-rich parent materials. Sites are typically level to gently sloping with smooth or slightly hummocky topography. Soils are permanently saturated but rarely inundated (MacKenzie and Moran 2004); however, standing water is present.
Succession and Disturbance: mid-seral; seasonal flooding
Landcover Class: Wet Herbaceous

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Empetrum nigrum	100	1	-
Salix stolonifera	100	3	-
Vaccinium uliginosum	100	5	-
Forb			
Artemisia arctica	100	1	-
Caltha leptosepala	100	1	-
Erigeron peregrinus	100	3	-
Geum calthifolium	100	5	-
Parnassia palustris	100	2	-
Petasites frigidus var. *frigidus*	100	2	-
Platanthera dilatata	100	1	-
Polygonum viviparum	100	1	-
Sanguisorba canadensis	100	5	-
Graminoid			
Carex anthoxanthea	100	10	-
Carex macrochaeta	100	5	-
Carex saxatilis	100	10	-
Carex scirpoidea	100	3	-
Juncus mertensianus	100	5	-
Trichophorum cespitosum	100	35	-
Moss			
Sphagnum warnstorfii	100	5	-



Nonvascular Plant Associations

Andreaea blyttii

Number of Plots Sampled: 1 (18.03)
Rank: GNR SNR
Other Studies: none
Distribution: small patch; local occurrence
Slope: 12°
Aspect: 116°
Elevation: 1244 m
Hydrology: mesic
Landform: mountain sideslopes, benches,
Vegetation: An upland, subalpine to alpine type where the moss, *Andreaea blyttii* is the dominant species and the liverwort, *Anthelia juratzkana*, is subdominant. Both species are commonly found on wet, acidic rock and in Klondike occur over glaciated bedrock flushed by upgradient snowmelt. *Anthelia juratzkana* has been found to be a major component of cryptogamic crust forming over volcanic deposits in Aniachak National Park and Preserve (Boucher et al. 2012). Vascular species are absent or sparse; species diversity is generally low.
Succession and Disturbance: early-seral; avalanche, glaciation
Landcover Class: Ericaceous Dwarf Shrub - Rock

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Graminoid			
Carex pyrenaica ssp. *micropoda*	100	1	-
Moss			
Andreaea blyttii	100	65	-
Liverwort			
Anthelia juratzkana	100	10	-
Lichen			
Solorina crocea	100	1	-



Racomitrium lanuginosum - Crustose Lichen

Number of Plots Sampled: 1 (12.02)
Rank: GNR SNR
Other Studies: Shacklette et al. 1969, Boucher et al. 2012
Distribution: medium patch; scattered occurrence
Slope: 23°
Aspect: 260°
Elevation: 427 m
Hydrology: dry
Landform: talus, alluvial fans
Vegetation: An upland, low-elevation to alpine type where the dry, acidic site moss, *Racomitrium lanuginosum* is the dominant species and crustose lichen species cover rock surfaces. This association appears to occur on stable talus and presumably, dry, recently-exposed bedrock. Woody species are sparse and herbaceous species are not represented. Species diversity is low.
Succession and Disturbance: early-seral; rockfall, avalanche
Landcover Class: Rock-Bare Ground



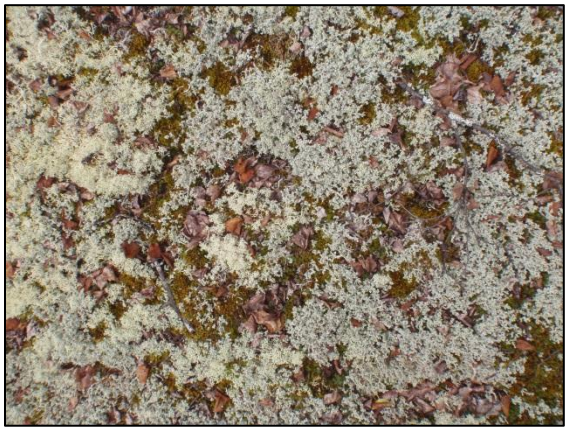
Scientific Name	Con-stancy	Cover (%) Ave.	Range
Tree			
Betula papyrifera	100	1	-
Shrub			
Alnus viridis ssp. *sinuata*	100	1	-
Menziesia ferruginea	100	1	-
Moss			
Dicranum sp.	100	1	-
Pleurozium schreberi	100	1	-
Polytrichum sp.	100	1	-
Racomitrium lanuginosum	100	10	-
Liverwort			
Ptilidium ciliare	100	3	-
Lichen			
Cladina rangiferina	100	2	-
Cladina stellaris	100	2	-
Cladonia sp.	100	1	-
Lichen, crustose	100	60	-
Umbilicaria angulata	100	5	-



Stereocaulon paschale

Number of Plots Sampled: 1 (3.03)
Rank: GNR SNR
Other Studies: a similar association was described by Brock and Burke (1980) from the Ray Mountains in central Alaska.
Distribution: small patch; local occurrence
Slope: 19°
Aspect: 120°
Elevation: 50 m
Hydrology: dry
Landform: mountain sideslopes, bedrock benches
Vegetation: An upland, low-elevation to alpine type where the early-seral, dry site lichen, *Stereocaulon paschale* is the dominant species (Holt 2007). The fruticose lichen species, *Cladonia uncialis* and *Cladina stellaris* and the moss *Dicranum scoparium* are subdominant. This association appears to occur on exposed bedrock and presumably vegetated talus. Woody species are sparse and herbaceous species are not represented. Species diversity is low.
Succession and Disturbance: mid-seral; no significant disturbance other than frequent desiccation.
Landcover Class: Hemlock - Paper Birch Open

Scientific Name	Con-stancy	Cover (%) Ave.	Range
Shrub			
Ribes sp.	100	1	-
Forb			
Cryptogramma acrostichoides	100	1	-
Graminoid			
Agrostis scabra	100	1	-
Moss			
Dicranum scoparium	100	12	-
Pleurozium schreberi	100	3	-
Polytrichum juniperinum	100	8	-
Lichen			
Cladina rangiferina	100	5	-
Cladina stellaris	100	10	-
Cladonia gracilis	100	5	-
Cladonia uncialis	100	15	-
Stereocaulon paschale	100	35	-





Discussion

The diversity of natural vegetation and landcover types present in Klondike Gold Rush NHP is captured in coastal, mountain sideslope, alluvial fan and alpine ecological gradients. Generalized locations of these ecological gradients within the Park are shown in Figures 8, 10, 12 and 14; toposequences depicting these gradients are provided in Figures 9, 11, 13 and 15. Because the Dyea area of the Chilkoot Unit is situated along a rising coastline, the progression of landcover types across the landscape mimics a generalized successional sequence, whereas the sequence of landcover classes across the valley bottom, mountainside and alpine landscapes reflect differences in elevation, topography, and disturbance regime.

Coastal Landscapes

The coastal landscape at Dyea is most strongly influenced by isostatic uplift, river flooding and human disturbance (Figures 8 and 9). Following deglaciation in the Pleistocene, the coastal lands at Dyea have been rising at a rate of 21.02 (±4.06) mm/yr (Larsen et al. 2005). This movement elevates land above tidal influence and allows plant species from the inland, non-tidal communities to colonize. In this way, the progression of landcover types encountered across the landscape at Dyea mimics a successional pathway. Moving inland, landcover transitions from unvegetated mudflats, which are inundated twice daily by marine waters, to the lower tidal zone, which is sparsely vegetated by grasses such as *Puccinellia nutkaensis* and succulent forbs such as *Honckenya peploides* that have high tolerance to saline and flooded environments. Depending on topography and freshwater inputs, vegetation in the upper tidal zone transitions to either estuarine or coastal meadow communities. In sheltered locations along tidal sloughs and inlets vegetation is dominated by salt- and flood- tolerant graminoids such as *Carex lyngbyei* and *Deschampsia beringensis*. In more exposed locations along the outer coastline, beach meadows comprised of salt-tolerant, yet flood-intolerant grasses such as *Leymus mollis* and forbs such as *Lathyrus japonicus* ssp. *maritimus* establish. Where tidal influence is limited to storm tide inputs, herbaceous meadows become more diverse with respect to forbs. Beyond the reach of tidal-inundation vegetation transitions to a *Picea sitchensis* woodland with subdominant *Pinus contorta* var. *latifolia*. The residence and extent of halophytic species across these coastal lands are presumably longer and greater due to the tidal history of inland sites.

Flooding and migration of the Taiya River, which enters Lynn Canal at Dyea, directs the types and extent of riparian vegetation within the floodplain. The main Taiya floodplain channel segment consists of multiple to braided segments indicative of high bed loads and frequent channel migrations (Paustian et al. 1994). Flooding from these channels saturates and refreshes soils with nutrient-rich sediment seasonally across the active floodplain and during periods of high flow in the inactive floodplain. Vegetation establishes in response to this flood disturbance gradient. In the most active sections of the floodplain, species with fast juvenile growth rates that require mineral soil for germination and tolerate extended periods of saturation such as shrubs in the *Alnus* and *Salix* genera establish. In the less active portions of the floodplain, shade-intolerant trees such as *Populus balsamifera* ssp. *trichocarpa*, which can withstand a fluctuating groundwater table and is able to overcome sedimentation through suckering and coppice sprouting, colonize (Agee 1988). In the least

active or inactive sections of the floodplain longer-lived, shade-tolerant species with more sustained mature growth rates such as *Picea sitchensis* and *Tsuga heterophylla* establish (USFS 1994, Deal and Harrington 2006). *Picea sitchensis* requires mineral soil for germination and is less shade-tolerant compared to *Tsuga heterophylla* and for these reasons it is more common in the comparatively open and dynamic habitats towards the Taiya River and coastline (USFS 1994). *Tsuga heterophylla* tends to colonize forests following development of organic soils and the stabilization of their landforms.

Human disturbance is variable and thus difficult to quantify. At Dyea, the acute occupation during the gold rush resulted in the denudation of forests, which are now in second growth. Today, Dyea is a prime recreational area that is open to foot, bike and vehicular traffic. The frequent, low-grade ground disturbance resulting from these activities tends to retard natural successional processes and through the exposure of mineral soils, favor the establishment of nonnative plant species, which are well-represented at Dyea.

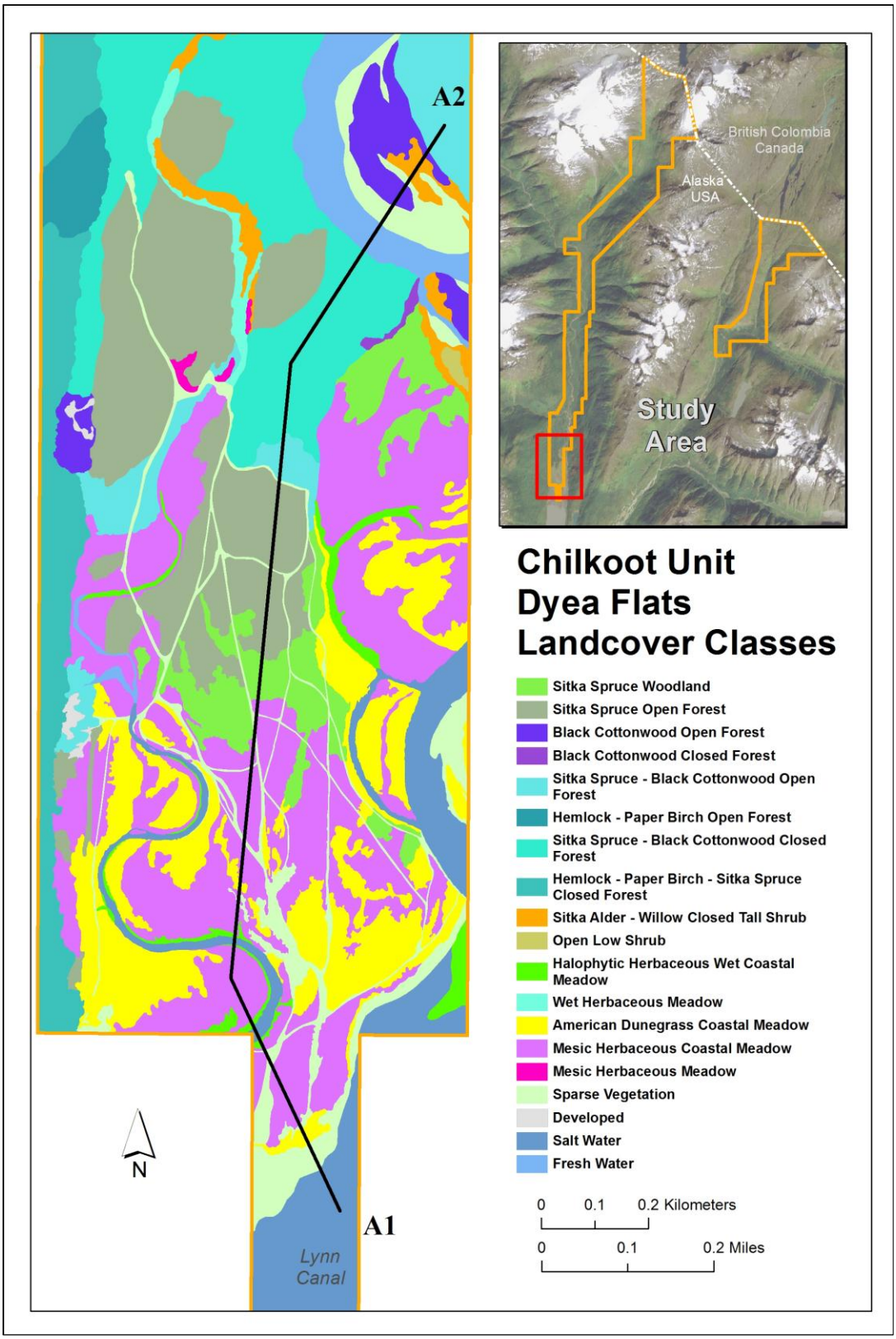


Figure 8 Generalized location of a coastal toposequence at Dyea, Klondike Gold Rush National Historical Park, Alaska.

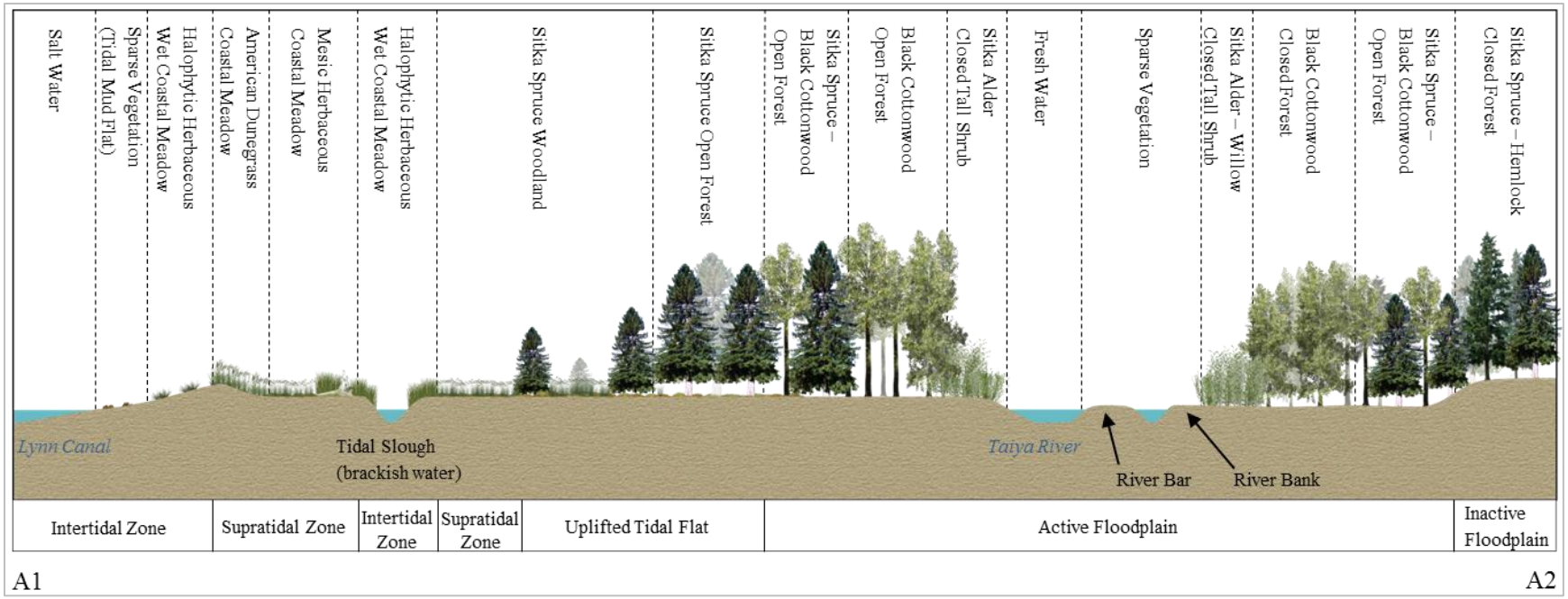


Figure 9 Coastal toposequence at Dyea, Klondike Gold Rush National Historical Park, Alaska

Mountain Valleys and Sideslopes

The progression of landcover types across mountain valleys and sideslopes in Klondike Gold Rush NHP is strongly influenced by disturbance and elevation (Figures 10 and 11). Disturbances such as landslide, avalanche, logging and windthrow that when restricted in scale contribute to a shifting mosaic of vegetation types and the complexity of forest structure and diversity (Deal et al. 2004). These disturbances alter forest vigor and density, which through their relation to light interception by the canopy are thought to be the primary controlling factor in the secondary succession of southeast Alaska forests. In response to the favorable growth conditions created by overstory removal (more light, less competition with conifers), residual shrubs and tree seedlings have been shown to increase their growth with understory biomass peaking 15-25 years post-disturbance. As the forest canopy closes, circa 25-35 years post disturbance, the presence of shrubs and herbs becomes greatly reduced and bryophytes and ferns dominate the understory. This depauperate phase apparently distinguishes the needleleaf forests of southeast Alaska from most other forest types (Alaback 1982). With the opening of canopy gaps 140-160 years post-disturbance, deciduous shrubs and herbs tend to reestablish and increase their abundance and reestablish vertical stratification (Paustian et al. 1994). Old-growth forest types dominated by *Tsuga heterophylla* are achieved in the final stages of succession. These forests are characterized by trees exceeding ages of 250 years, a multilayered canopy and presence of snags and coarse woody debris. The varied mesotopography and substrates of the forest floor in these older types supports a more diverse assemblage of plants, which is often dominated by *Vaccinium* (blueberry) shrubs (Alaback 1982, DeMeo et al. 1992).

The upper reaches of the Taiya and Skagway Rivers are bedrock constrained and not prone to overbank flooding, thus the riparian vegetation comprised of species in the *Alnus, Salix* and *Populus* genera, in these valley bottoms is restricted to narrow stringers that flank river and tributary banks. Mountain valley and sideslopes are forested with extensive stands of *Picea sitchensis* and *Tsuga heterophylla*; in White Pass where valley bottoms are more affected by cold air drainage, *Abies lasiocarpa* shares dominance. On cliffs and broken sideslopes, the presence of *Betula papyrifera* increases, in the Chilkoot Unit, pure stands of *Pinus contorta* var. *latifolia* develop on the most exposed bedrock knolls. In both the Chilkoot and White Pass units, upper mountain sideslopes are forested by members of the *Tsuga* genus with species dominance transitioning from *T. heterophylla* to *T. mertensiana* and *Abies lasiocarpa* becoming codominant in the subalpine. With increasing exposure, the growth of *Tsuga mertensiana* and *Abies lasiocarpa* is restricted to dwarf stature and often krummholz form.

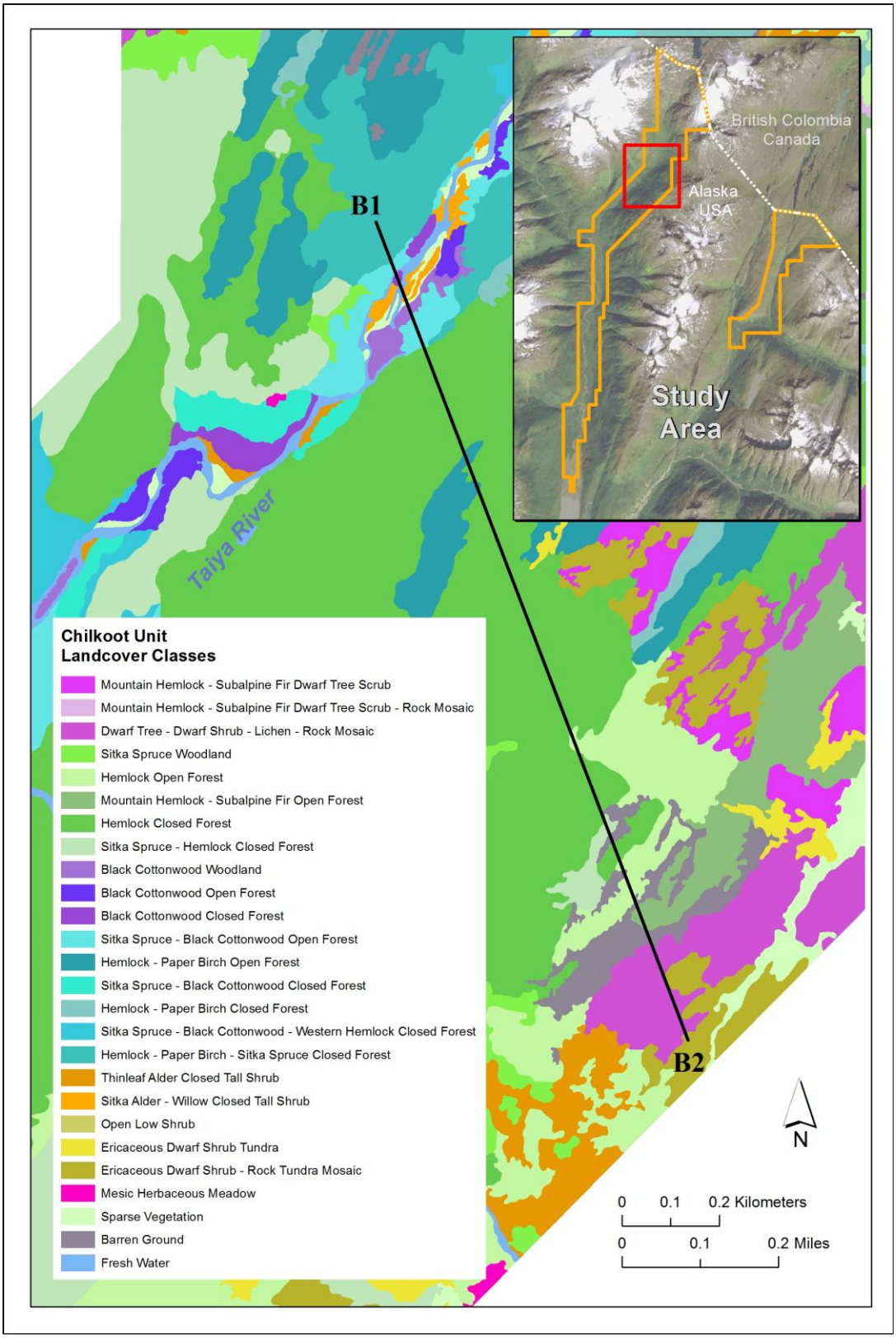


Figure 10 Generalized location of a mountain valley and sideslope toposequence, Klondike Gold Rush National Historical Park, Alaska.

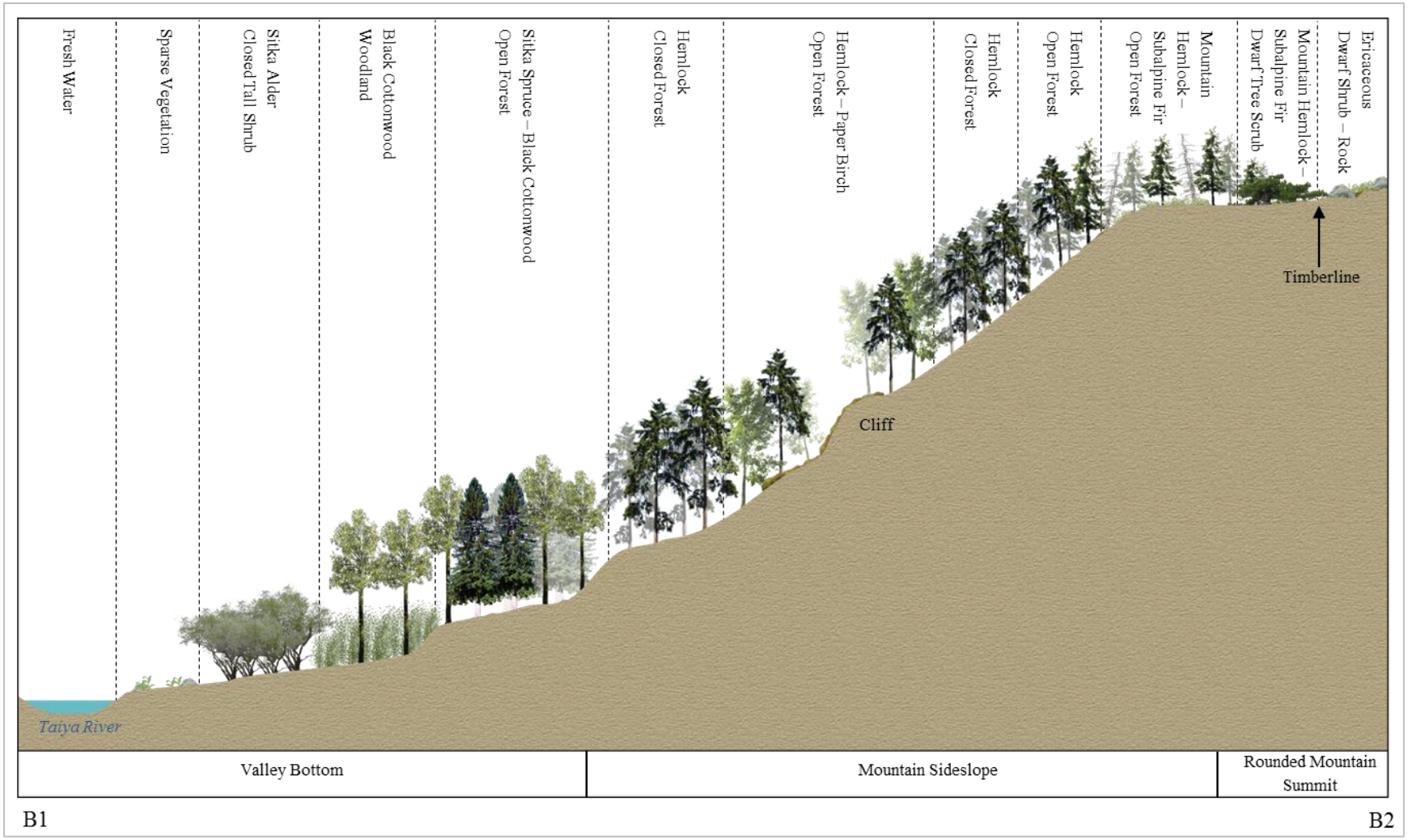


Figure 11 Mountain valley and sideslope toposequence, Klondike Gold Rush National Historical Park, Alaska.

Alluvial Fans

The steep and geologically-young environment that characterizes much of Klondike Gold Rush NHP makes sideslopes susceptible to mass wasting processes such as landslide, avalanche and glacial outburst flooding (Figures 12 and 13). Where this movement of earth, snow or water results in the denudation of vegetation, primary succession is initiated. Alluvial fans, built by debris flow, exemplify a typical sequence of landcover classes across this type of large-scale disturbance gradient. Here, barren to sparsely-vegetated types found in the most disturbed, medial sections of the fan grade to open cover of low shrubs belonging to the *Alnus* and *Salix* genera. With time, shrub thickets close and herbaceous meadows develop in topographic lows that have a higher rate of organic matter accumulation and subsequently, greater water retention. On stable, lateral portions of the fan, *Populus balsamifera* ssp. *trichocarpa* woodlands may develop. Beyond the extent of alluvial deposition, vegetation transitions to whichever type the fan intruded.

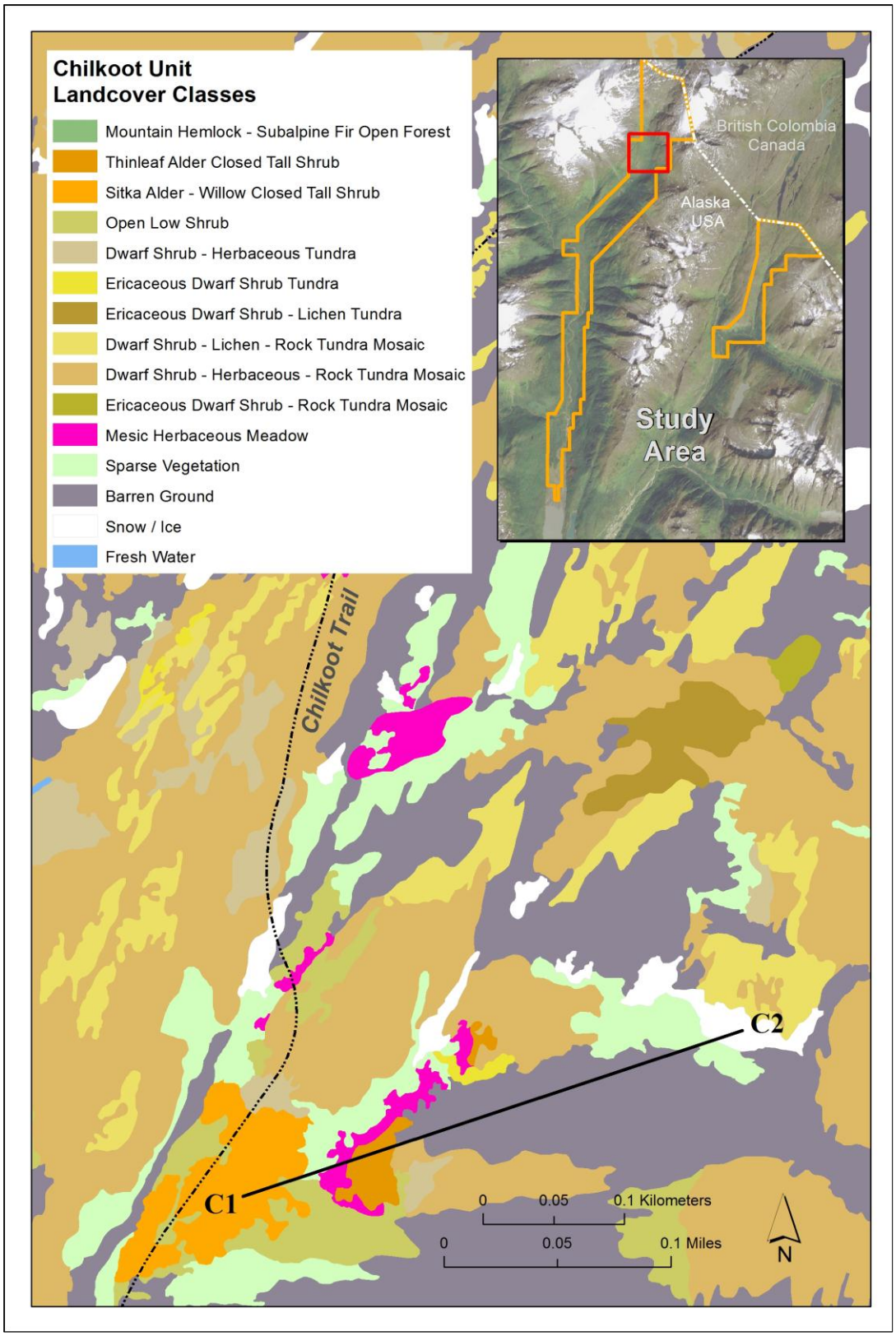


Figure 12 Generalized location of an alluvial fan toposequence, Unit, Klondike Gold Rush National Historical Park, Alaska.

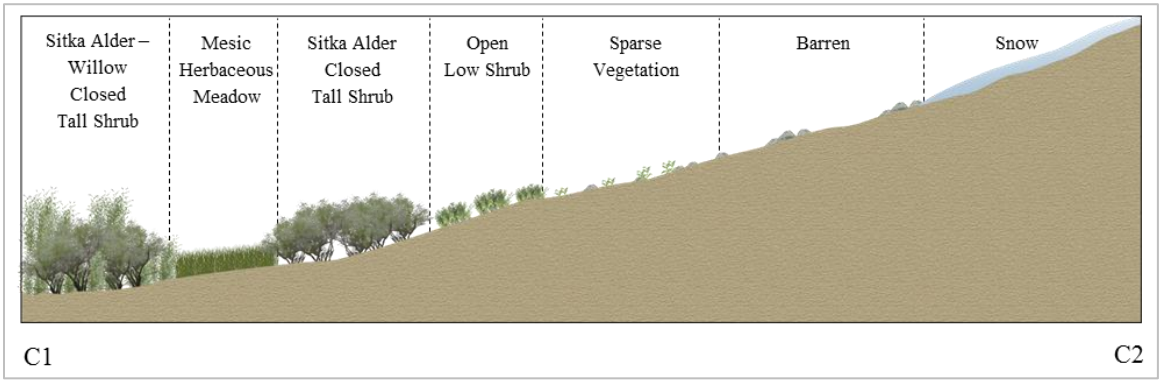


Figure 13 Alluvial fan toposequence, Klondike Gold Rush National Historical Park, Alaska.

Alpine Landscapes

The alpine landscape in Klondike Gold Rush NHP is most strongly influenced by time since disturbance (i.e. successional stage) and exposure. Alpine succession is a slow and thus poorly-understood process (Marcante et al. 2009) that is difficult to isloate from the influences of site condition. Generally, primary succession in alpine environments proceeds from bare rock or soil. These substrates are pioneered by dry lichen communities, which are colonized by xeric mosses that serve as germination beds for vascular plants (Cox 1933). The repetitive establishment and mortality of seedlings in these impoverished beds eventually cumulates in a thin hummus or poor soil sufficient to allow early colonizers to complete their life cycle (Cox 1933). Continued soil development allows vegetation to build and for larger, often woody, life-forms to establish (Figures 14 and 15).

In both the Chilkoot and White Pass Units units, ice and perennial snow are well-represented in the highest alpine environments. In areas of high exposure or recent deglaciation, landcover ranges from barren to lichen-encrusted bedrock. With increasing protection and/or time since disturbance a sparse cover of graminoid species such as *Luzula piperi, L. arcuata* and *Carex pyrenaica* and nonvascular species belonging to the *Cladina* genus and *Racomitrium lanuginosum* may develop. In more protected, lower elevation sites, fruticose lichens in the genus *Cladina* proliferate in association with *Harrimanella stelleriana* and *Empetrum nigrum*. Well-protected areas that retain snow late into the growing season are dominated by the ericaceous dwarf shrubs *Harrimanella stelleriana, Cassiope mertensiana*, *Phyllodoce glanduliflora,* and *Empetrum nigrum,* the dwarf shrub *Luetkea pectinata* and a diversity of subalpine forbs such as *Artemisia arctica*, *Arnica lessingii*, *Athyrium filix-femina* and *Veratrum viride*. Wet herbaceous communities dominated by *Carex anthoxanthea* and *Trichophorum cespitosum* develop in headwater fens and fringing lakes and drainage paths. The transition from alpine to subalpine is most commonly occupied by dwarf forests codominated by *Tsuga mertensiana* and *Abies lasiocarpa* and thickets of the tall shrub, *Alnus viridis* ssp. *sinuata*.

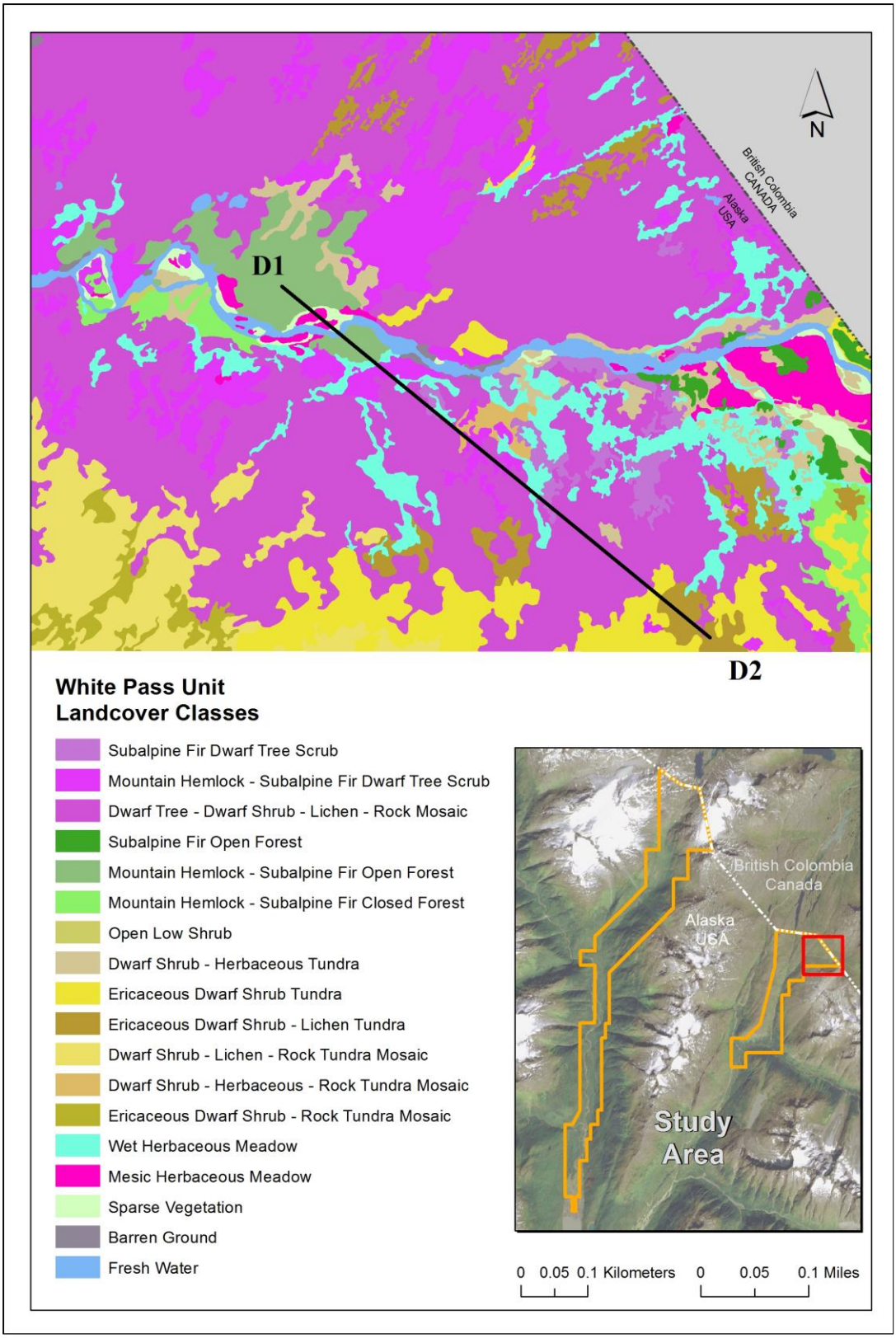


Figure 14 Generalized location of an alpine toposequence, Klondike Gold Rush National Historical Park, Alaska.

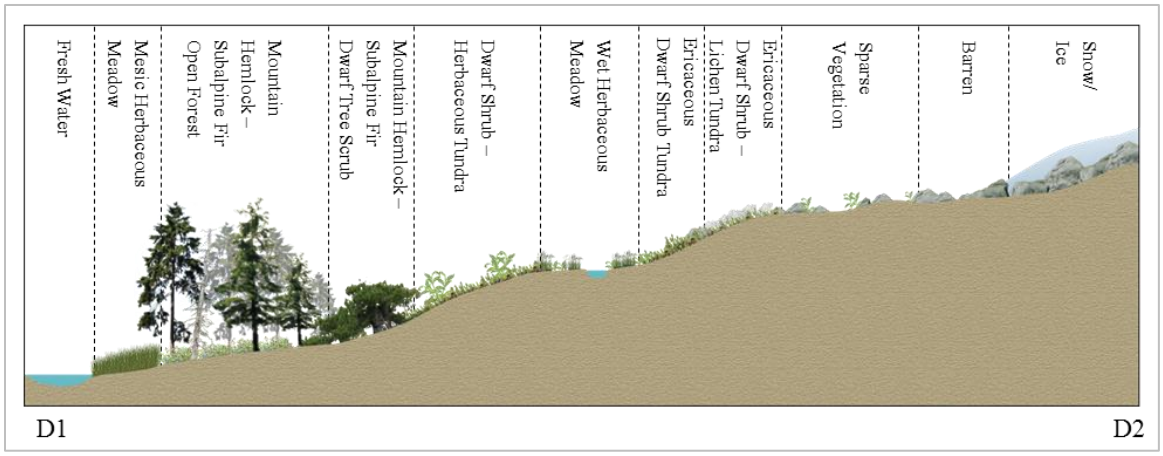


Figure 15 Alpine toposequence, Klondike Gold Rush National Historical Park, Alaska.

Conclusions

This project addresses landcover at both the map class and plant association levels for Klondike Gold Rush National Historical Park (NHP). Landcover is classified, described and mapped at the map class level and classified and described at the plant association level. The 57 map classes and 86 plant associations described herein are based on the Alaska Vegetation Classification (Viereck et al. 1992) and informed by the floristics of 180 field plots. Landcover distribution was manually digitized on current aerial photography in a GIS environment and attributed at the map class level. The landcover information presented here provides an inventory from which the status, condition and trend of natural resources within Klondike Gold Rush NHP can be monitored.

There are several measures that could be taken to improve the accuracy of the landcover classifications and map presented here. The broad climatic and ecological gradients traversed by the Chilkoot and White Passes result in a considerable number of plant associations, many of which are considered provisional due to the paucity of supporting plot data. Additional vegetation survey within the map classes that house these provisional plant associations, especially in the White Pass Unit where access was limited, would help refine their classification. With respect to landcover mapping, acquisition of higher-resolution imagery for the areas of the Chilkoot Unit for which aerial photography is not currently available would allow classes to be mapped with greater accuracy. Both the addition of plot data and higher-resolution imagery would provide a reference dataset that could be used to assess the accuracy of the landcover map.

The completion of this project concludes the Inventory and Monitoring Program's initial phase of documenting the dominant vegetation types within Alaska's National Park units. While similar methodologies were employed for each park, the individual datasets have not been reconciled to a single database. The compilation of plot data across Alaska park units would promote the multiscale assessment of the status, condition and trend of key natural resources within NPS networks and potentially regions. External to park units, a compilation of plot data would assist the development of a unified vegetation classification that could be applied to future landcover mapping on the wall-to-wall orthomosaic image that is currently in production for the state.

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Appendix A: Conservation Status Ranks

Conservation Status Ranks

Determining which species and ecosystems are thriving and which are rare or declining is crucial for targeting conservation towards elements of biodiversity in greatest need. NatureServe and its member programs and collaborators use a suite of factors to assess the conservation status of plant, animal, and fungal species, as well as ecological communities and systems. These assessments lead to the designation of a conservation status rank. For species these ranks provide an estimate of extinction risk, while for ecological communities and systems they provide an estimate of the risk of elimination.

Conservation status ranks are based on a scale, ranging from critically imperiled (G1) to demonstrably secure (G5). Status is assessed and documented at two distinct geographic scales-global (G) and state/province (S).

Interpreting Conservation Status Ranks

The conservation status of a species or ecosystem is designated by a number from 1 to 5, preceded by a letter reflecting the appropriate geographic scale of the assessment (G = Global and S = Subnational). The numbers have the following meaning:

1 = critically imperiled
2 = imperiled
3 = vulnerable
4 = apparently secure
5 = secure.

For example, G1 would indicate that a species is critically imperiled across its entire range (i.e., globally). In this sense the species as a whole is regarded as being at very high risk of extinction. A rank of S3 would indicate the species is vulnerable and at moderate risk within a particular state or province, even though it may be more secure elsewhere.

Species and ecosystems are designated with either an "X" (presumed extinct or extirpated) if there is no expectation that they still survive, or an "H" (possibly extinct or extirpated) if they are known only from historical records but there is a chance they may still exist. Other variants and qualifiers are used to add information or indicate any range of uncertainty.

Global and Subnational Assessments

The overall status of a species or ecosystem is regarded as its "global" status; this range-wide assessment of condition is referred to as its global conservation status rank (G-rank). Because the G-rank refers to the species or ecosystem as a whole, each species or ecosystem can have just a single global conservation status rank. Status can vary by state or province, and thus subnational conservation status ranks (S-rank) document the condition of the species or ecosystem within a particular state or province. Again, there may be as many subnational conservation status ranks as the number of states or provinces in which the species or ecosystem occurs.

Subnational status ranks must always be equal to or lower than the global rank for a particular species or ecosystem (in this sense a "lower" number indicates greater risk). On the other hand, it is possible for a species or ecosystem to be more imperiled in a given state/province than it is range-wide. As an example, a species may be common and secure globally (G5), yet critically imperiled in Florida (S1). In the United States and Canada, the combination of global and subnational ranks (e.g., G3S1) are widely used to place local priorities within a broader conservation context.

Status Assessment Criteria

Use of standard criteria and rank definitions makes NatureServe conservation status ranks comparable across organism types and political boundaries. Thus, G1 has the same basic meaning whether applied to a salamander, a moss species, or a forest community. Similarly, an S1 has the same meaning whether applied to a species or ecosystem in Manitoba, Minnesota, or Mississippi. This standardization in turn allows NatureServe scientists to use the subnational ranks assigned by heritage programs and conservation data centers to help determine and refine global conservation status ranks.

Ten factors are used to assess conservation status, grouped into three categories – **rarity**, **trends**, and **threats**.

- Rarity factors are Population Size (for species), Range Extent, Area of Occupancy, Number of Occurrences (i.e., distinct populations), Number of Occurrences or Percent Area with Good Viability/Ecological Integrity, and Environmental Specificity.
- Trends factors are Long- and Short-term Trend in population size or area.
- Threats factors are overall Threat Impact, which is determined by considering the scope and severity (i.e., magnitude or impact) of major threats, and Intrinsic Vulnerability. NatureServe has developed a “rank calculator” to increase the repeatability and transparency of its ranking process. The “rank calculator” assigns a conservation status rank, based on weightings assigned to each factor and some conditional rules.

Relationship to Other Status Designations

NatureServe conservation status ranks are a valuable complement to legal status designations assigned by government agencies such as the U.S. Fish and Wildlife Service and the National Marine Fisheries Service in administering the U.S. Endangered Species Act (ESA), and the Canadian Wildlife Service in administering the Species at Risk Act (SARA). NatureServe status ranks, and the documentation that support them, are often used by such agencies in making official determinations, particularly in the identification of candidates for legal protection. Because NatureServe assessment procedures-and subsequent lists of imperiled and vulnerable species-have different criteria, evidence requirements, purposes, and taxonomic coverage than official lists of endangered and threatened species, they do not necessarily coincide.

The International Union for Conservation of Nature (IUCN) Red List of threatened species is similar in concept to NatureServe's global conservation status assessments. NatureServe is an active participant in the IUCN Red List Programme, and in the region covered by NatureServe Explorer, NatureServe status ranks and their underlying

documentation often form a basis for Red List threat assessments. In recent years, NatureServe has worked with IUCN to standardize the ratings for shared information fields, such as Range Extent, Area of Occupancy, Population Size, and Threats. This standardization permits the sharing of information between organizations and countries, and allows the information to be used in both IUCN as well as NatureServe assessments.

Global Conservation Status Definitions

Listed below are definitions for interpreting NatureServe global (range-wide) conservation status ranks. These ranks are assigned by NatureServe scientists or by a designated lead office in the NatureServe network.

Rank	Definition
GX	Presumed Extinct (species)—Not located despite intensive searches and virtually no likelihood of rediscovery. Eliminated (ecological communities)—Eliminated throughout its range, with no restoration potential due to extinction of dominant or characteristic taxa and/or elimination of the sites and disturbance factors on which the type depends.
GH	Possibly Extinct (species) Eliminated (ecological communities and systems) — Known from only historical occurrences but still some hope of rediscovery. There is evidence that the species may be extinct or the ecosystem may be eliminated throughout its range, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20 - 40 years despite some searching or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or eliminated throughout its range.[1]
G1	Critically Imperiled—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.
G2	Imperiled—At high risk of extinction or elimination due to very restricted range, very few populations, steep declines, or other factors.
G3	Vulnerable—At moderate risk of extinction or elimination due to a restricted range, relatively few populations, recent and widespread declines, or other factors.
G4	Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
G5	Secure—Common; widespread and abundant.

[1] Possibly eliminated ecological communities and systems may include ones presumed eliminated throughout their range, with no or virtually no likelihood of rediscovery, but with the potential for restoration, for example, American Chestnut (Forest).

Subnational Conservation Status Definitions

Listed below are definitions for interpreting NatureServe conservation status ranks at subnational (S-rank) levels. The term "subnational" refers to state or province-level jurisdictions (e.g., California, Ontario).

Status	Definition
SX	Presumed Extirpated—Species or ecosystem is believed to be extirpated from the jurisdiction (i.e., nation or state/province). Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
SH	Possibly Extirpated— Known from only historical records but still some hope of rediscovery. There is evidence that the species or ecosystem may no longer be present in the jurisdiction, but not enough to state this with certainty. Examples of such evidence include (1) that a species has not been documented in approximately 20 - 40 years despite some searching or some evidence of significant habitat loss or degradation; (2) that a species or ecosystem has been searched for unsuccessfully, but not thoroughly enough to presume that it is no longer present in the jurisdiction.
S1	Critically Imperiled—Critically imperiled in the jurisdiction because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the jurisdiction.
S2	Imperiled—Imperiled in the jurisdiction because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from jurisdiction.
S3	Vulnerable—Vulnerable in the jurisdiction due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	Apparently Secure—Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5	Secure—Common, widespread, and abundant in the jurisdiction.

Assigning subnational conservation status ranks for species and ecosystems follows the same general principles as used in assigning global status ranks. A subnational rank, however, cannot imply that the species or ecosystem is more secure at the state/province level than it is nationally or globally (i.e., a rank of G1S3 is invalid). Subnational ranks are assigned and maintained by state or provincial NatureServe network programs.

Appendix B: Summary of Site Characteristics for Klondike Gold Rush National Historical Park Park Plots

Plot Number	Date Sampled	Latitude (UTM8, NAD83)	Longitude	Slope (° from level)	Aspect (° from true N)	Elevation (m)	Hydrologic Regime	Landcover Class	Plant Association
1.01	8/21/2011	59.487197	-135.360488	1	180	6	Brackish-Very Wet	Halophytic Herbaceous Wet Coastal Meadow	*Carex lyngbyei*
1.02	8/21/2011	59.490169	-135.359677	2	90	7	Brackish-Mesic	American Dunegrass Coastal Meadow	*Leymus mollis*
1.03	8/21/2011	59.490380	-135.358481	0	NA	4	Brackish-Wet	Mesic Herbaceous Coastal Meadow	*Leymus mollis-Lathyrus japonicus* var. *maritimus*
1.04	8/22/2011	59.494540	-135.361996	1	250	4	Brackish-VeryWet	Halophytic Herbaceous Wet Coastal Meadow	*Carex lyngbyei-Argentina egedii-Poa eminens*
1.05	8/22/2011	59.494710	-135.361241	0	NA	2	Brackish-Wet	Mesic Herbaceous Coastal Meadow	*Argentina egedii-Festuca rubra*
1.06	8/22/2011	59.495000	-135.360087	1	230	7	Brackish-Mesic	Mesic Herbaceous Coastal Meadow	*Poa eminens-Argentina egedii*
1.07	8/22/2011	59.495024	-135.358818	1	230	9	Brackish-Mesic	American Dunegrass Coastal Meadow	*Leymus mollis*
1.08	8/22/2011	59.493106	-135.354170	0	NA	10	Brackish-Mesic	American Dunegrass Coastal Meadow	*Leymus mollis*
1.09	8/22/2011	59.493493	-135.353914	0	NA	10	Brackish-Mesic	Mesic Herbaceous Coastal Meadow	*Plantago maritima-Atriplex alaskensis*
1.10	8/22/2011	59.494832	-135.353116	1	170	10	Mesic	Mesic Herbaceous Coastal Meadow	*Carex gmelinii-Leymus mollis*
1.11	8/22/2011	59.495948	-135.357378	0	NA	7	Dry-Mesic	Mesic Herbaceous Coastal Meadow	*Festuca rubra*
1.12	8/22/2011	59.499544	-135.361187	1	230	5	Brackish-Very Wet	Halophytic Herbaceous Wet Coastal Meadow	*Carex lyngbyei*
1.13	8/22/2011	59.499600	-135.361001	1	130	-3	Brackish-VeryWet	Mesic Herbaceous Coastal Meadow	*Poa eminens-Juncus haenkei*
1.14	8/22/2011	59.499738	-135.360865	1	230	2	Mesic	Mesic Herbaceous Coastal Meadow	*Leymus mollis-Achillea millefolium* var. *borealis*
1.15	8/22/2011	59.500468	-135.360628	0	NA	13	Mesic	Sitka Spruce Woodland	*Picea sitchensis*/Seral Herb
1.16	8/22/2011	59.498885	-135.356662	0	NA	21	Dry-Mesic	Sitka Spruce Open Forest	*Picea sitchensis/Hylocomium splendens*
2.01	8/9/2011	59.499363	-135.350469	0	NA	5	Dry-Mesic	Mesic Herbaceous Coastal Meadow	Culturally-modified
2.02	8/9/2011	59.499696	-135.352003	0	NA	3	Mesic	American Dunegrass Coastal Meadow	*Leymus mollis*
2.03	8/9/2011	59.500711	-135.352201	6	19	3	Mesic-Wet	Mesic Herbaceous Coastal Meadow	*Deschampsia beringensis*
2.04	8/9/2011	59.501620	-135.351978	0	NA	15	Mesic	Mesic Herbaceous Coastal Meadow	Culturally-modified
2.05	8/9/2011	59.502295	-135.351052	0	NA	11	Mesic	Mesic Herbaceous Coastal Meadow	Culturally-modified
2.06	8/21/2011	59.502762	-135.353494	0	NA	10	Dry-Mesic	Sitka Spruce Woodland	*Picea sitchensis*/Seral Herb
2.07	8/21/2011	59.504801	-135.353317	0	NA	45	Not recorded	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Rhytidiadelphus species*
2.08	8/21/2011	59.503990	-135.357473	0	NA	23	Wet	Wet Herbaceous Meadow	*Alnus rubra/Myrica gale*
2.09	8/21/2011	59.504630	-135.356112	0	NA	20	Mesic	Sitka Spruce Open Forest	*Picea sitchensis/Hylocomium splendens*
2.10	8/21/2011	59.507013	-135.358897	0	NA	23	Mesic	Sitka Spruce Open Forest	*Picea sitchensis/Hylocomium splendens*
3.01	8/20/2011	59.524513	-135.359933	24	138	41	Mesic	Sitka Spruce - Paper Birch Open Forest	*Betula papyrifera-Picea sitchensis/Hylocomium splendens*

Plot Number	Date Sampled	Latitude (UTM8, NAD83)	Longitude	Slope (° from level)	Aspect (° from true N)	Elevation (m)	Hydrologic Regime	Landcover Class	Plant Association
3.02	8/20/2011	59.524286	-135.363326	18	78	118	Mesic	Hemlock - Paper Birch Closed Forest	*Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea*
3.03	8/20/2011	59.523036	-135.360354	19	120	50	Dry	Hemlock - Paper Birch Open Forest	*Stereocaulon paschale*
3.04	8/20/2011	59.523385	-135.356871	0	NA	50	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
3.05	8/20/2011	59.519443	-135.356066	0	NA	42	Mesic	Black Cottonwood - Paper Birch - Sitka Spruce Closed Forest	*Populus balsamifera* ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*
3.06	8/20/2011	59.517936	-135.353854	0	NA	14	Mesic	Open Low Shrub	Culturally-modified
3.07	8/20/2011	59.517361	-135.350897	0	NA	18	Mesic	Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
3.08	8/20/2011	59.516198	-135.350716	0	NA	38	Mesic	Black Cottonwood - Paper Birch Closed Forest	*Populus balsamifera* ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*
4.01	8/20/2011	59.529353	-135.351192	0	NA	18	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
4.02	8/20/2011	59.530740	-135.351949	30	136	38	Mesic	Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Betula papyrifera-Picea sitchensis/Hylocomium splendens*
4.03	8/20/2011	59.530367	-135.350688	0	NA	13	Mesic	Thinleaf Alder Closed Tall Shrub	*Picea sitchensis-Betula papyrifera/Alnus incana* ssp. *tenuifolia/Cornus sericea* ssp. *sericea*
4.04	8/20/2011	59.532331	-135.348807	0	NA	-2	Mesic	Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Gymnocarpium dryopteris*
4.05	8/20/2011	59.532437	-135.348173	0	NA	-13	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
4.06	8/20/2011	59.533678	-135.348021	0	NA	19	Mesic	Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
4.07	8/20/2011	59.531048	-135.345727	0	NA	22	Mesic	Black Cottonwood Woodland	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
4.08	8/20/2011	59.522012	-135.346094	0	NA	1	Mesic-Wet	Thinleaf Alder Closed Tall Shrub	*Alnus incana* ssp. *tenuifolia-Alnus viridis* ssp. *sinuata*
4.09	8/20/2011	59.527196	-135.347496	0	NA	26	Mesic	Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
5.01	8/18/2011	59.558503	-135.336193	0	NA	41	Mesic	Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa-Tsuga heterophylla*/Depauperate
5.02	8/18/2011	59.558597	-135.338084	0	NA	39	Mesic	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
5.03	8/18/2011	59.559911	-135.341166	6	270	35	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*

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5.04	8/18/2011	59.559971	-135.343057	0	NA	40	Mesic	Sitka Spruce Open Forest	*Picea sitchensis/Hylocomium splendens*
5.05	8/18/2011	59.560085	-135.344468	0	NA	45	Wet	Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
5.06	8/18/2011	59.560223	-135.345215	0	NA	38	Wet	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
5.07	8/18/2011	59.562796	-135.341817	0	NA	34	Dry-Mesic	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cladina* species
6.01	8/18/2011	59.578503	-135.327857	24	290	79	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
6.02	8/19/2011	59.573341	-135.336156	4	290	66	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
6.03	8/19/2011	59.571412	-135.337995	0	NA	47	Mesic-Wet	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
6.04	8/19/2011	59.565595	-135.337668	3	295	54	Mesic	Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Cornus sericea* ssp. *sericea*
6.05	8/19/2011	59.565466	-135.336143	8	270	71	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Gymnocarpium dryopteris*
6.06	8/19/2011	59.567259	-135.336458		NA	92	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
7.01	8/17/2011	59.592123	-135.327313	0	NA	54	Wet	Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
7.02	8/17/2011	59.595073	-135.326141	0	NA	65	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis*/Depauperate
7.03	8/17/2011	59.595395	-135.324892	24	285	98	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Hylocomium splendens*
7.04	8/17/2011	59.599789	-135.327836	0	NA	75	Mesic	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
7.05	8/17/2011	59.605342	-135.324159	0	NA	118	Mesic	Hemlock Open Forest	*Tsuga heterophylla/Menziesia ferruginea*
8.01	8/16/2011	59.611659	-135.346595	13	120	157	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Hylocomium splendens*
8.02	8/16/2011	59.611447	-135.345537	5	90	101	Mesic	Black Cottonwood Woodland	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
8.03	8/16/2011	59.611404	-135.343186	1	86	111	Mesic	Black Cottonwood Woodland	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
8.04	8/16/2011	59.611490	-135.342101	2	126	84	Mesic	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
8.05	8/16/2011	59.611944	-135.337790	0	NA	104	Mesic	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*

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8.06	8/16/2011	59.610730	-135.337044	0	NA	88	Mesic	Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
9.01	8/16/2011	59.628450	-135.309897	3	230	287	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Oplopanax horridus*
9.02	8/16/2011	59.627228	-135.311151	32	325	230	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea*
9.03	8/16/2011	59.626212	-135.312955	35	330	227	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Oplopanax horridus*
9.04	8/16/2011	59.623963	-135.322390	30	300	194	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Hylocomium splendens*
9.05	8/16/2011	59.623163	-135.323467	10	290	184	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Hylocomium splendens*
10.01	8/11/2011	59.631127	-135.285177	2	220	664	Mesic-Wet	Hemlock Open Forest	*Tsuga mertensiana/Vaccinium ovalifolium*
10.02	8/11/2011	59.631674	-135.286466	37	345	652	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga mertensiana-Picea sitchensis*/Moss
10.03	8/11/2011	59.636640	-135.287509	24	325	381	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea*
10.04	8/11/2011	59.639346	-135.291816	5	305	230	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea*
11.01	8/12/2011	59.656236	-135.264636	10	290	303	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
11.02	8/12/2011	59.656464	-135.266384	0	NA	307	Mesic	Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
11.03	8/12/2011	59.657328	-135.266214	6	220	281	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea*
11.04	8/12/2011	59.652961	-135.265725	10	270	279	Mesic	Hemlock - Paper Birch Closed Forest	*Betula papyrifera-Tsuga heterophylla/Oplopanax horridus*
11.05	8/12/2011	59.650671	-135.271831	0	NA	236	Wet	Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
11.06	8/12/2011	59.653672	-135.269407	0	NA	276	Wet	Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
12.01	8/12/2011	59.660168	-135.263423	11	230	385	Mesic	Paper Birch Open Forest	*Betula papyrifera/Menziesia ferruginea*
12.02	8/12/2011	59.660732	-135.261538	23	260	427	Dry	Barren	*Racomitrium lanuginosum*-Crustose Lichen
12.03	8/12/2011	59.660371	-135.260138	38	267	480	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Dryopteris expansa*
12.04	8/12/2011	59.661491	-135.258685	36	280	540	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea*
13.01	8/12/2011	59.665506	-135.265610	11	216	405	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Tsuga mertensiana/Vaccinium vitis-idaea*
13.02	8/12/2011	59.665736	-135.264154	22	250	381	Mesic	Hemlock Closed Forest	*Tsuga heterophylla-Tsuga mertensiana*
13.03	8/12/2011	59.666123	-135.262619	20	238	446	Mesic	Hemlock - Paper Birch Closed Forest	*Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea*

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13.04	8/12/2011	59.664606	-135.266516	5	247	365	Mesic	Hemlock - Paper Birch Open Forest	*Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea*
13.05	8/12/2011	59.664237	-135.266515	2	280	357	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
14.01	8/15/2011	59.684898	-135.249817	16	253	723	Mesic/Mesic-Wet	Sitka Alder - Willow Closed Tall Shrub	*Alnus viridis* ssp. *sinuata-Salix alaxensis*
14.02	8/15/2011	59.680489	-135.253205	17	342	641	Dry-Mesic	Sparse Vegetation	*Cladonia species-Cladina* species
14.03	8/15/2011	59.679721	-135.254698	17	342	614	Not recorded	Sitka Alder - Willow Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Oplopanax horridus*
14.04	8/15/2011	59.675355	-135.263958	6	210	488	Mesic	Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
14.05	8/15/2011	59.673713	-135.265722	11	180	460	Mesic	Mountain Hemlock-Subalpine Fir Open Forest	*Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea*
14.06	8/15/2011	59.670393	-135.266450	11	147	423	Mesic	Mountain Hemlock - Subalpine Fir Closed Forest	*Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea*
14.07	8/15/2011	59.667997	-135.266964	18	290	397	Not recorded	Mountain Hemlock - Subalpine Fir Closed Forest	*Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea*
14.08	8/15/2011	59.663686	-135.267044	6	260	366	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Oplopanax horridus*
14.09	8/15/2011	59.662983	-135.267840	9	250	342	Mesic	Paper Birch Open Forest	*Betula papyrifera/Alnus viridis* ssp. *sinuata*
15.01	8/14/2011	59.690414	-135.246042	30	129	835	Mesic	Dwarf Shrub - Herbaceous Tundra	*Phyllodoce glanduliflora*
15.02	8/14/2011	59.685371	-135.251080	7	207	733	Mesic-Wet	Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	*Luetkea pectinata/Leptarrhena pyrolifolia*
15.03	8/14/2011	59.681121	-135.253478	2	220	640	Dry-Mesic	Sparse Vegetation	*Chamerion latifolium*
15.04	8/14/2011	59.680904	-135.255592	5	223	623	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Empetrum nigrum/Cladina* species
15.05	8/14/2011	59.682065	-135.255629	14	154	674	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Menziesia ferruginea*
15.06	8/14/2011	59.682626	-135.256721	6	186	709	Mesic	Hemlock Closed Forest	*Tsuga mertensiana/Vaccinium ovalifolium*
15.07	8/14/2011	59.682634	-135.259837	37	153	704	Mesic	Dwarf Shrub - Herbaceous Tundra	*Carex macrochaeta-Athyrium filix-femina-Veratrum viride*
15.08	8/14/2011	59.682746	-135.259720	15	166	700	Not recorded	Dwarf Shrub - Herbaceous Tundra	*Cassiope mertensiana*
15.09	8/14/2011	59.682733	-135.257964	50	194	766	Mesic	Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	*Vaccinium ulignosum-Empetrum nigrum*
15.10	8/14/2011	59.692694	-135.242378	45	182	935	Mesic	Dwarf Shrub - Herbaceous Tundra	*Carex macrochaeta*
16.01	8/14/2011	59.690158	-135.244343	15	290	828	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Harrimanella stelleriana-Phyllodoce glanduliflora*
16.02	8/14/2011	59.687783	-135.246859	30	275	827	Mesic	Mesic Herbaceous Meadow	*Calamagrostis canadensis-Carex macrochaeta*
16.03	8/14/2011	59.687696	-135.243726	20	270	885	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species
16.04	8/14/2011	59.687453	-135.242360	25	270	929	Wet	Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	*Carex macrochaeta*
16.05	8/14/2011	59.685038	-135.246339	23	290	875	Dry-Mesic	Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	*Empetrum nigrum*-Mixed Dwarf Shrub/Rock
16.06	8/14/2011	59.684872	-135.247432	24	270	771	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis ssp. sinuata/Dryopteris expansa*
16.07	8/14/2011	59.687057	-135.248832	23	200	760	Mesic	Dwarf Shrub - Herbaceous Tundra	*Phyllodoce glanduliflora*
16.08	8/14/2011	59.687783	-135.246859	30	275	827	Mesic	Dwarf Shrub - Herbaceous Tundra	Omitted from plant association classification

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17.01	8/13/2011	59.696806	-135.241094	6	45	1107	Dry-Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Luzula arcuata-Cladina* species
17.02	8/13/2011	59.694827	-135.244697	23	120	1121	Mesic	Ericaceous Dwarf Shrub Tundra	*Harrimanella stelleriana-Phyllodoce glanduliflora*
17.03	8/15/2011	59.693121	-135.242195	43	120	974	Mesic	Ericaceous Dwarf Shrub Tundra	*Phyllodoce glanduliflora*
18.01	8/13/2011	59.692361	-135.262821	10	208	1283	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Harrimanella stelleriana-Cladina* species
18.02	8/13/2011	59.692656	-135.262598	0	NA	1282	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Carex pyrenaica* ssp. *micropoda-Luzula* species-*Cladina* species
18.03	8/13/2011	59.695745	-135.255547	12	116	1244	Mesic	Ericaceous Dwarf Shrub - Rock Tundra Mosaic	*Andreaea blyttii*
18.04	8/13/2011	59.695536	-135.253762	0	NA	1211	Mesic	Ericaceous Dwarf Shrub - Rock Tundra Mosaic	*Harrimanella stelleriana-Luetkea pectinata*
19.01	8/21/2011	59.568776	-135.198546	25	112	525	Mesic	Sitka Spruce - Subalpine Fir Closed Forest	*Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus*
19.02	8/21/2011	59.565934	-135.194477	15	135	397	Mesic	Subalpine Fir - Sitka Spruce Open Forest	*Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus*
19.03	8/21/2011	59.564841	-135.191912	20	122	332	Mesic	Sitka Spruce-Subalpine Fir Closed Forest	*Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus*
19.04	8/21/2011	59.561663	-135.193940	1	124	342	Mesic /Wet	Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
19.05	8/21/2011	59.558237	-135.193335	0	NA	303	Mesic	Western Hemlock - Subalpine Fir Closed Forest	*Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea*
19.06	8/21/2011	59.558742	-135.197355	38	115	379	Mesic/Dry-Mesic	Paper Birch - Lodgepole Pine - Subalpine Fir Open Forest	*Betula papyrifera-Abies lasiocarpa-Pinus contorta* var. *latifolia/Ledum groenlandicum*
19.07	8/21/2011	59.558802	-135.199373	21	94	451	Mesic	Western Hemlock - Subalpine Fir Closed Forest	*Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea*
20.01	8/18/2011	59.623870	-135.155685	28	131	1067	Mesic	Subalpine Fir Dwarf Tree Scrub	*Abies lasiocarpa/Harrimanella stelleriana*
20.02	8/18/2011	59.623745	-135.155617	25	142	1062	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Tsuga mertensiana/Harrimanella stelleriana*
20.03	8/18/2011	59.623511	-135.151801	13	70	1040	Mesic	Dwarf Tree - Dwarf Shrub - Lichen - Rock Mosaic	*Cassiope mertensiana*
20.04	8/18/2011	59.623746	-135.150102	10	112	1016	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
20.05	8/18/2011	59.623373	-135.149854	8	100	1014	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species
20.07	8/18/2011	59.621229	-135.151877	18	115	1020	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
20.08	8/18/2011	59.619295	-135.154943	20	113	1037	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species
20.09	8/18/2011	59.617221	-135.151667	1	74	966	Wet	Wet Herbaceous Meadow	*Carex anthoxanthea*
20.10	8/18/2011	59.613595	-135.156800	1	63	998	Very Wet	Wet Herbaceous Meadow	*Carex anthoxanthea*
21.01	8/19/2011	59.611253	-135.099608	0	NA	1031	Mesic	Mesic Herbaceous Meadow	Mesic Herbaceous Alpine
21.02	8/19/2011	59.611728	-135.101311	3	310	1027	Mesic	Subalpine Fir Open Forest	*Abies lasiocarpa/Cassiope mertensiana*
21.03	8/19/2011	59.612996	-135.103893	1	226	1026	Wet	Wet Herbaceous Meadow	*Carex anthoxanthea*
21.04	8/19/2011	59.613047	-135.105798	4	192	1028	Mesic	Subalpine Fir Dwarf Tree Scrub	*Abies lasiocarpa/Cassiope mertensiana*

Plot Number	Date Sampled	Latitude (UTM8, NAD83)	Longitude	Slope (° from level)	Aspect (° from true N)	Elevation (m)	Hydrologic Regime	Landcover Class	Plant Association
21.05	8/19/2011	59.613940	-135.113035	8	211	1007	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
21.06	8/19/2011	59.614231	-135.113330	0	NA	1004	Mesic-Wet	Dwarf Tree - Dwarf Shrub - Lichen - Rock Mosaic	*Salix stolonifera-Carex macrochaeta*
21.07	8/19/2011	59.617263	-135.117789	5	220	1012	Mesic	Dwarf Tree - Dwarf Shrub - Lichen - Rock Mosaic	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
21.08	8/19/2011	59.619296	-135.122328	1	218	999	Very Wet	Wet Herbaceous Meadow	*Trichophorum cespitosum*
21.09	8/19/2011	59.621801	-135.129884	13	297	989	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species
21.10	8/19/2011	59.623655	-135.137806	2	205	883	Mesic	Willow Closed Tall Shrub	*Salix barclayi*/Mixed Herb
21.11	8/19/2011	59.619249	-135.150498	8	49	982	Mesic	Dwarf Tree - Dwarf Shrub - Lichen - Rock Mosaic	*Cassiope mertensiana*
23.01	8/22/2011	59.612634	-135.145622	42	110	905	Mesic	Mountain Hemlock - Subalpine Fir Closed Forest	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
23.02	8/22/2011	59.620476	-135.140017	36	106	891	Mesic	Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
23.03	8/22/2011	59.619821	-135.139603	0	NA	880	Mesic-Wet	Willow Closed Tall Shrub	*Salix barclayi*/Mixed Herb
23.04	8/22/2011	59.615241	-135.141773	20	98	884	Mesic	Mountain Hemlock - Subalpine Fir Closed Forest	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
23.05	8/22/2011	59.614749	-135.145947	6	320	944	Mesic	Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species
23.06	8/22/2011	59.615052	-135.150353	9	91	954	Mesic	Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Cassiope mertensiana*
30.01	8/11/2011	59.638536	-135.288973	29	337	104	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Hylocomium splendens*
30.02	8/11/2011	59.638850	-135.288531	5	30	274	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Vaccinium ovalifolium*
30.03	8/11/2011	59.640344	-135.285873		NA	324	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
30.04	8/11/2011	59.642201	-135.286931	0	NA	244	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Gymnocarpium dryopteris*
30.05	8/11/2011	59.642083	-135.287891	0	NA	274	Mesic-Wet	Sitka Spruce - Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
30.06	8/11/2011	59.643113	-135.287157	0	NA	266	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Alnus viridis* ssp. *sinuata*
30.07	8/11/2011	59.645863	-135.277904	0	NA	303	Mesic	Sitka Spruce - Black Cottonwood Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Oplopanax horridus*
30.08	8/11/2011	59.646469	-135.275975	14	322	269	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
30.09	8/11/2011	59.648254	-135.273033	0	NA	278	Mesic	Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea*
31.01	8/16/2011	59.633839	-135.301301	25	298	242	Mesic	Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
32.01	8/17/2011	59.613830	-135.324207	34	198	171	Mesic	Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Betula papyrifera-Picea sitchensis/Hylocomium splendens*
32.02	8/17/2011	59.614365	-135.328354	17	239	155	Mesic	Hemlock - Paper Birch - Lodgepole Pine Closed (Open) Forest	*Tsuga heterophylla-Betula papyrifera-Pinus contorta* var. *latifolia-Picea sitchensis*/Moss

Plot Number	Date Sampled	Latitude (UTM8, NAD83)	Longitude	Slope (^{o} from level)	Aspect (^{o} from true N)	Elevation (m)	Hydrologic Regime	Landcover Class	Plant Association
32.03	8/17/2011	59.613480	-135.326056	30	234	167	Mesic	Lodgepole Pine Open Forest	*Pinus contorta* var. *latifolia/Cladina* species
50.01	7/11/2012	59.694000	-135.238780	2	206	1071	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Carex pyrenaica* ssp. *micropoda-Luzula* species-*Cladina* species
50.02	7/11/2012	59.694930	-135.238510	3	200	1072	Mesic-Wet	Ericaceous Dwarf Shrub - Rock Tundra Mosaic	*Harrimanella stelleriana-Luetkea pectinata*
50.03	7/11/2012	59.695380	-135.235050	30	250	1119	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Harrimanella stelleriana-Cladina* species
50.04	7/11/2012	59.694020	-135.236010	8	200	1088	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Carex pyrenaica* ssp. *micropoda-Luzula* species-*Cladina* species
50.05	7/11/2012	59.693260	-135.234240	42	300	1119	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Luzula arcuata-Cladina* species
50.06	7/11/2012	59.696220	-135.240220	25	200		Mesic	Ericaceous Dwarf Shrub - Rock Tundra Mosaic	*Phyllodoce glanduliflora*
50.07	7/11/2012	59.696640	-135.244050	5	58	1122	Mesic	Dwarf Shrub - Lichen - Rock Tundra Mosaic	*Harrimanella stelleriana-Cladina* species
51.01	7/12/2012	59.659230	-135.269550	5	175		Mesic	Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea*
52.01	7/13/2012	59.618890	-135.327290	25	280	134	Mesic	Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla-Picea sitchensis/Oplopanax horridus*

Appendix C: Plant Species List and Occurrence in Klondike Gold Rush National Historical Park

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Tree	*Abies lasiocarpa*	subalpine fir	ABLA	34
	Alnus rubra	red alder	ALRU2	5
	Betula papyrifera	paper birch	BEPA	47
	Picea sitchensis	Sitka spruce	PISI	82
	Pinus contorta var. *latifolia*	lodgepole pine	PICOL	10
	Populus balsamifera ssp. *trichocarpa*	black cottonwood	POBAT	41
	Salix scouleriana	Scouler's willow	SASC	12
	Tsuga heterophylla	western hemlock	TSHE	61
	Tsuga mertensiana	mountain hemlock	TSME	34
Shrub	*Acer glabrum* var. *douglasii*	Douglas maple	ACGLD4	3
	Alnus incana ssp. *tenuifolia*	thinleaf alder	ALINT	5
	Alnus viridis ssp. *crispa*	mountain alder	ALVIC	1
	Alnus viridis ssp. *sinuata*	Sitka alder	ALVIS	58
	Cornus sericea ssp. *sericea*	redosier dogwood	COSES	24
	Dasiphora fruticosa	shrubby cinquefoil	DAFR6	1
	Juniperus communis	common juniper	JUCO6	1
	Ledum groenlandicum	bog Labrador tea	LEGR	1
	Ledum palustre	marsh Labrador tea	LEPA11	1
	Menziesia ferruginea	rusty menziesia	MEFE	49
	Myrica gale	sweetgale	MYGA	2
	Oplopanax horridus	devilsclub	OPHO	56
	Ribes sp.	currant	RIBES	2
	Ribes hudsonianum	northern black currant	RIHU	1
	Ribes lacustre	prickly currant	RILA	24
	Ribes laxiflorum	trailing black currant	RILA3	14
	Ribes triste	red currant	RITR	8
	Rosa acicularis	prickly rose	ROAC	1
	Rosa nutkana	Nootka rose	RONU	2
	Rubus idaeus	American red raspberry	RUID	5
	Rubus spectabilis	salmonberry	RUSP	1
	Salix alaxensis	feltleaf willow	SAAL	8
	Salix barclayi	Barclay's willow	SABA3	11
	Salix bebbiana	Bebb willow	SABE2	1
	Salix commutata	undergreen willow	SACO2	2
	Salix richardsonii	Richardson's willow	SARI4	1
	Salix sitchensis	Sitka willow	SASI2	10
	Sambucus racemosa	red elderberry	SARA2	15
	Sorbus sitchensis	western mountain ash	SOSI2	7
	Spiraea stevenii	beauverd spirea	SPST3	10
	Vaccinium ovalifolium	oval-leaf blueberry	VAOV	58
	Viburnum edule	squashberry	VIED	46
Dwarf Shrub	*Arctostaphylos alpina*	alpine bearberry	ARAL2	1
	Cassiope mertensiana	western moss heather	CAME7	18
	Dryas octopetala	eightpetal mountain-avens	DROC	2
	Empetrum nigrum	black crowberry	EMNI	24
	Harrimanella stelleriana	Alaska bellheather	HAST3	33
	Kalmia microphylla	alpine laurel	KAMI	1

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Dwarf Shrub (continued)	*Linnaea borealis*	twinflower	LIBO3	4
	Loiseleuria procumbens	alpine azalea	LOPR	5
	Luetkea pectinata	partridgefoot	LUPE	23
	Phyllodoce glanduliflora	yellow mountainheath	PHGL6	29
	Salix arctica	arctic willow	SAAR27	5
	Salix polaris	polar willow	SAPO	3
	Salix reticulata	netleaf willow	SARE2	4
	Salix stolonifera	sprouting leaf willow	SAST2	19
	Vaccinium uliginosum	bog blueberry	VAUL	14
	Vaccinium vitis-idaea	lingonberry	VAVI	9
Forb	*Achillea millefolium* var. *borealis*	boreal yarrow	ACMIB	14
	Aconitum delphiniifolium	larkspurleaf monkshood	ACDE2	7
	Aconitum delphiniifolium ssp. *delphiniifolium*	larkspurleaf monkshood	ACDED3	2
	Aconitum delphiniifolium ssp. *paradoxum*	larkspurleaf monkshood	ACDEP	1
	Actaea rubra	red baneberry	ACRU2	17
	Anemone sp.	anemone	ANEMO	1
	Anemone narcissiflora var. *monantha*	narcissus anemone	ANNAM2	2
	Anemone richardsonii	yellow thimbleweed	ANRI	4
	Angelica lucida	seacoast angelica	ANLU	7
	Antennaria media	Rocky Mountain pussytoes	ANME2	1
	Antennaria monocephala	pygmy pussytoes	ANMO9	1
	Antennaria monocephala ssp. *monocephala*	pygmy pussytoes	ANMOM	2
	Antennaria rosea ssp. *rosea*	rosy pussytoes	ANROR	1
	Aquilegia formosa	western columbine	AQFO	1
	Arabis lyrata	lyrate rockcress	ARLY2	2
	Argentina egedii	Pacific silverweed	AREG	13
	Arnica latifolia	broadleaf arnica	ARLA8	10
	Arnica lessingii	nodding arnica	ARLE2	3
	Artemisia arctica	boreal sagebrush	ARAR9	24
	Artemisia arctica ssp. *arctica*	boreal sagebrush	ARARA2	1
	Artemisia tilesii	Tilesius' wormwood	ARTI	3
	Aruncus dioicus var. *acuminatus*	bride's feathers	ARDIA	20
	Athyrium filix-femina	common ladyfern	ATFI	40
	Atriplex alaskensis	Alaska orache	ATAL	1
	Boschniakia rossica	northern groundcone	BORO	15
	Botrychium lunaria	common moonwort	BOLU	2
	Caltha sp.	marsh marigold	CALTH	2
	Caltha leptosepala	white marsh marigold	CALE4	5
	Caltha palustris	yellow marsh marigold	CAPA5	1
	Campanula sp.	bellflower	CAMPA	0
	Campanula lasiocarpa	mountain harebell	CALA7	6
	Cardamine bellidifolia	alpine bittercress	CABE	1
	Cardamine oligosperma var. *kamtschatica*	umbel bittercress	CAOLK	2
	Castilleja parviflora	mountain Indian paintbrush	CAPA26	2
	Castilleja unalaschcensis	Alaska Indian paintbrush	CAUN4	4
	Chamerion angustifolium	fireweed	CHAN9	24
	Chamerion latifolium	dwarf fireweed	CHLA13	8

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Forb (continued)	*Chrysanthemum arcticum*	arctic daisy	CHAR13	3
	Cicuta douglasii	western water hemlock	CIDO	1
	Circaea alpina	small enchanter's nightshade	CIAL	11
	Conioselinum gmelinii	Pacific hemlockparsley	COGM	8
	Cornus canadensis	bunchberry dogwood	COCA13	38
	Cryptogramma acrostichoides	American rockbrake	CRAC3	3
	Cryptogramma sitchensis	Sitka rockbrake	CRSI7	5
	Dactylorhiza aristata	keyflower	DAAR	0
	Dodecatheon sp.	shootingstar	DODEC	1
	Dodecatheon frigidum	western arctic shootingstar	DOFR	1
	Dodecatheon pulchellum ssp. *macrocarpum*	darkthroat shootingstar	DOPUM2	3
	Dryopteris expansa	spreading woodfern	DREX2	50
	Epilobium anagallidifolium	pimpernel willowherb	EPAN4	5
	Epilobium hornemannii ssp. *hornemannii*	Hornemann's willowherb	EPHOH	6
	Epilobium lactiflorum	milkflower willowherb	EPLA3	5
	Equisetum arvense	field horsetail	EQAR	21
	Equisetum fluviatile	water horsetail	EQFL	1
	Equisetum pratense	meadow horsetail	EQPR	8
	Equisetum variegatum	variegated scouringrush	EQVA	1
	Erigeron peregrinus	subalpine fleabane	ERPE3	8
	Fritillaria camschatcensis	Kamchatka fritillary	FRCA5	6
	Galium sp.	bedstraw	GALIU	1
	Galium trifidum	threepetal bedstraw	GATR2	3
	Galium triflorum	fragrant bedstraw	GATR3	26
	Geocaulon lividum	false toadflax	GELI2	8
	Geranium erianthum	woolly geranium	GEER2	4
	Geum calthifolium	calthaleaf avens	GECA6	5
	Geum macrophyllum	largeleaf avens	GEMA4	3
	Glaux maritima	sea milkwort	GLMA	3
	Gymnocarpium dryopteris	western oakfern	GYDR	57
	Heracleum maximum	common cowparsnip	HEMA80	7
	Heuchera glabra	alpine heuchera	HEGL5	18
	Hieracium triste	woolly hawkweed	HITR2	2
	Hippuris montana	mountain mare's-tail	HIMO2	1
	Honckenya peploides	seaside sandplant	HOPE	6
	Huperzia selago	fir clubmoss	HUSE	14
	Iris setosa	beachhead iris	IRSE	10
	Kumlienia cooleyae	Cooley's false buttercup	KUCO	10
	Lathyrus japonicus	beach pea	LAJA	11
	Lathyrus japonicus var. *maritimus*	beach pea	LAJAM	3
	Lathyrus palustris	marsh pea	LAPA4	2
	Leptarrhena pyrolifolia	fireleaf leptarrhena	LEPY	6
	Ligusticum scoticum	Scottish licorice-root	LISC3	1
	Listera cordata	heartleaf twayblade	LICO6	2
	Lupinus nootkatensis	Nootka lupine	LUNO	12
	Lycopodium alpinum	alpine clubmoss	LYAL3	10
	Lycopodium annotinum	stiff clubmoss	LYAN2	17
	Lycopodium clavatum	running clubmoss	LYCL	8
	Lycopodium complanatum	groundcedar	LYCO3	2
	Lycopodium sabinifolium	savinleaf groundpine	LYSA	2

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Forb (continued)	*Maianthemum dilatatum*	false lily of the valley	MADI	1
	Moehringia lateriflora	bluntleaf sandwort	MOLA6	5
	Moneses uniflora	single delight	MOUN2	14
	Orthilia secunda	sidebells wintergreen	ORSE	38
	Osmorhiza purpurea	purple sweetroot	OSPU	6
	Oxyria digyna	alpine mountainsorrel	OXDI3	3
	Parnassia fimbriata	fringed grass of Parnassus	PAFI3	1
	Parnassia kotzebuei	Kotzebue's grass of Parnassus	PAKO3	1
	Parnassia palustris	marsh grass of Parnassus	PAPA8	8
	Pedicularis sp.	lousewort	PEDIC	2
	Pedicularis capitata	capitate lousewort	PECA2	1
	Petasites frigidus var. *frigidus*	arctic sweet coltsfoot	PEFRF	7
	Phegopteris connectilis	long beechfern	PHCO24	5
	Plantago maritima	goose tongue	PLMA3	6
	Platanthera dilatata	scentbottle	PLDI3	1
	Platanthera obtusata	bluntleaved orchid	PLOB	5
	Polygonum viviparum	alpine bistort	POVI3	10
	Polypodium glycyrrhiza	licorice fern	POGL8	9
	Polystichum lonchitis	northern hollyfern	POLO4	1
	Polystichum setigerum	Alaska hollyfern	POSE5	1
	Potentilla villosa	villous cinquefoil	POVI4	0
	Prenanthes alata	western rattlesnakeroot	PRAL	9
	Pyrola asarifolia	liverleaf wintergreen	PYAS	29
	Pyrola asarifolia ssp. *asarifolia*	liverleaf wintergreen	PYASA	2
	Pyrola chlorantha	greenflowered wintergreen	PYCH	1
	Pyrola minor	snowline wintergreen	PYMI	1
	Ranunculus sp.	buttercup	RANUN	3
	Ranunculus eschscholtzii	Eschscholtz's buttercup	RAES	1
	Ranunculus nivalis	snow buttercup	RANI	0
	Rhinanthus minor	little yellow rattle	RHMI13	4
	Rhodiola integrifolia	ledge stonecrop	RHIN11	1
	Rhodiola integrifolia ssp. *integrifolia*	ledge stonecrop	RHINI	2
	Rubus arcticus	arctic blackberry	RUAR	7
	Rubus chamaemorus	cloudberry	RUCH	2
	Rubus pedatus	strawberryleaf raspberry	RUPE	38
	Rumex acetosella	common sheep sorrel	RUAC3	4
	Rumex aquaticus var. *fenestratus*	western dock	RUAQF	2
	Sanguisorba canadensis	Canadian burnet	SACA14	18
	Saxifraga bronchialis	yellowdot saxifrage	SABR6	6
	Saxifraga ferruginea	russethair saxifrage	SAFE	11
	Saxifraga lyallii ssp. *hultenii*	Hulten's saxifrage	SALYH	2
	Saxifraga mertensiana	wood saxifrage	SAME7	1
	Saxifraga nelsoniana ssp. *carlottae*	heartleaf saxifrage	SANEC	1
	Saxifraga nelsoniana ssp. *nelsoniana*	heartleaf saxifrage	SANEN	3
	Saxifraga nelsoniana ssp. *pacifica*	Pacific saxifrage	SANEP	1
	Saxifraga oppositifolia	purple mountain saxifrage	SAOP	0
	Saxifraga tricuspidata	three toothed saxifrage	SATR5	1
	Senecio triangularis	arrowleaf ragwort	SETR	4
	Sibbaldia procumbens	creeping sibbaldia	SIPR	10
	Silene acaulis	moss campion	SIAC	6

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
	Spiranthes romanzoffiana	hooded lady's tresses	SPRO	1
Forb (continued)	*Stellaria borealis* ssp. *borealis*	boreal starwort	STBOB	3
	Stellaria borealis ssp. *sitchana*	Sitka starwort	STBOS	2
	Stellaria calycantha	northern starwort	STCA	4
	Stellaria crispa	curled starwort	STCR2	1
	Streptopus amplexifolius	claspleaf twistedstalk	STAM2	54
	Taraxacum lyratum	harp dandelion	TALY	2
	Taraxacum officinale ssp. *ceratophorum*	common dandelion	TAOFC	1
	Taraxacum officinale ssp. *officinale*	common dandelion	TAOFO	2
	Taraxacum phymatocarpum	northern dandelion	TAPH	1
	Tellima grandiflora	bigflower tellima	TEGR2	1
	Tiarella trifoliata	threeleaf foamflower	TITR	7
	Tofieldia pusilla	Scotch false asphodel	TOPU	1
	Trientalis europaea	arctic starflower	TREU	48
	Triglochin maritima	seaside arrowgrass	TRMA20	4
	Triglochin palustris	marsh arrowgrass	TRPA28	1
	Valeriana sitchensis	Sitka valerian	VASI	3
	Veratrum viride	green false hellebore	VEVI	8
	Veronica serpyllifolia ssp. *serpyllifolia*	thymeleaf speedwell	VESES	1
	Veronica wormskjoldii	American alpine speedwell	VEWO2	3
	Viola sp.	violet	VIOLA	1
	Viola epipsila	dwarf marsh violet	VIEP	2
	Viola epipsila ssp. *repens*	dwarf marsh violet	VIEPR	8
	Viola glabella	pioneer violet	VIGL	2
	Viola langsdorffii	Aleutian violet	VILA6	2
	Viola renifolia	white violet	VIRE2	2
	Viola selkirkii	Selkirk's violet	VISE2	1
Graminoid	*Agrostis exarata*	spike bentgrass	AGEX	2
	Agrostis scabra	rough bentgrass	AGSC5	4
	Anthoxanthum monticola	alpine sweetgrass	ANMO7	3
	Anthoxanthum monticola ssp. *alpinum*	alpine sweetgrass	ANMOA3	11
	Calamagrostis canadensis	bluejoint	CACA4	45
	Calamagrostis canadensis var. *canadensis*	bluejoint	CACAC10	1
	Calamagrostis canadensis var. *langsdorffii*	bluejoint	CACAL3	3
	Carex sp.	sedge	CAREX	1
	Carex anthoxanthea	grassyslope arctic sedge	CAAN10	6
	Carex aquatilis	water sedge	CAAQ	1
	Carex bicolor	twocolor sedge	CABI4	3
	Carex brunnescens	brownish sedge	CABR15	1
	Carex brunnescens ssp. *pacifica*	Pacific brownish sedge	CABRP2	1
	Carex canescens	silvery sedge	CACA11	1
	Carex gmelinii	Gmelin's sedge	CAGM	5
	Carex lachenalii	twotipped sedge	CALA10	3
	Carex lyngbyei	Lyngbye's sedge	CALY3	6
	Carex macrochaeta	longawn sedge	CAMA11	45
	Carex mertensii	Mertens' sedge	CAME6	1
	Carex microchaeta	smallawned sedge	CAMI4	3

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Graminoid (continued)	*Carex nigricans*	black alpine sedge	CANI2	7
	Carex pyrenaica ssp. *micropoda*	Pyrenean sedge	CAPYM	11
	Carex saxatilis	rock sedge	CASA10	2
	Carex scirpoidea	northern singlespike sedge	CASC10	1
	Cinna latifolia	drooping woodreed	CILA2	10
	Deschampsia beringensis	Bering's tufted hairgrass	DEBE2	4
	Deschampsia cespitosa	tufted hairgrass	DECE	1
	Eleocharis kamtschatica	Kamchatka spikerush	ELKA	1
	Elymus glaucus ssp. *glaucus*	blue wildrye	ELGLG	11
	Eriophorum angustifolium	tall cottongrass	ERAN6	2
	Festuca sp.	fescue	FESTU	1
	Festuca altaica	Altai fescue	FEAL	6
	Festuca brachyphylla	alpine fescue	FEBR	2
	Festuca brevissima	Alaska fescue	FEBR2	2
	Festuca rubra	red fescue	FERU2	13
	Hierochloe odorata	sweetgrass	HIOD	1
	Hordeum brachyantherum	meadow barley	HOBR2	2
	Hordeum jubatum	foxtail barley	HOJU	1
	Juncus biglumis	twoflowered rush	JUBI2	1
	Juncus drummondii	Drummond's rush	JUDR	3
	Juncus haenkei	Haenke's rush	JUHA2	5
	Juncus mertensianus	Mertens' rush	JUME3	3
	Leymus mollis	American dunegrass	LEMO8	18
	Luzula sp.	woodrush	LUZUL	1
	Luzula arctica	arctic woodrush	LUAR9	1
	Luzula arcuata	curved woodrush	LUAR5	14
	Luzula parviflora	smallflowered woodrush	LUPA4	3
	Luzula piperi	Piper's woodrush	LUPI2	1
	Phleum alpinum	alpine timothy	PHAL2	4
	Poa sp.	bluegrass	POA	3
	Poa alpina	alpine bluegrass	POAL2	2
	Poa arctica ssp. *arctica*	arctic bluegrass	POARA2	3
	Poa arctica ssp. *lanata*	arctic bluegrass	POARL4	2
	Poa eminens	largeflower speargrass	POEM	8
	Poa leptocoma	marsh bluegrass	POLE2	5
	Poa palustris	fowl bluegrass	POPA2	2
	Poa pratensis ssp. *irrigata*	spreading bluegrass	POPRI2	8
	Poa pratensis ssp. *pratensis*	Kentucky bluegrass	POPRP2	7
	Poa trivialis	rough bluegrass	POTR2	1
	Puccinellia nutkaensis	Nootka alkaligrass	PUNU	1
	Puccinellia pumila	dwarf alkaligrass	PUPU3	1
	Trichophorum cespitosum	tufted bulrush	TRCE3	2
	Trisetum spicatum	spike trisetum	TRSP2	6
	Vahlodea atropurpurea	mountain hairgrass	VAAT2	9
Moss	*Andreaea blyttii*	Blytt's andreaea moss	ANBL70	2
	Andreaea rupestris	andreaea moss	ANRU7	4
	Brachythecium albicans	brachythecium moss	BRAL70	1
	Brachythecium hyalotapetum	brachythecium moss	BRHY3	1
	Brachythecium nelsonii	Nelson's brachythecium moss	BRNE4	5
	Brachythecium rivulare	brachythecium moss	BRRI5	1
	Brachythecium salebrosum	brachythecium moss	BRSA7	2

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Moss (continued)	*Campylium hispidulum*	hispid campylium moss	CAHI70	1
	Campylium stellatum	star campylium moss	CAST51	1
	Campylium stellatum var. *protensum*	star campylium moss	CASTP	1
	Ceratodon purpureus	ceratodon moss	CEPU12	1
	Climacium dendroides	tree climacium moss	CLDE70	3
	Dicranoweisia crispula	dicranoweisia moss	DICR71	2
	Dicranum sp.	dicranum moss	DICRA8	35
	Dicranum fuscescens	dicranum moss	DIFU5	8
	Dicranum muehlenbeckii	Muehlenbeck's dicranum moss	DIMU70	2
	Dicranum scoparium	dicranum moss	DISC71	17
	Hamatocaulis vernicosus	hamatocaulis moss	HAVE70	1
	Heterocladium procurrens	heterocladium moss	HEPR8	1
	Hylocomium splendens	splendid feather moss	HYSP70	70
	Mnium sp.	mnium calcareous moss	MNIUM2	1
	Moss sp.	Moss	2MOSS	75
	Philonotis fontana	philonotis moss	PHFO6	1
	Plagiomnium sp.	plagiomnium moss	PLAGI7	19
	Plagiomnium medium	intermediate plagiomnium moss	PLME4	2
	Pleurozium schreberi	Schreber's big red stem moss	PLSC70	61
	Polytrichastrum alpinum	alpine polytrichastrum moss	POAL24	2
	Polytrichum sp.	polytrichum moss	POLYT5	21
	Polytrichum juniperinum	juniper polytrichum moss	POJU70	6
	Polytrichum piliferum	polytrichum moss	POPI10	1
	Ptilium crista-castrensis	knights plume moss	PTCR70	21
	Racomitrium sp.	racomitrium moss	RACOM	3
	Racomitrium lanuginosum	racomitrium moss	RALA70	10
	Rhizomnium sp.	rhizomnium moss	RHIZO2	3
	Rhizomnium glabrescens	rhizomnium moss	RHGL70	1
	Rhytidiadelphus loreus	goose neck moss	RHLO70	52
	Rhytidiadelphus squarrosus	square goose neck moss	RHSQ70	2
	Rhytidiadelphus triquetrus	rough goose neck moss	RHTR70	29
	Rhytidiopsis robusta	robust rhytidiopsis moss	RHRO7	2
	Sanionia uncinata	sanionia moss	SAUN8	2
	Sphagnum sp.	sphagnum	SPHAG2	4
	Sphagnum compactum	low sphagnum	SPCO70	1
	Sphagnum girgensohnii	Girgensohn's sphagnum	SPGI70	12
	Sphagnum teres	sphagnum	SPTE71	2
	Sphagnum warnstorfii	Warnstorf's sphagnum	SPWA70	1
	Tetraplodon mnioides	entireleaf nitrogen moss	TEMN70	1
Liverwort	*Anthelia juratzkana*		ANJU2	4
	Lophozia sp.		LOPHO9	2
	Marchantia sp.		MARCH	1
	Ptilidium sp.		PTILI2	3
	Ptilidium ciliare		PTCI	4
	Ptilidium pulcherrimum		PTPU2	1
	Scapania sp.		SCAPA	2
Lichen	*Bryoria* sp.	horsehair lichen	BRYOR2	1
	Cetraria sp.	cetraria lichen	CETRA2	5
	Cetraria ericetorum	cetraria lichen	CEER6	4
	Cetraria islandica	island cetraria lichen	CEIS60	5
	Cladina sp.	reindeer lichen	CLADI3	9

Physiognomic Class	Scientific Name	Common Name	Symbol	Occurrence
Lichen (continued)	*Cladina mitis*	reindeer lichen	CLMI60	23
	Cladina rangiferina	greygreen reindeer lichen	CLRA60	32
	Cladina stellaris	star reindeer lichen	CLST60	37
	Cladonia sp.	cup lichen	CLADO3	36
	Cladonia amaurocraea	cup lichen	CLAM60	1
	Cladonia bellidiflora	cup lichen	CLBE4	16
	Cladonia gracilis	cup lichen	CLGR13	4
	Cladonia maxima	cup lichen	CLMA18	2
	Cladonia strepsilis	cup lichen	CLST6	1
	Cladonia uncialis	cup lichen	CLUN60	2
	Flavocetraria nivalis	snow lichen	FLNI	8
	Icmadophila ericetorum	peppermint drop lichen	ICER	1
	Lichen sp.	Lichen	2LICHN	27
	Lobaria sp.	lung lichen	LOBAR2	9
	Lobaria linita	lung lichen	LOLI60	17
	Nephroma sp.	kidney lichen	NEPHR3	2
	Nephroma arcticum	arctic kidney lichen	NEAR60	12
	Peltigera sp.	felt lichen	PELTI2	17
	Peltigera leucophlebia	felt lichen	PELE61	3
	Solorina crocea	chocolate chip lichen	SOCR60	6
	Sphaerophorus globosus	globe ball lichen	SPGL60	0
	Stereocaulon sp.	snow lichen	STERE2	23
	Stereocaulon condensatum	condensed snow lichen	STCO17	2
	Stereocaulon paschale	snow lichen	STPA60	8
	Thamnolia vermicularis	whiteworm lichen	THVE60	15
	Umbilicaria sp.	navel lichen	UMBIL2	6
	Umbilicaria angulata	navel lichen	UMAN60	3

Appendix D: Plant Associations Listed by Landcover Class for Klondike Gold Rush National Historical Park

Note: Plant associations are listed by the landcover class with which they are spatially coincident rather than the landcover class returned by the dichotomous key.

Landcover Class	Plant Association
Subalpine Fir Dwarf Tree Scrub	*Abies lasiocarpa/Cassiope mertensiana* *Abies lasiocarpa/Harrimanella stelleriana*
Subalpine Fir Closed Forest	No Plot Data
Subalpine Fir Open Forest	*Abies lasiocarpa/Cassiope mertensiana*
Subalpine Fir - Sitka Spruce Open Forest	*Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus*
Paper Birch Open Forest	*Betula papyrifera/Alnus viridis* ssp. *sinuata* *Betula papyrifera/Menziesia ferruginea*
Paper Birch - Lodgepole Pine - Subalpine Fir Open Forest	*Betula papyrifera-Abies lasiocarpa-Pinus contorta* var. *latifolia/Ledum groenlandicum*
Dwarf Shrub - Herbaceous Tundra	*Carex macrochaeta* *Carex macrochaeta-Athyrium filix-femina-Veratrum viride* *Cassiope mertensiana* *Phyllodoce glanduliflora*
Dwarf Shrub - Herbaceous - Rock Tundra Mosaic	*Carex macrochaeta* *Empetrum nigrum*-Mixed Dwarf Shrub/Rock *Luetkea pectinata/Leptarrhena pyrolifolia* *Vaccinium ulignosum-Empetrum nigrum*
Dwarf Shrub - Lichen - Rock Tundra Mosiac	*Carex pyrenaica* ssp. *micropoda-Luzula* species-*Cladina* species *Harrimanella stelleriana-Cladina* species *Luzula arcuata-Cladina* species
Dwarf Tree - Dwarf Shrub - Lichen - Rock	*Cassiope mertensiana* *Salix stolonifera-Carex macrochaeta* *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera*
Ericaceous Dwarf Shrub Tundra	*Harrimanella stelleriana-Phyllodoce glanduliflora* *Phyllodoce glanduliflora*
Ericaceous Dwarf Shrub - Lichen Tundra	*Empetrum nigrum/Cladina* species *Harrimanella stelleriana-Phyllodoce glanduliflora*
Ericaceous Dwarf Shrub - Rock Tundra Mosaic	*Andreaea blyttii* *Harrimanella stelleriana-Luetkea pectinata* *Phyllodoce glanduliflora*
Fresh Water	No Plot Data

Landcover Class	Plant Association
Halophytic Herbaceous Wet Meadow	*Carex lyngbyei*
	Carex lyngbyei-Argentina egedii-Poa eminens
American Dunegrass Coastal Meadow	*Leymus mollis*
Open Low Shrub	Culturally-modified
Mesic Herbaceous Meadow	*Calamagrostis canadensis-Carex macrochaeta*
	Mesic Herbaceous Alpine
Mesic Herbaceous Coastal Meadow	*Argentina egedii-Festuca rubra*
	Carex gmelinii-Leymus mollis
	Culturally-modified
	Deschampsia beringensis
	Festuca rubra
	Leymus mollis-Achillea millefolium var. *borealis*
	Leymus mollis-Lathyrus japonicus var. *maritimus*
	Plantago maritima-Atriplex alaskensis
	Poa eminens-Argentina egedii
	Poa eminens-Juncus haenkei
Lodgepole Pine Open Forest	*Pinus contorta* var. *latifolia/Cladina* species
Sitka Spruce Open Forest	*Picea sitchensis/Hylocomium splendens*
Sitka Spruce Woodland	*Picea sitchensis*/Seral Herb
Sitka Spruce - Subalpine Fir Closed Forest	*Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus*
Sitka Spruce - Paper Birch Open Forest	*Betula papyrifera-Picea sitchensis/Hylocomium splendens*
Sitka Spruce - Black Cottonwood Closed Forest	*Alnus viridis* ssp. *sinuata*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Rhytidiadelphus* species
	Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
Sitka Spruce - Black Cottonwood Open Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cladina* species
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
Sitka Spruce - Black Cottonwood - Western Hemlock Closed Forest	*Picea sitchensis-Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
	Picea sitchensis-Populus balsamifera ssp. *trichocarpa-Tsuga heterophylla*/Depauperate
Sitka Spruce - Black Cottonwood - Western Hemlock Open Forest	No Plot Data

Landcover Class	Plant Association
Sitka Spruce - Hemlock Closed Forest	*Tsuga heterophylla/Menziesia ferruginea*
	Tsuga heterophylla-Picea sitchensis/Depauperate
	Tsuga heterophylla-Picea sitchensis/Gymnocarpium dryopteris
	Tsuga heterophylla-Picea sitchensis/Hylocomium splendens
	Tsuga heterophylla-Picea sitchensis/Oplopanax horridus
	Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea
	Tsuga mertensiana-Picea sitchensis/Moss
Black Cottonwood Closed Forest	*Populus balsamifera* ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
	Populus balsamifera ssp. *trichocarpa/Gymnocarpium dryopteris*
	Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
Black Cottonwood Open Forest	*Populus balsamifera* ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
	Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
Black Cottonwood Woodland	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
	Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
Black Cottonwood - Paper Birch Closed Forest	*Populus balsamifera* ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*
Black Cottonwood - Paper Birch - Sitka Spruce Closed Forest	*Populus balsamifera* ssp. *trichocarpa-Betula papyrifera/Cornus sericea* ssp. *sericea*
Barren	*Racomitrium lanuginosum*-Crustose Lichen
Salt Water	No Plot Data
Snow / Ice	No Plot Data
Sparse Vegetation	*Chamerion latifolium*
Standing Dead Tree	No Plot Data
Thinleaf Alder Closed Tall Shrub	*Alnus incana* ssp. *tenuifolia-Alnus viridis* ssp. *sinuata*
	Picea sitchensis-Betula papyrifera/Alnus incana ssp. *tenuifolia/Cornus sericea* ssp. *sericea*
Sitka Alder Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Dryopteris expansa*
	Alnus viridis ssp. *sinuata/Menziesia ferruginea*
	Alnus viridis ssp. *sinuata/Oplopanax horridus*
Sitka Alder - Willow Closed Tall Shrub	*Alnus viridis* ssp. *sinuata/Oplopanax horridus*
	Alnus viridis ssp. *sinuata-Salix alaxensis*
Willow Closed Tall Shrub	*Salix barclayi*/Mixed Herb
Western Hemlock - Subalpine Fir Closed Forest	*Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea*
	Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera
Western Hemlock - Subalpine Fir Open Forest	No Plot Data
Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub	*Cassiope mertensiana*
	Empetrum nigrum/Cladina species
	Tsuga mertensiana/Harrimanella stelleriana
	Tsuga mertensiana/Vaccinium vitis-idaea
	Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glandulifera

Landcover Class	Plant Association
Mountain Hemlock - Subalpine Fir Dwarf Tree Scrub - Rock Mosaic	No Plot Data
Mountain Hemlock - Subalpine Fir Open Forest	*Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea*
Hemlock Closed Forest	*Tsuga heterophylla/Hylocomium splendens* *Tsuga heterophylla/Menziesia ferruginea* *Tsuga heterophylla/Vaccinium ovalifolium* *Tsuga heterophylla-Tsuga mertensiana* *Tsuga heterophylla-Tsuga mertensiana/Dryopteris expansa* *Tsuga heterophylla-Tsuga mertensiana/Mensiesia ferruginea* *Tsuga mertensiana/Vaccinium ovalifolium*
Hemlock Open Forest	*Tsuga heterophylla/Menziesia ferruginea* *Tsuga mertensiana/Vaccinium ovalifolium*
Hemlock - Paper Birch Closed Forest	*Betula papyrifera-Tsuga heterophylla/Oplopanax horridus* *Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea*
Hemlock - Paper Birch Open Forest	*Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea* *Stereocaulon paschale*
Hemlock - Paper Birch - Sitka Spruce Closed Forest	*Betula papyrifera-Picea sitchensis/Hylocomium splendens* *Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Cornus sericea* ssp. *sericea* *Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea*
Hemlock - Paper Birch - Lodgepole Pine Closed (Open) Forest	*Tsuga heterophylla-Betula papyrifera-Pinus contorta* var. *latifolia-Picea sitchensis/*Moss
Wet Herbaceous Meadow	*Alnus rubra/Myrica gale* *Carex anthoxanthea* *Trichophorum cespitosum*

Appendix E: Structure of the National Vegetation Classification

The NVC is a hierarchical organization of cultural and natural vegetation. Cultural vegetation is defined as vegetation with a distinctive structure, composition, and development determined by regular human activity (Küchler 1969). Natural (including seminatural) vegetation is defined as vegetation where ecological processes primarily determine species and site characteristics; that is, vegetation comprised of a largely spontaneously growing set of plant species that are shaped by both site and biotic processes (Küchler 1969, Westhoff and van der Maarel 1973). Natural vegetation is further classified across eight levels defined by diagnostic growth forms at upper levels; on compositional similarity reflecting biogeographic differences, character species and dominant growth forms at intermediate levels; and on differential and dominant species and compositional similarity at lower floristic levels, in combination with specific physiognomic and habitat conditions. Within this classification the plant association is equivalent to a plant community.

NVC LEVEL	VEGETATION CLASSIFICATION CRITERIA	ECOLOGICAL CONTEXT	EXAMPLE
Upper Levels	**Predominantly physiognomy**		
Class	Broad combinations of general dominant growth forms.	Basic temperature (energy budget), moisture, and substrate/aquatic conditions.	Shrubland & Grassland
Subclass	Combinations of general dominant and diagnostic growth forms.	Global macroclimatic factors driven primarily by latitude and continental position, or overriding substrate/aquatic conditions.	Temperate & Boreal Shrubland & Grassland
Formation	Combinations of dominant and diagnostic growth forms.	Global macroclimatic factors as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions.	Temperate & Boreal Scrub & Herb Coastal Vegetation
Middle Levels	**Physiognomy, biogeography, and floristics**		
Division	Combinations of dominant and diagnostic growth forms and a broad set of diagnostic plant species that reflect biogeographic differences.	Continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.	Pacific North American Coast Scrub & Herb Vegetation
Macrogroup	Combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences.	Sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.	Pacific Coastal Beach & Dune Vegetation
Group	Combinations of relatively narrow sets of diagnostic plant species, including dominants and co-dominants, broadly similar composition, and diagnostic growth forms.	Regional mesoclimate, geology, substrates, hydrology and disturbance regimes.	American Dunegrass - Sand Ryegrass - Coastal Sand Verbena Dune Scrub & Herb
Lower Levels	**Predominantly floristics**		
Alliance	Diagnostic species, including some from the dominant growth form or layer, and moderately similar composition.	Regional to subregional climate, substrates, hydrology, moisture/ nutrient factors, and disturbance regimes.	American Dunegrass Coastal Beach Herbaceous
Association	Diagnostic species, usually from multiple growth forms or layers, and more narrowly similar composition.	Topo-edaphic climate, substrates, hydrology, and disturbance regimes	*Leymus mollis*

Appendix F: Placement of Klondike Gold Rush National Historical Park Plant Associations within the National Vegetation Classification Hierarchy

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
Forest to Open Woodland							
	Temperate & Boreal Forest						
		Boreal Forest					
			Lowland & Montane Boreal Forest				
				Western North American Boreal Conifer & Hardwood Forest			
					Alaskan-Yukon Aspen - Birch - Poplar Forest		
						Paper Birch - Black Cottonwood Forest	
							Populus balsamifera ssp. *trichocarpa/Betula papyerifa/Cornus sericea* ssp. *sericea*
						Paper Birch Mesic Forest	
							Betula papyrifera/Alnus viridis ssp. *sinuata*
							Betula papyrifera/Menziesia ferruginea
					Alaskan-Yukon White Spruce - Aspen - Birch Forest		
						Sitka Spruce - Paper Birch Mesic Forest	
							Betula papyrifera-Picea sitchensis/Hylocomium splendens
					Western Boreal Dry Lodgepole Pine Forest		
						Lodgepole Pine Dry Forest	
							Pinus contorta var. *latifolia/Cladina* species
		Cool Temperate Forest					
			Vancouverian Cool Temperate Forest				
				Vancouverian Lowland & Montane Rainforest			
					North Pacific Maritime Western Hemlock - Sitka Spruce Rainforest		
						Sitka Spruce - Western Hemlock / Devilsclub Forest	
							Tsuga heterophylla-Picea sitchensis/Oplopanax horridus
						Sitka Spruce - Subalpine Fir Mesic Forest	
							Abies lasiocarpa-Picea sitchensis/Menziesia ferruginea-Oplopanax horridus
						Sitka Spruce Mesic Forest	
							Picea sitchensis/Hylocomium splendens
							*Picea sitchensis/*Seral Herb
						Western Hemlock - Paper Birch Mesic Forest	
							Betula papyrifera-Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea
						Western Hemlock - Sitka Spruce Mesic Forest	

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
							Tsuga heterophylla-Betula papyrifera-Picea sitchensis/Menziesia ferruginea
							Tsuga heterophylla-Picea sitchensis/Gymnocarpium dryopteris
							Tsuga heterophylla-Picea sitchensis/Hylocomium splendens
Forest to Open Woodland							
	Temperate & Boreal Forest						
		Cool Temperate Forest					
			Vancouverian Cool Temperate Forest				
				Vancouverian Lowland & Montane Rainforest			
					North Pacific Maritime Western Hemlock - Sitka Spruce Rainforest		
						Western Hemlock - Subalpine Fir Mesic Forest	
							Tsuga heterophylla-Abies lasiocarpa/Menziesia ferruginea
						Western Hemlock / Oval-leaf Blueberry Forest	
							Tsuga heterophylla/Vaccinium ovalifolium
						Western Hemlock / Rusty Menziesia Mesic Forest	
							Tsuga heterophylla/Menziesia ferruginea
						Western Hemlock Mesic Forest	
							Tsuga heterophylla/Hylocomium splendens
				Vancouverian Subalpine Forest			
					North Pacific Mountain Hemlock - Silver Fir Forest & Tree Island		
						Mountain Hemlock Subalpine Forest	
							Tsuga mertensiana/Harrimanella stelleriana
							Tsuga mertensiana/Vaccinium ovalifolium
						Subalpine Fir - Mountain Hemlock Mesic Forest	
							Tsuga mertensiana-Abies lasiocarpa/Menziesia ferruginea
							Tsuga mertensiana-Abies lasiocarpa/Phyllodoce glanduliflora
						Subalpine Fir Subalpine Forest	
							Abies lasiocarpa/Cassiope mertensiana
							Abies lasiocarpa/Harrimanella stelleriana
						Western Hemlock - Mountain Hemlock Forest	
							Tsuga heterophylla-Tsuga mertensiana/Menziesia ferruginea
		Temperate Flooded & Swamp Forest					
			Vancouverian Flooded & Swamp Forest				

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
				Vancouverian Flooded & Swamp Forest			
					Black Cottonwood - Red Alder Lowland Riparian Forest & Woodland		
						Black Cottonwood Riparian Forest	
							Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
						Black Cottonwood / Sitka Alder Mesic Forest	
							Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
Forest to Open Woodland							
	Temperate & Boreal Forest						
		Temperate Flooded & Swamp Forest					
			Vancouverian Flooded & Swamp Forest				
				Vancouverian Flooded & Swamp Forest			
					Black Cottonwood - Red Alder Lowland Riparian Forest & Woodland		
						Black Cottonwood Mesic Forest	
							Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
						Sitka Spruce - Black Cottonwood / Devilsclub Riparian Forest	
							Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Oplopanax horridus*
						Sitka Spruce - Black Cottonwood / Sitka Alder Mesic Forest	
							Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Alnus viridis* ssp. *sinuata*
							Picea sitchensis-Populus balsamifera ssp. *trichocarpa/Cornus sericea* ssp. *sericea*
Nonvascular & Sparse Vascular Rock Vegetation							
	Polar & High Montane Nonvascular & Sparse Vegetation						
		Polar & Alpine Cliff, Scree & Rock Vegetation					
			North American Alpine Cliff, Scree & Rock Vegetation				
				Vancouverian Alpine Cliff, Scree & Rock Vegetation			
					North Pacific Alpine & Subalpine Bedrock & Scree		
						Andreaea Rock Moss	
							Andreaea blyttii
						Racomitrium Moss Dry Moss	
							Racomitrium lanuginosum-Crustose Lichen
						Snow Lichen Rock Lichen	
							Stereocaulon paschale
Polar & High Montane Scrub & Grassland							
	Temperate, Boreal & Polar Alpine - Tundra Vegetation						

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
		Temperate & Boreal Alpine Vegetation					
			Western North American Alpine Vegetation				
				Vancouverian Alpine Scrub, Forb Meadow & Grassland			
					Black Crowberry - Pink Mountainheath - Western Moss Heather Alpine-Subalpine Dwarf-Shrubland & Heath		
						Alaska Bellheather Alpine or Tundra Dwarf Shrub	
							Harrimanella stelleriana-Cladina species
							Harrimanella stelleriana-Luetkea pectinata
							Harrimanella stelleriana-Phyllodoce glanduliflora
						Black Crowberry - Bog Blueberry Alpine or Tundra Dwarf Shrub	
							Vaccinium ulignosum-Empetrum nigrum
						Black Crowberry Alpine or Tundra Dwarf Shrub	
							Empetrum nigrum-Cladina species
						Partridgefoot Alpine or Tundra Dwarf Shrub	
							Luetkea pectinata/Leptarrhena pyrolifolia
						Western Moss Heather Alpine or Tundra Dwarf Shrub	
							Cassiope mertensiana
						Yellow Mountain Heath Alpine or Tundra Dwarf Shrub	
							Phyllodoce glanduliflora
					Longawn Sedge - Showy Sedge - Spreading Phlox Alpine-Subalpine Turf & Herbaceous Meadow		
						Curved Woodrush Mesic Herbaceous	
							Luzula arcuata-Cladina species
						Longawned Sedge Wet Herbaceous	
							Carex macrochaeta
						Pyrenean Sedge Mesic Herbaceous	
							Carex pyrenaica ssp. *micropoda-Luzula* species-*Cladina* species
Shrubland & Grassland							
	Temperate & Boreal Shrubland & Grassland						
		Boreal Grassland, Meadow & Shrubland					
			North American Boreal Grassland, Meadow & Shrubland				
				North American Boreal Shrubland & Grassland			
					Western Boreal Mesic Herbaceous Meadow		
						Dwarf Fireweed Mesic Herbaceous	
							Chamerion latifolium
					Western Sub-Boreal Mesic Alder - Willow Shrubland		

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
						Barclay's Willow Mesic Shrub	
							Salix barclayi/Mixed Herb
						Sitka Alder - Feltleaf Willow Mesic Shrub	
							Alnus viridis ssp. *sinuata-Salix alaxensis*
						Sitka Alder Mesic Shrub	
							Alnus viridis ssp. *sinuata*
							Alnus viridis ssp. *sinuata/Dryopteris expansa*
							Alnus viridis ssp. *sinuata/Oplopanax horridus*
		Salt Marsh					
			Temperate & Boreal Pacific Coastal Salt Marsh				
				North American Pacific Coastal Salt Marsh			
					Lyngbye's Sedge - Cosmopolitan Bulrush - Sea Milkwort Temperate Pacific Tidal Salt & Brackish Marsh		
						Largeflower Speargrass Coastal Beach Herbaceous	
							Carex lyngbyei-Poa eminens
							Poa eminens-Argentina egedii
						Lyngbye's Sedge Tidal	
							Carex lyngbyei
						Red Fescue Tidal	
							Argentina egedii-Festuca rubra
							Festuca rubra
						Tufted Hairgrass Tidal	
							Deschampsia beringensis
Shrubland & Grassland							
	Temperate & Boreal Shrubland & Grassland						
		Temperate & Boreal Bog & Fen					
			North American Bog & Fen				
				North Pacific Bog & Fen			
					North Pacific Water Sedge - Sweetgale Neutral - Alkaline Fen		
						Grassyslope Arctic Sedge Wet Herbaceous	
							Carex anthoxanthea
						Tufted Bulrush Wet Herbaceous	
							Trichophorum cespitosum
		Temperate & Boreal Scrub & Herb Coastal Vegetation					
			Pacific North American Coast Scrub & Herb Vegetation				
				Pacific Coastal Beach & Dune Vegetation			
					American Dunegrass - Sand Ryegrass - Coastal Sand Verbena Dune Scrub & Herb		

Class	Subclass	Formation	Division	Macrogroup	Group	Alliance	Plant Association
						American Dunegrass Coastal Beach Herbaceous	
							Leymus mollis

Appendix G: Field Data Sheet for Klondike Gold Rush National Historical Park

KLGO **FIELD FORM**

Plot: SITK	GPS : Trimble ☐ hurricane	**LC Class size (m):**
Surveyors:	Garmin ☐ external	**PA size (m):**
Date:	**LAT** (DD NAD83):	**Slope** (degrees):
Cameras: Ricoh Oly1 IR Lumix	**LON** (DD NAD83):	**Aspect** (0-360°,mag):
Img #s:	**Elevation (m):**	**Plot Type:** LC only PA only PA and LC
	Error +- (m)	**Plot Size:** _____ x _____ 20 x 20 m 10 x 10 m

Cover by Layer: (forest) (shrub/herb)

Life Form	Absolute Cover	Cover (=100%)	Height (m)
Conifer			
Broadleaf			
Tall shrub (>1.5m)			
Low sh (.2 -1.5m)			
Dwarf sh (<20cm)			
Forb			*****
Ferns/Allies			*****
Grass			*****
Sedge			*****
Moss			*****
Lichen			*****
Water			*****
Bare Ground			*****
Other			*****

Ground Cover (= 100%)	
Litter, duff	
Wood (>1cm)	
Silt (feel on tongue)	
Sand (feel b/w fingers)	
Small rocks (<7.6cm)	
Large rocks (>7.6cm)	
Bedrock	
Stems (basal area)	
Moss	
Lichen	
Water	
Other (describe)	

Hydrologic Regime:	Landform:
Dry	
Dry-Mesic	
Mesic	**Disturbance:**
Mesic-Wet	
Wet	
Very Wet	**Field LC name:**
Aquatic	
Brackish-Mesic	
Brackish-Wet	**Field PA name**
Brackish-Very Wet	
Other	

Landscape sketch:

Ecological Unit (1993)	Plant Association / Community	
Floodplain	Western Hemlock/Blueberry	
Stream Terrace	Western Hemlock/Devil's Club	
Moraine	Sitka Spruce/Devil's Club-Salmonberry	
Lowlands	Sitka Spruce/Salmonberry	
Estuary	Red Alder/Salmonberry	
Beach	Red Alder	
Uplifted Beach	Red Alder-Sitka Spruce/Salmonberry	
Uplifted Beach Meadow	Grass-Umbel	
Visitor Center Area	Estuarine Communities :	
Indian River		Hairgrass
		Hairgrass Forb
Bishops House		Sedge
Other	Sorbus acuparia	
	Landscaped	Other

Species	Cover (%)	Height (m)	Voucher	Species	Cover (%)	Height (m)	Voucher

updated June 2012

Appendix G: Field Data Sheet for Klondike Gold Rush National Historical Park (continued)

KLGO **FIELD FORM**

Plot:
Surveyors:
Date:

Species	Cover (%)	Height (m)	Voucher	Species	Cover (%)	Height (m)	Voucher

updated June 2012

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior

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