TERRESTRIAL ECOSYSTEM MAPPING WITH WILDLIFE INTERPRETATIONS FOR WEYERHAEUSER TFL 15

VOLUME I:
TERRESTRIAL ECOSYSTEM MAPPING WITH EXPANDED LEGENDS FOR TERRESTRIAL ECOSYSTEM UNITS

Prepared by

Darren R. Bruhjell
Scott Robertson
Ksenija Vujnovic
Amit Saxena
Jerry A. Bentz

***GEOWEST* Environmental Consultants Ltd.**
#203, 4209 - 99 Street
Edmonton, Alberta
T6E 5V7

Prepared for:

Weyerhaeuser Canada Ltd.
Okanagan Falls, British Columbia

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- Lonnie Bilyk, Wildlife Biologist, Geowest Environmental Consultants Ltd.
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- Carcey Rowand, Vegetation Ecologist, Geowest Environmental Consultants Ltd.
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- Lorrie Agnew, GIS Analyst, Geowest Environmental Consultants Ltd.
- Myron Karpiak, GIS Technician, Geowest Environmental Consultants Ltd.
- Jim Squarok, GIS Technician, Geowest Environmental Consultants Ltd.
- Roger Thompson, GIS Technician, Geowest Environmental Consultants Ltd.
- Terry Lang, Word Processing/Data Administration, Geowest Environmental Consultants Ltd.
- Joanne Silla, Word Processing/Data Administration, Geowest Environmental Consultants Ltd.

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1.0 INTRODUCTION

1.1 Project Background

The South Okanagan region of British Columbia is host to some of the most diverse, rare and unique assemblages of flora and fauna in Canada. Following environmental trends exhibited world-wide, these species have been severely affected by habitat loss, habitat fragmentation and over-hunting. At least 100 rare, threatened or endangered vascular plants, approximately 125 invertebrates (insects and spiders) and up to 55 mammals, birds, reptiles and amphibians are found in this region, some occur no where else in Canada. Others, including sage grouse sharp-tailed grouse, burrowing owl and short-horned lizards have already been extirpated from the area. Some of these species are at the northern extent of their range and are essential in maintaining intraspecific genetic diversity as well as British Columbia's biodiversity (Harper et al. n.d.).

This region has been adversely affected by resource use activities during recent decades. Harper et al. (n.d.) suggest that only 9% of the South Okanagan landscape remains in its natural state. Alterations resulting from past resource decisions in the Penticton Forest District – population growth, recreational activities, overgrazing, irrigation projects, fire suppression, over-commitment of forest resources, poor management or lax enforcement by previous governments - have made planning for a sustainable future essential. In order to promote a sustainable future, resource-base managers and planners require ecological information at different scales depending upon specific management objectives. Terrestrial Ecosystem Mapping (TEM) fulfils information needs by supplying valuable information for many uses, particularly resource allocation. (RIC 1998a)

TEM has evolved from various forms of ecological classifications and now forms the basis of most biophysical resource assessment in British Columbia. Its history can be traced back to the formation of the Resources Inventory Committee (RIC). RIC was established to provide integrated standards for all resource inventories in the province. Consequently, TEM was developed as a response to the shift to ecosystem and landscape-based management. The methodology for terrestrial ecosystem classification is embodied in Standards for Terrestrial Ecosystem Mapping in British Columbia (RIC 1998a). The primary purpose of TEM is to provide a permanent record of the location and distribution of ecosystems and produce a common communication framework within which numerous resource management disciplines can co-operatively plan and make decisions. Interpretive products derived from TEM provide frameworks for developing, applying and monitoring landscape level and site-specific management prescriptions for many potential resource values. This enables many Forest Practices Code-related needs to be satisfied by using these products including landscape unit forest development and range use planning, biodiversity guidelines, riparian guidelines and proposed wildlife management strategies.

The TEM process has been adopted by resource management industries such as forestry companies as a vehicle by which to inventory and manage the forested land base in British Columbia in a sustainable and conservative manner. As such, the Ministry of Environment, Lands and Parks, the Ministry of Forests, and Weyerhaeuser Canada Ltd. require TEM and wildlife interpretations following the RIC standards for Weyerhaeuser Canada's Tree Farm License 15 (TFL15). It is anticipated that this mapping project will support wildlife and wildlife habitat inventory objectives as well as a number of forest management objectives.

1.2 Concepts in Bioterrain and Terrestrial Ecosystem Mapping

The term *"biophysical classification"* was originally coined in order to connote the blending of several fields of natural resource science as a way of describing ecosystems (Lacate 1969). Under this approach, the ecosystem is referred to in a holistic manner as being composed of a complex web of abiotic and biotic ecological components including geomorphology, bedrock geology, soils, and vegetation. Throughout Canada, biophysical classification schemes have undergone significant evolutionary changes since their inception, with classification development being primarily the responsibility of provincial regulatory and management agencies. The biophysical or ecosystem classification system developed by British Columbia governments is an integrated classification, which unites physical and biological elements - soil, landforms, climate, vegetation, and water – to form a co-ordinated entity.

In British Columbia, the Resources Inventory Committee (RIC 1998a) developed Standards for Terrestrial Ecosystem Mapping in order to provide integrated standards for all resource inventories in the province. This methodology has evolved from two previous methodology manuals – the biogeoclimatic ecosystem classification of the Ministry of Forests (Mitchell et al. 1989) and the ecoregion classification of the Ministry of Environment, Lands and Parks (Demarchi 1996). Ecosystem mapping has been defined by RIC (1995) as the stratification of a landscape into map units based on ecological criteria; primarily climate, physiography, surficial material, soil and vegetation. Ecosystem mapping provides:

- a biological and ecological framework for land management;
- integration of abiotic and biotic ecosystem components on one map;
- basic information on the distribution of ecosystems from which management interpretations can be developed, from broad-scale landscape planning to site-specific interpretations;
- a historical record of ecological site conditions that can be used as a framework for monitoring ecosystem response to management; and
- a demonstration tool for portraying ecosystem and landscape diversity.

These developing mapping standards utilize a three-level system of hierarchical ecological units, involving broad-level delineations of **ecoregion units** and **biogeoclimatic units** as well as site-level polygons describing **ecosystem units** nested within the broader units. Terrain classification and mapping is integral to the process of ecosystem mapping and therefore, ecosystem mapping is based on a **bioterrain** approach, whereby polygons are initially delineated on aerial photographs based on permanent terrain features. This bioterrain approach emphasizes those site characteristics (i.e., soil depth, aspect, slope position) that determine the function and distribution of plant communities in the landscape.

Bioterrain mapping is primarily based on terrain and soil mapping standards (Howes and Kenk 1997, Agriculture Canada Expert Committee 1987) and includes any ecologically significant feature which is thought to influence the functioning of an ecosystem. The bioterrain map forms the primary base for an ecological map. Bioterrain mapping is essentially an enhanced terrain map that incorporates site, soil and vegetation parameters into the distinguishing criteria for map unit determination. Ecosystems are viewed as permanent functional entities and consist of both

unique and repetitive segments of the landscape. The segments consist of combinations of terrain, soil, topography and vegetation that respond in a predictable fashion by way of physical interpretations, vegetation succession, wildlife use and other resource interpretations (Maxwell and Lea 1993).

1.3 Project Objectives

Weyerhaeuser Canada Ltd., Okanagan Falls, requires Terrestrial Ecosystem Mapping with wildlife interpretations following Resources Inventory Standards (RIC) for TFL15 in the Penticton Forest District to support wildlife and wildlife inventory objectives as well as a number of forest management objectives.

Specific project objectives include:

1. Creation of base Terrestrial Ecosystem maps, following 1998 RIC Standards, which will form the basis for future species and ecosystem analysis.

2. Creation of species habitat models for the following five species:

    - white-headed woodpecker
    - Williamson's sapsucker
    - elk
    - lynx
    - mule deer

3. Assessment of the area for suitability/capability for the above mentioned species.

2.0 STUDY AREA DESCRIPTION

2.1 Location

Portions of the Weyerhaeuser Canada Ltd. TFL15 lie within the Southern Okanagan Valley with the remainder extending into the Okanagan Highland. The western boundary of the TFL occurs east of Highway 97 and extends north to south from approximately the municipality of Okanagan Falls to the municipality of Oliver. The Nelson/Kamloops Forest Region boundary and/or the Baldy Mountain Ski Resort best represent the eastern boundary. The study area encompasses an area of approximately 49,100 ha. (Figure 1).

Elevations range from a low of approximately 300 masl (meters above sea level) within the Okanagan valley in the westernmost portion of the TFL (area adjacent to the Vaseux-Bighorn National Wildlife Area) to a height of approximately 2,300 masl atop Baldy Mountain. Vaseux Creek and its tributaries dissect the northern portion of the TFL, while the southern portion is dominated by Inkaneep Creek and its tributaries. Shuttleworth Creek forms a portion of the northern boundary of the study area.

2.2 Climate

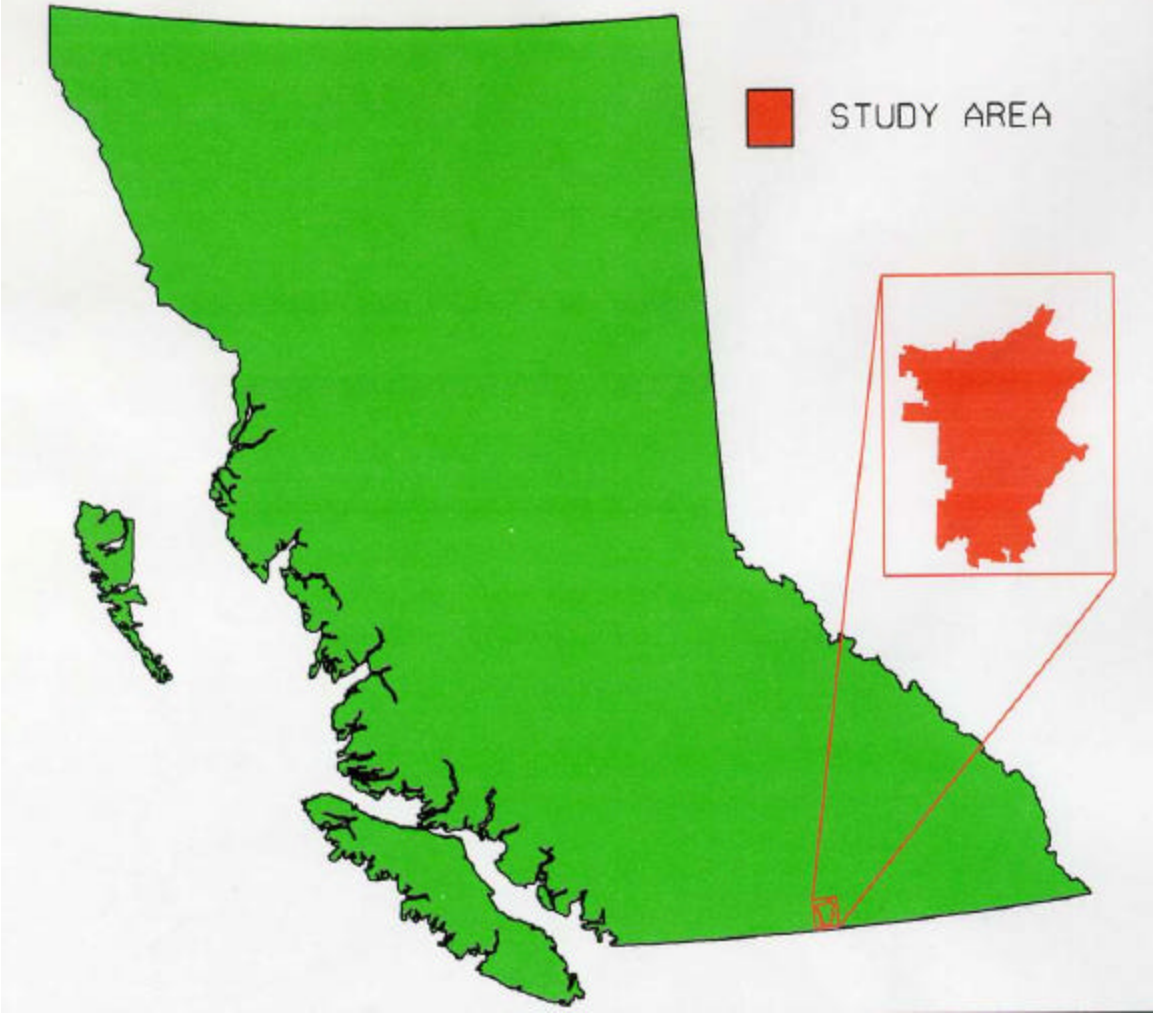
The general climate of the southern Okanagan is among the mildest in Canada. Summers are generally warm and sunny without excessive heat, while winters can best described as being mild and cloudy. Annual temperatures around Oliver average 10 degrees Celsius, decreasing with elevation and latitude as you go north and east. Nights in the lower valleys are typically cool due to down-slope cold air drainage. Precipitation around Oliver averages approximately 23.92 cm (Kelley and Spilsbury 1949) increasing with elevation and latitude.

2.3 Drainage

The watershed of TFL15 forms a portion of the Columbia River Basin. This basin whose tributaries include the Kootenay, Similkameen and Okanagan Rivers, is estimated at 102,000 square kilometres with a discharge of 2193 cubic meters per second. It is internationally significant and is best known for the Columbia Valley Treaty signed in the 1960's allowing for the Columbia River and its tributaries to be dammed on either side of the Canadian/ United States border.

Four major drainages are located within the TFL. These drainages include Vasuex, Shuttleworth, Inkaneep and Dutton creeks. Shuttleworth Creek is the northernmost drainage which affects the upper mapsheets within the study area. Vaseux Creek is the largest drainage within the TFL. During deglaciation, this channel served as a major outlet draining into glacial Lake Okanagan. The result of this high discharge is a gorge (~400 m deep) and an extensive valley which disects the study area. A small tributary, Dutton Creek, adds to this erosion and down cutting of the canyon. Vaseux Creek is responsible for draining approximately half of the TFL. The southern portions of the TFL are drained by Inkaneep Creek. Similar to Vaseux, this creek forms a large gorge which has numerous small tributaries. The Inkaneep watershed is responsible for approximately 30 % of the drainage of the TFL.

FIGURE 1: STUDY AREA LOCATION



2.4 Geology

The geology of TFL 15 is dominated by Mesozoic high grade metamorphics with granitic inclusions. The TFL is located on the Interior Plateau, which extends from the U.S./ Canada border north to the Omineca and Skeena Mountains. A number of highland areas are found along eastern edge of the Interior Plateau. These highlands (from north to south) include the Quesnel, Shuswap and Okanagan highlands. TFL 15 is located on the Okanagan highland which is comprised of metamorphic gneiss with localized granitic intrusions. The gneiss of this formation is medium to coarse grained with dark amphibole and feldspar alternating with light biotite, feldspar and quartz. Gneissosity is typically subhorizontal with minor swirls and augen structures (Preto and Monger 1972). Specific groups and formations within the lower Okanagan highland include:

- Late-Jurassic to Early-Cretaceous (~144 ma) hornblende-biotite quartz diorite
- Mid-Cretaceous (~90 ma) foliated hornblende quartz diorite
- Early-Tertiary (65-54 ma) ladybird granite (Wheeler and McFeely 1981).

The landforms which develop within an area are dependent on the specific properties of the underlying bedrock (Ryder 1978). In general, granitic bedrock is highly resistant to erosion. In high elevation settings, the bedrock breaks down slowly due to frost shattering processes. The combination of physical and chemical weathering causes a granular disintegration. The competency of gneiss is dependent on the internal composition of the original rock type. Fine-grained and weaker minerals are more susceptible to erosion and weathering processes. In general, gneiss tends to weather in a layered or banded fashion due to the alternating beds of resilient and erosive mineralogy.

2.5 Glacial History, Surficial Materials, and Soils

2.5.1 Glacial History

The glacial history of the southern Okanagan is complex due to its relative proximity to the ice sheet margin, the large scale trenching found in the Okanagan valley, and the history of multiple glaciations that have directly affected the area. Throughout most of British Columbia up to four glaciations have been recorded. Within the southern Okanagan, evidence supports three or more glacial episodes, the most recent is termed the Fraser Glaciation. Within the mountainous regions large valley glaciers coalesced to form ice caps. These caps in turn coalesced with the ice sheets (or domes) which covered the plateau regions of the province (Ryder 1978). The Fraser Glaciation commenced approximately 25 ka BP and reached its maximum ice limit in northern Washington by ~15 ka BP. Rapid deglaciation took place following the establishment of glacial maximum. Based on radiocarbon dating, the Fraser Plateau and Strait of Georgia were ice free by 13 ka BP. Throughout the following 2 ka, the ice margin fluctuated near the present day Canadian-American border. By 11 ka BP most valleys within the southern interior were ice free. Dendrochronology and radiocarbon dating suggest that within the Coast Mountains, local glaciers were close to present positions by ~9.5 ka BP. This is locally significant and does not apply to all of the ranges along the southern edge of the province (Ryder 1978). Data for the Okanagan highlands does not exist, however, it is assumed that this area was ice free by this date (9.5 ka BP) due to the low elevation of the peaks (<2200 m asl) and their proximity to the Interior Plateau.

One of the most prominent features within the Interior Plateau is the Okanagan valley, which contains a number of large lakes (the largest of which is Lake Okanagan). Seismic and sediment core studies indicate that the bedrock basement in the valley is ~ 500 m below the surface of the glacial drift. Based on town sites elevations within the valley, this places the bedrock at ~200 meters below sea level. The formation of the valley is thought to be the result of one of three possible processes. The first process involves the downcutting of the valley by stream erosion. This process seems unlikely due to the extreme depth, size, and shape of the valley (Fulton 1972). The second interpretation suggests that the valley formed as a result of tectonic downwarping or dropping. This interpretation suggests that this valley is simply a post-Tertiary garben. This is not supported by the surrounding topography as it would have also been affected by such a tectonic process (Fulton 1972).

The third formational process invokes significant glacial erosion. As stated before, evidence exists for at least three glaciations within the Okanagan valley. Evidence for any prior glaciations has either been eroded or masked. This suggests that earlier glaciations were more erosive and responsible for the downcutting of the valley. Each of the subsequent glaciations were less erosive, thereby preserving previously deposited sediment as well as depositing its own sediment. Sediment cores within the Okanagan valley indicate layering of glacial and non-glacial sediments (Fulton 1972). These glacial deposits include glacial lake sedimentation, proglacial sedimentation and till. Non-glacial deposits are limited to lacustrine and fluvial sedimentation.

Following deglaciation and throughout the Holocene, the upland areas of the Okanagan Highlands were intensely modified by fluvial and colluvial processes. The most widespread of these processes was the modification of the landscape by fluvial action. This process involves the erosion and deposition of sediment via moving water. This process creates gullies and valleys that have a V-shape due to dominant downward erosion. In areas of deposition, large flat terrace and floodplain deposits mask pre-existing sediments. Colluvial processes involve the movement of sediment via gravitational energy. The downward movement of sediment creates aprons and fans that also mask the pre-existing sediments.

2.5.2 Surficial Materials

Within Weyerhaeuser's TFL 15 seven different surficial deposits were noted. These parent materials included moraine, glaciofluvial, colluvial, fluvial, organic, glaciolacustrine and eolian.

Morainal (glacial till) deposits are the most widespread sediment type found within the TFL. These deposits are deposited directly by glacier ice in a sub, or supra-glacial setting. These sediments are generally heterogeneous with a mixture of particle sizes and lithologies (Ryder 1978). Morainal deposits are highly variable depending on the nature of the source material being eroded. As a rule, most moraine sediments are non-sorted and non-stratified and vary in structure from non-compact to compact. These sediments occur on a variety of landscapes and can be significantly thick enough to mask the underlying bedrock topography. In other areas very thin morainal deposits will cap the underlying bedrock. Within the TFL till textures vary from silty clay (dzc) to sandy loam (szd) with a high variability of coarse fragment content. The most dominant moraine within the TFL is a non-compact ablation till. This particular deposit forms as a result of the *in situ* mass wasting of glacial ice. As the ice melts, loose non-compact sediments are deposited. In localized areas surrounding the western slope of Mount Baldy, a dense lodgment till was noted. This deposit forms at the bed of a glacier and is compacted by the weight and pressure of the overlying ice. These sediments are commonly silt and clay (sdc) with moderate percentage of coarse fragments.

Colluvium is associated with steep topography within the study area, especially where thin unconsolidated materials overly steeply sloping bedrock (>55 %). Colluvium is the result of mass wastage, dominated by the movement of sediment due to gravity. The combination of pore-water infiltration and gravitational forces can induce rapid mass movement in certain sediments (i.e. slumping, debris flows). As well, rapid mass movements (bedrock failures) can be induced by frost shattering. Slow mass movements such as solifluction (alpine areas), and soil creep (i.e. slope wash) are also common. Colluvial materials are generally very coarsely-textured with a variety of coarse fragments depending on the source area (szr-sr). These materials tend to be well drained, as most of the finer grain fractions have been washed away from the upper soil horizons.

Glaciofluvial materials are the third most dominant parent material found in the TFL. These sediments are deposited by meltwater either in direct contact with the ice or beyond the ice margin as outwash. These deposits vary in thickness from thin veneers to blankets of several meters. These deposits are typically coarse-grained gravel (sg-gs) and sand that may be stratified and sorted. Glaciofluvial terraces generally form the highest terraces preserved within a valley. Proglacial outwash deposits are generally sorted or poorly bedded and form large flat plains. Discontinuous esker complexes are found within the study area. Generally, these eskers are less than 300 m in length and reach only 15-20 m in height. Within the TFL, glaciofluvial deposits are confined to large active drainage basins and the confluence of relict drainage basins. At the western end of Vaseux Canyon, thick (~300 m) stratified glaciofluvial sediments form a large delta which built into glacial Lake Okanagan. This deposit is only locally preserved on the valley walls, as subsequent fluvial erosion and lake lowering has removed much of the previously deposited sediment.

Fluvial materials are found within the valley floors flanking contemporary rivers and streams. These sediments are generally well-sorted, stratified gravel, sand and silt (sz-sg). Seepage within these deposits is generally never a concern due to the ease of pore water movement through the sediment. Most of the contemporary stream channels are irregular in form and generate marginal fluvial plains with occasional oxbow lakes and back channels.

Materials of lesser abundance include eolian and glaciolacustrine deposits and organic accumulations. Each of these deposits occur sporadically throughout the TFL. Eolian deposits are limited to the highland rock outcrops immediately east of the Okanagan Valley. Glacial silt deposited within the valley has been entrained by the wind and deposited in small depressions on the rock outcrops. The structure of this sediment is generally characterized by massive to fine horizontal bedding. Glaciolacustrine sediments were limited to the eastern portions of Vaseux Canyon. These sediments are deposited in proglacial lakes during or shortly after deglaciation. They are commonly massive or varved (repeating horizontal layers of summer and winter accumulations) silt and clay. These deposits generally lack any coarse fragments, however dropstones which fall through the water column, may be incorporated into the sediment profile. Drainage in these sediments is imperfect to poor depending on the size of the sediment particles. Organic accumulations can be associated with lacustrine and fluvial deposits but most are common on wide valley floors. They are also commonly found within poorly drained undulating topography and the micro-topography of many riparian areas.

2.5.3 Soils

The soils of the study area are strongly indicative of the bedrock geology, parent material, topography, vegetation and climate of the region. Six soil orders were identified within TFL 15, including Brunisols, Regosols, Podzols, Luvisols, Gleysols, and Organics.

Soils belonging to the Brunisolic Order were the most commonly mapped soil within the TFL 15. These soils have sufficient development to exclude them from the Regosolic Order, however, they lack the degree or kind of horizon development specified for soils of the other orders. This group includes soils of various colours with both Ae and weakly expressed B horizons showing weak accumulations of aluminum or iron (Bfj) or an accumulation of clay (Btj). The most distinguishing characteristic of the Brunisolic Order, under forest conditions, is a brownish-coloured Bm horizon of at least 5 cm. Brunisols occur throughout the study area on a variety of different parent materials, including moraine, colluvium, glaciofluvial, fluvial and eolian deposits.

The widespread mapping of Brunisols coincides with the Soils Map of British Columbia (Valentine et al. 1978) which indicates that this region of British Columbia is dominated by both Eutric and Dystric Brunisols. These two great groups are separated based on the pH of the uppermost 25 cm of the soil. Dystric Brunisols have a pH less than 5.5, while Eutric Brunisols have pH values 5.5 or greater. The distribution of the two great groups reflects the bedrock geology of a region, as the pH of the bedrock strongly influences the pH of the overlying surficial materials.

Soils of the Regosolic Order were also commonly classified within the study area. These soils generally lack the well-developed profiles of the other soil orders. The poor development of this soil order is the result of a number of factors including: the youthfulness of the material (i.e. recent alluvium); instability of the material (i.e. colluvium on slopes subject to mass wasting); the nature of the parent material (i.e. dominated by quartz sand); and the climate of the region (i.e. cold, wet environments). Within the TFL, Regosolic soils have commonly been mapped in association with soils of the Brunisolic Order. Regosols were generally associated with both colluvial and fluvial deposits.

Soils of the Podzolic Order are characterized by the formation of a Bf horizon. This horizon is distinguished by the accumulation of organic matter and varying degrees of amorphous material, primarily aluminum (Al) and Iron (Fe). Organic carbon content ranges from 0.5-5.0 %, while pyrophosphate Fe + Al is 0.6 % or greater (0.4 % for sands). Podzolic soils are typically coarse to medium textured with acidic parent materials. Most Podzolic soils have a reddish-brown Bf horizon (7.5 YR or redder) with an abrupt upper boundary and lower B or BC horizons with colours progressively more yellow in hue and lower in chroma with depth (except in parent materials of reddish colour). Podzolic soils were most often associated with stable morainal, colluvial and glaciofluvial deposits. The slow development of Podzolic soils precludes those sediments that undergo chronic instability.

Soils of the Luvisolic Order occur infrequently within the study area. These soils generally have light coloured, eluvial A horizons and illuvial B horizons in which silicate clay has accumulated. A Luvisolic B horizon must have a greater amount of clay compared to that found in the eluvial horizon. Clay skins are indicative of clay translocation and must account for greater than 1% of the horizon. As well, this horizon must be at least 5 cm thick. Luvisols generally occur under forest or mixed forest conditions in a wide range of climates.

Soils of the Gleysolic Order occur on poorly drained sites, however they were not commonly mapped within the TFL. Gleysols have features indicative of periodic or prolonged saturation. As such these soils are typified by reducing conditions. These soils result from excessive groundwater discharge commonly observed in the mid to lower slope positions. Gleysols often occur in shallow depressions and on level lowlands that are saturated almost every spring.

Gleysolic soils often produce different vegetation communities than the surrounding soils due to the high moisture content and poor internal drainage. Gleysols have either matrix colours of low chroma or distinct to prominent mottles of high chroma in the upper 50 cm. This suggests localized oxidation of ferrous iron and deposition of hydrated ferric oxide.

Soils belonging to the Organic Order occur mainly in the upper elevations of the TFL. Very few organic openings were noted within the lower, dry biogeoclimatic zones. The Organic soils found are composed largely of organic materials including peat, muck, or bog type deposits. Organic soils generally occur in very poorly drained areas with long-term to permanent soil saturation. Organic soils are derived from the local vegetation and contain at least 30% organic matter by weight. Organic soils are classified based on the level of decomposition of the organic matter. The soil classes, based from least to most decomposed, are: folic, fibric, mesic, or humic. The four stages of decomposition are defined by the von Post scale of decomposition. The classification at the great group level is based on the properties of the second tier (~80 cm deep). Mesisols, which are composed primarily of partially decomposed organic materials, were most commonly found within the TFL. Fibrisols, composed largely of undecomposed organic materials, were also found to a lesser degree within the TFL.

2.6 Ecoregion and Biogeoclimatic Classification

2.6.1 Ecoregions

British Columbia's complex marine and terrestrial ecosystems are stratified into discrete geographical units at five different levels. The broadest levels of classification are Ecodomains and Ecodivisions, which serve to place British Columbia globally. The three remaining units - Ecoprovinces, Ecoregions and Ecosections - are progressively more detailed and narrow in scope, relating segments of the province to one another. These units describe areas of similar climate, physiography, oceanography, hydrology, vegetation, and wildlife potential. (Demarchi 1996)

This report is concerned with the two most specific levels, the Ecoregion and the Ecosection. The majority of the TFL is located within the Thompson-Okanagan Plateau Ecoregion with a lesser component found in the Okanagan Highland. The Thompson-Okanagan Plateau Ecoregion is a broad plateau with low elevation basins. This ecoregion is characterised by having the driest and warmest climates in British Columbia. In comparison, the Okanogan Highland Ecoregion is a transitional mountain area lying between the Columbia Basin to the south and the Columbia Mountains to the northeast. (Demarchi 1996)

Of the five Ecosections contained within the Thompson-Okanagan Plateau Ecoregion, only the Northern Okanagan Highland Ecosection is found within the TFL. According to Demarchi (1996), the Northern Okanagan Highland is a cool, moist, transitional mountain area, dominated by a rolling upland. The Southern Okanagan Basin Ecosection, found within the Okanagan Highland Ecoregion, comprises the remainder of the study area. This ecosection is limited to the western portion of the TFL, and is best described as a wide trench located between the Okanagan Ranges Ecoregion to the west and the Southern Okanagan Highlands to the east. Some of the hottest and driest climates in British Columbia are located within this ecosection. (Demarchi 1996)

2.6.2 Biogeoclimatic Classification

The TFL is separated into four biogeoclimatic zones, including the Ponderosa Pine (PP), Interior Douglas-fir (IDF), Montane Spruce (MS), and Engelmann Spruce - Subalpine Fir (ESSF) zones. Within these four zones exist seven subzone variants. These variants include the Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1), Okanagan Very Dry Hot Interior Douglas-fir Variant (IDFxh1), Kettle Dry Mild Interior Douglas-fir Variant (IDFdm1), Okanagan Dry Mild Montane Spruce Variant (MSdm1), Okanagan Dry Cold Engelmann spruce - Subalpine Fir Variant (ESSFdc1), Okanagan Dry Cold Engelmann spruce - Subalpine Fir Upper Elevational Variant (ESSFdcu) and Okanagan Dry Cold Engelmann spruce - Subalpine Fir Parkland Variant (ESSFdcp1).

2.6.2.1 Ponderosa Pine (PP)

The PP occurs at low elevations along the very dry valleys of the southern Interior Plateau of British Columbia. Of all the Biogeoclimatic zones in British Columbia, this zone is the driest and in the summer, the warmest. Its climate is strongly influenced by the rainshadow cast by the Cascade Mountains over the southern Interior Plateau. Seasons are characterized by hot, dry summers resulting in large moisture deficits during the growing season and cool winters with light snow. Mean annual precipitation is 280-500 mm, 15-40% of which falls as snow. The PP landscape has evolved in a environment highly influenced by fire. This has formed a community that can best be described as a mosaic of forest and grassland consisting primarily of fire tolerant species such as ponderosa pine. Ponderosa pine (*Pinus ponderosa*) generally dominates xeric to mesic forest canopies with Douglas-fir (*Pseudotsuga menziesii*) becoming more dominant on subhygric to hygric sites primarily associated with riparian or seepage sites throughout the zone. Subhydric to hydric sites within this subzone are generally absent from the TFL. The Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1) dominates the lower elevations of the study area. It is located in the westernmost portion of the TFL at elevations ranging from 300 masl to 870 masl. (Meidinger and Pojar 1991)

2.6.2.2 Interior Douglas-fir (IDF)

Meidinger and Pojar (1991) describe the IDF as dominating the low- to mid-elevation landscape of south-central interior British Columbia. Within the study area this zone is found immediately below the Montane Spruce (MS) zone and above the Ponderosa Pine (PP) zone. The climate of the IDF is also influenced by the rainshadow produced by the Cascade Mountains. Summers are characterized as being warm and dry with a relatively long growing season while winters are best described as cool. Moisture deficits are common during the growing season and frosts can occur anytime. Mean annual precipitation ranges from 300 – 750 mm, with approximately 20 to 50% falling as snow. Frequent historical fires have favoured the survival of mature trees with thick bark. This has led to the development of forests dominated by Douglas-fir with pure Douglas-fir stands being common. Other common trees include lodgepole pine (*Pinus contorta*), trembling aspen (*Populus tremuloides*), western larch (*Larix occidentalis*), ponderosa pine and hybrid white spruce (*Picea engelmannii* x *glauca*). Lodgepole pine is generally widespread at higher elevations where it is a common successional species and often forms extensive mixed stands with Douglas-fir and scattered Douglas-fir veterans in ecosystems where crown fires are common. Trembling aspen is also a widely distributed seral species throughout the zone. Western larch is also common in the IDF frequently occurring following a fire. Ponderosa pine generally forms early seral stands on zonal sites and climatic climax stands on drier sites. Hybrid white spruce is typically restricted to moister sites and upper elevational IDF. Edaphic and topographic conditions and fire history have favoured the development of large grasslands within

the TFL. Common grasses include bluebunch wheatgrass (*Elymus spicatum*), cheatgrass (*Bromus tectorum*) and Idaho fescue (*Festuca idahoensis*). Wetlands are typically dominated by non-forested communities ranging from cattail (*Typha latifolia*) marshes in shallow depressions and around open water, to sedge fens dominated by water sedge (*Carex aquatilis*), beaked sedge (*Carex utriculata*) and slender sedge (*Carex lasiocarpa*). Shrub-carrs dominated by scrub birch (*Betula glandulosa*), are typically limited to upper elevational IDF. Tall alder (*Alnus* spp.) and willow (*Salix* spp.) swamps frequently occur along small streams and drainage channels. Two IDF subzone variants are found within the TFL. They include the Okanagan Very Dry Hot Interior Douglas-fir Variant (IDFxh1) and the Kettle Dry Mild Interior Douglas-fir Variant (IDFdm1).

The IDFxh1 within the TFL occurs immediately above the PPxh1 subzone variant. Elevations range from a topographic low of 870 masl to a high of 1160 masl. It dominates the lower elevations of the study area forming a mosaic of open forest with a grass-dominated understory. This subzone variant lacks lodgepole pine and commonly has ponderosa pine forming a significant portion of the canopy, particularly on sites that are submesic or drier. IDFxh1 grassland phases are common within the TFL, dominating steep, southern aspects such as the southern slopes of both Vaseux and Dutton creeks.

Immediately above the IDFxh1 exists the IDFdm1. The IDFdm1 differs from the IDFxh1 in that lodgepole pine is a dominant seral species occurring on a significant portion of the IDFdm1 within the study area. When compared to the IDFxh1, this subzone experiences cooler temperatures and slightly more precipitation due to its higher elevations which range from 1100 masl to 1450 masl. These climatic parameters generally result in a closed forest canopy and an understory with more shrubs and forb-grass-moss ground cover. (Meidinger and Pojar 1991)

2.6.2.3 Montane Spruce (MS)

The MS is a mid elevation zone occurring elevationally above the IDF and below the Engelmann Spruce-Subalpine fir (ESSF) Zone in the Southern Interior Plateau. Its climate can best be described as transitional between the IDF and ESSF with cold winters and moderately short, warm summers. Precipitation varies from 380 mm to 900mm. Growing seasons within the MS of the TFL can be described as being sufficiently warm and dry that moisture deficits can occur. Floristically, the MS can best be described as a transitional zone between the IDF and ESSF. Vegetation communities contain species that are common to both of the aforementioned zones, forming a unique combination of species that differ from both the IDF and ESSF. An important distinguishing characteristic of this zone is the extensive seral stands of lodgepole pine that have formed following wildfire. Climax tree species include hybrid white spruce and subalpine fir (*Abies lasiocarpa*). Other seral tree species include Douglas-fir, trembling aspen and western larch. Willows (*Salix* spp.), sedges (Carex spp.), Sphagnum mosses and glow moss (*Aulacomnium palustre*) dominate wetland communities. Of the five described MS subzones, only the Okanagan Dry Mild Montane Spruce Variant (MSdm1) is found in the study area. The MSdm1 dominates TFL15 occurring as a broad transitional zone between the IDFdm1 and the ESSF. Elevations vary from a topographic low of 1450 masl to a high of 1750 masl. (Meidinger and Pojar 1991)

2.6.2.4 Engelmann Spruce-Subalpine Fir (ESSF)

The ESSF is the uppermost forested zone in the southern three quarters of the interior of British Columbia, lying immediately below the Alpine Tundra in the Northern Columbia Mountains. Meidinger and Pojar (1991) describe this zone as having a relatively cold, moist, and snowy

continental climate consisting of short, cool growing seasons and long, cold winters. Depending on subzone variant, precipitation levels are highly variable in this zone ranging from 400 to 2200 mm, with 50 - 70% falling as snow. Variants within the TFL are at the drier extreme of this range. Floristically, this zone can be described as having continuous forest at its lower and middle elevations and subalpine parkland at its upper elevations. The tree canopy is dominated by Engelmann spruce and to a lesser extent subalpine fir. Non-forested ecosystems including wetlands and subalpine meadows are common in this zone due to climatic extremes.

Three ESSF subzone variants exist within the TFL. The lowest in elevation and most common ESSF subzone variant is the Okanagan Dry Cold Engelmann Spruce - Subalpine Fir Variant (ESSFdc1). This variant dominates the easternmost portion of the study area occurring on and around Baldy Mountain, Mount Underdown and the northeastern portion of the TFL. Elevations range from 1750 masl to 1950 masl.

Directly above the ESSFdc1 on Baldy Mountain lies the Okanagan Dry Cold Engelmann Spruce - Subalpine Fir Upper Elevational Variant (ESSFdcu). The open tree canopy, presence of pink mountain heather and the lack of white-flowered rhododendron on mesic sites distinguishes this variant phase from the ESSFdc1. Elevations ranges from 1950 masl to 2150 masl. The Okanagan Dry Cold Engelmann Spruce - Subalpine Fir Parkland Variant (ESSFdcp1) occupies the extreme upper elevations of Baldy Mountain. This variant is characterized by clumps of whitebark pine (*Pinus albicaulis*) and subalpine fir intermixed with areas of heath, meadow, and grassland. Presence of krumholz vegetation and whitebark pine distinguishes this subzone variant from the ESSFdcu. Elevations vary from approximately 2150 masl to 2300 masl. (Meidinger and Pojar 1991).

2.7 Wildlife

TFL 15 hosts a mosaic of diverse wildlife habitats, owing largely to the elevational and landform diversity described in preceding sections of this report. The proximity of the TFL to Canada's only "arid" desert environment, combined with the presence of mid to high elevation spruce-fir forests, provides a range of habitat types for a vast number of wildlife species. The South Okanagan region is widely acknowledged as having some of the most diverse, rare, and unique wildlife assemblages in British Columbia, with many species reaching the northern limits of their range in this area.

The unique habitat associations that are present within the TFL include shrubby grasslands, rock outcroppings, canyons, cliffs, escarpments, and talus slopes at the lowest elevations. Deeply incised gorges such as those carved by Vaseux and Inkaneep creeks provide habitat for numerous species of snakes, bats and bighorn sheep. Vaseux Lake Provincial Park, located along Highway 97 between the towns of Oliver and Okanagan Falls, is part of a large ungulate range that is used heavily in the spring and fall by both mountain goats and bighorn sheep.

Coniferous forests within the TFL and surrounding vicinity range from parkland-type ponderosa pine with open grassy understories at the lower elevations, dense seral lodgepole pine and Douglas fir stands with closed canopies at mid elevations, and spruce-dominated forests at higher elevations such as upper slopes of Baldy Mountain. Due to their extreme diversity, these coniferous forests provide habitat for a variety of wildlife species. Ponderosa pine forests in the valley bottoms are relied upon by endemic species such as the white-headed woodpecker (*Picoides albolarvatus*), which, in Canada, occurs only in the South Okanagan. Upper elevation

forested habitats provide year-round life requisites for species such as Canada lynx (*Lynx canadensis*), northern flying squirrel (*Tamiasciurus sabrinus*), and ungulates such as moose (*Alces alces*), elk (*Cervus elaphus*) and mule deer (*Odiocoileus hemionus*).

The Ministry of Environment, Lands and Parks has identified that 31% of the province's red-listed vertebrates (n=20/65) and 51% of the province's blue-listed vertebrates (n=42/82) can be found in the South Okanagan (BC Environment 1996). While many of these species are associated with endangered grassland ecosystems outside the boundaries of TFL 15 itself, some also do occur within the TFL. A query of the BC Conservation Data Center database for rare element occurrence records within the TFL area showed 10 red-listed and 17 blue-listed species that have been recorded, including the following:

Red-Listed Vertebrates		**Blue-Listed Vertebrates**	
Tiger Salamander	*Ambystona tigrinum*	White-throated Swift	*Aeronautes saxatalis*
Pallid Bat	*Antrozus pallidus*	Canyon Wren	*Catherpes maxicanus*
Lark Sparrow	*Chondestes grammacus*	Gray Flycatcher	*Empidonax wrightii*
Peregrine Falcon	*Falco peregrinus anatum*	Lewis' Woodpecker	*Melanerpes lewis*
Night Snake	*Hypsiglena torquata*	Flammulated Owl	*Otus flammeolus*
Yellow-breasted Chat	*Icteria virens*	Williamson's Sapsucker	*Sphyrapicus thyroideus*
Sage Thrasher	*Oreoscoptes montanus*	Painted Turtle	*Chrysemys picta*
Western Screech Owl	*Otus kennicotti macfarlaneii*	Great Basin Spadefoot Toad	*Spea intermontana*
White-headed Woodpecker	*Picoides albolarvatus*	Gopher Snake	*Pituophis catenifer deserticola*
Brewer's Sparrow	*Spizella breweri breweri*	Racer	*Coluber constrictor*
		Western Rattlesnake	*Crotalus viridis*
		Townsend's Big-eared Bat	*Corynorhinus townsendii*
		Spotted Bat	*Euderma maculatum*
		Fringed myotis	*Myotis thysanoides*
		Great Basin Pocket Mouse	*Perognathus parvus*
		Western Harvest Mouse	*Reithrodontomys megalotis*
		California Bighorn Sheep	*Ovis canadensis*

2.8 Rare Ecosystems

2.8.1 Background Information

The British Columbia Conservation Data Centre (CDC) is a program of the Resources Inventory Branch of the British Columbia Ministry of Environment, Lands and Parks. The CDC systematically collects information on the rare and endangered vascular plants, vertebrate animals, and plant communities in the province. Rarity ranks are determined using the following quantitative and qualitative criteria: number of element occurrences, range, trend, protected

status, threats and fragility.

2.8.1.1 Basic Provincial Ranks

The following table outlines the basic provincial ranks according to the CDC of British Columbia (as displayed in Table 3).

Table 1. Basic Provincial Ranks of British Columbia

Symbol	Name	Definition
SX	Presumed Extirpated	Believed to be extirpated. Not located despite intensive searches and virtually no likelihood that it will be rediscovered.
SH	Possible Extirpated	Known only from historical occurrences. Still some hope of rediscovery.
S1	Critically Imperiled	Critically inmperiled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 5 or fewer occurrences or very few remaining individuals (<1000).
S2	Imperiled	Imperiled provincially because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. Typically 6 to 20 occurrences or few remaining individuals (1000-3000).
S3	Vulnerable	Vulnerable provincially either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3000 to 10000 individuals.
S4	Apparently Secure	Uncommon but not rare, and usually widespread. Possibly cause for long-term concern. Typically more than 100 occurrences provincially or more than 10000 individuals.
S5	Secure	Common, typically widespread and abundant.

2.8.1.2 Basic Provincial Status

The following table defines provincial list status categories according to the CDC of British Columbia (as displayed in Table 3).

Table 2. Provincial List Status Definitions of British Columbia

Name	Definition
RED LIST	Includes any indigenous species or subspecies (taxa) considered to be Extirpated, Endangered, or Threatened in British Columbia. Extirpated taxa no longer exist in the wild in British Columbia but do occur elsewhere. Endangered taxa are facing imminent extirpation or extinction. Threatened taxa are likely to become endangered if limiting factors are not reversed. Red-listed taxa include those that have been, or are being, evaluated for these designations.
BLUE LIST	Includes any indigenous species or subspecies (taxa) considered to be Vulnerable in British Columbia. Vulnerable taxa are of special concern because of characteristics that make them particularly sensitive to human activities or natural events. Blue-listed taxa are at risk, but are not Extirpated, Endangered or Threatened
YELLOW LIST	Includes any indigenous species or subspecies (taxa) which is not at risk in British Columbia. The CDC tracks some Yellow listed taxa which are vulnerable during times of seasonal concentration (e.g., breeding colonies).

2.8.2 Rare Plant Associations Within TFL 15

Rare plant associations, as defined by CDC (MoELP 2000), found in Tree Farm License 15 are displayed in Table 3. (Please note that "Plant Association" and "Site Series" names are two different identities and may not concur).

Table 3: Rare Plant Associations within Weyerhaeuser Canada Ltd. Tree Farm License 15

Biogeoclimatic Subzone/Variant	Site Series Code	Plant Association		Prov CDC Rank	Prov List
		Scientific Name	Common Name		
PPxh1	01	*Pinus ponderosa* / *Elymus spicatus* - *Festuca idahoensis*	Ponderosa pine / Bluebunch wheatgrass - Idaho fescue	S2S3	Blue
PPxh1	02	*Pinus ponderosa* / *Aristida longiseta*	Ponderosa pine / Red three-awn	S3	Blue
PPxh1	03	*Artemisia tridentata* / *Elymus spicatus – Balsamorhiza sagittata*	Big sage / Bluebunch wheatgrass-Balsamroot	S2	Red
PPxh1	05	*Pinus ponderosa* / *Elymus spicatus* - *Festuca campestris*	Ponderosa pine / Bluebunch wheatgrass - Rough fescue	S2S3	Blue
PPxh1	06	*Pseudotsuga* menziesii / *Symphoricarpos albus* / Calamagrostis *rubescens*	Douglas-fir / Common snowberry / Pinegrass	S3?	Blue
PPxh1	08	*Pseudotsuga menziesii* / *Betula occidentalis – Acer glabrum*	Douglas-fir / Water birch - Douglas maple	S1S2	Red
IDFxh1	02	*Pseudotsuga menziesii-Pinus* ponderosa / Elymus *spicatus*	Douglas-fir-Ponderosa pine / Bluebunch wheatgrass (Balsamroot)	S3	Blue
IDFxh1	03	*Pseudotsuga menziesii* - *Pinus* ponderosa / Elymus *spicatus*	Douglas-fir - Ponderosa pine / Bluebunch wheatgrass (Balsamroot)	S3	Blue
IDFxh1	04	*Pseudotsuga menziesii – Pinus* ponderosa / Ceanothus *velutinus*	Douglas-fir - Ponderosa pine / Snowbrush	S3?	Blue
IDFxh1	05	*Pseudotsuga menziesii* - *Pinus* ponderosa / Festuca *idahoensis*	Douglas-fir - Ponderosa pine / Idaho fescue	S3?	Blue
IDFxh1	08	*Pseudotsuga menziesii – Betula* papyrifera / Acer *glabrum*	Douglas-fir - Paper birch / Douglas maple	S3	Blue
IDFxh1	91	*Festuca idahoensis – Elymus spicatus*	Idaho Fescue - Bluebunch wheatgrass	S2	Red
IDFxh1	92	*Artemisia tridentata* / *Elymus spicatus – Balsamorhiza sagittata*	Big sage / Bluebunch wheatgrass - Balsamroot	S2	Red
IDFxh1	93	*Elymus spicatus – Balsamorhiza sagittata*	Bluebunch wheatgrass - Balsamroot	S2S3	Blue
IDFxh1	94	*Artemisia tridentata – Elymus spicatus – Balsamorhiza sagittata*	Big sage-Bluebunch wheatgrass - Balsamroot	S2	Red
IDFdm1	02	*Elymus spicatus – Koeleria macrantha*	Bluebunch wheatgrass - Junegrass	S2	Red
IDFdm1	03	*Pseudotsuga menziesii* - *Pinus ponderosa* / *Elymus spicatus*	Douglas-fir - Ponderosa pine / Bluebunch wheatgrass (Balsamroot)	S3	Blue
MSdm1	01	*Picea engelmanii* x *glauca* / *Pachistima* / *Pleurozium*	Hybrid white spruce / Falsebox / Feathermoss	S3?	Blue
MSdm1	04	*Pinus contorta* / *Arctostaphylos* / *Calamagrostis rubescens*	Lodgepole pine / Kinnikinnick / Pinegrass	S3?	Blue

3.0 METHODS

The methodology of this project strictly adheres to the mapping and field survey procedures outlined in RIC (1998a). Figure 2 illustrates the steps taken to ensure this project met its objectives by fulfilling the needs of Weyerhaeuser Canada Ltd. while conforming to provincial standards.

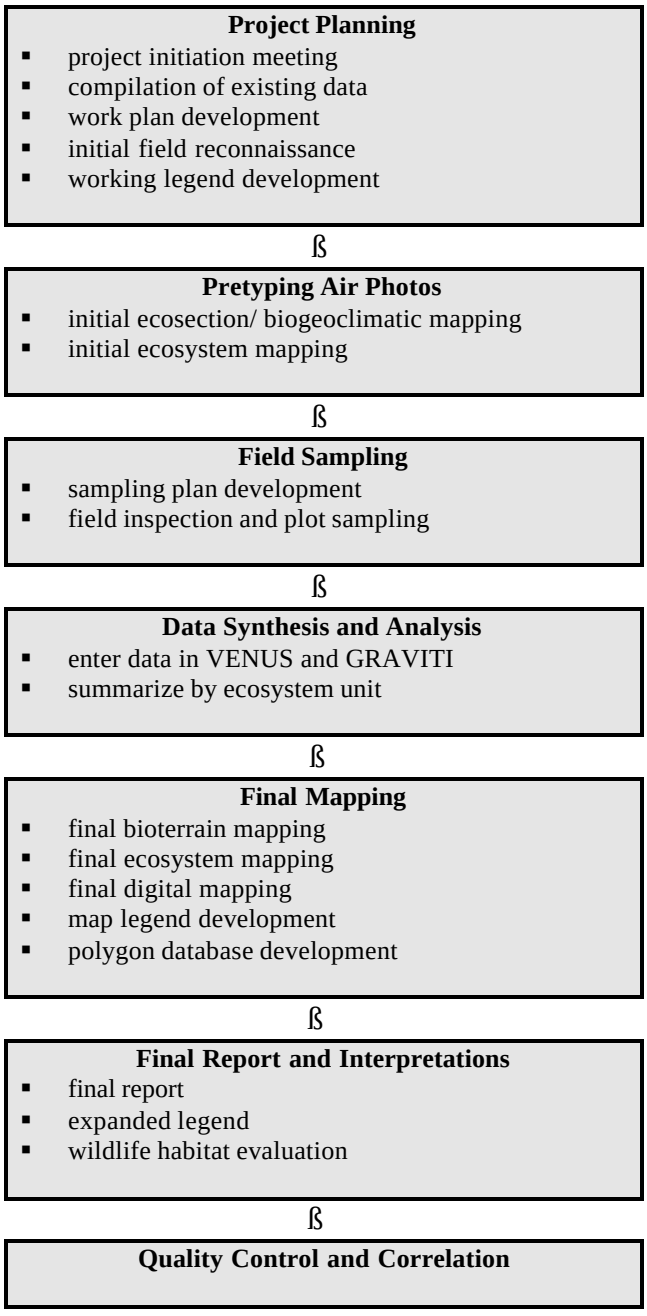


Figure 2. Summary of Mapping and Field Survey Procedures (after RIC 1998a) for Tree Farm Licence 15.

3.1 Project Planning

3.1.1 Project Initiation Meeting, Work Plan Development and Initial Field Reconnaissance

This project spanned a time period of approximately 18 months, from initial contract award to project completion. Following award of the contract in the fall of 1997 a project initiation meeting was held in Kamloops, BC from January 20 – 21, 1998. This meeting served as a forum in which the project objectives, methodologies and deliverables were discussed and finalized and a work plan established. The second day of the project initiation meeting consisted of an initial field reconnaissance of the study area. Attendees at this meeting consisted of Jerry Bentz (Project Manager), Dennis O'Leary (Project Manager- bioterrain), Amit Saxena (Senior Wildlife Biologist) of Geowest Environmental Consultants Ltd., Dennis Lloyd (Kamloops Regional Ecologist), Carmen Cadrin, Larry Lacelle, and Sal Rasheed of Ministry of Environment, Lands and Parks, Victoria and Ed Collen, Nick Kleyn and Steve Jones of Weyerhaeuser Canada Ltd., Okanagan Falls.

3.1.2 Compilation of Existing Data

Relevant background data was required on numerous fronts, including provincial mapping and interpretation standards and methodologies; study area resource descriptions at various scales and levels of resolution; wildlife species habitat requirements, both within the study area and outside; and previous similar wildlife interpretations completed by Ministry of Environment, Lands and Parks in adjacent areas.

The following documents were used to ensure adherence to the current provincial mapping and interpretation standards:

- Bioterrain Mapping Guidelines (Maxwell and Lea 1993; RIC 1995,1998a)
- Standards for Terrestrial Ecosystem Mapping in British Columbia (RIC 1998a)
- Guidelines and Standards to Terrain Geology Mapping in British Columbia (Ryder 1994)
- Terrain Classification System for British Columbia, Version 2. (Howes and Kenk 1997)
- Methods for Biogeoclimatic Ecosystem Mapping (Mitchell et al. 1989)
- Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia (RIC 1998b)
- A Guide to Site Identification and Interpretation for the Kamloops Forest Region, Land Management Handbook Number 23 (Lloyd et al. 1990)
- An Introduction to the Ecoregions of British Columbia (Demarchi 1996)
- Field Manual for Describing Ecosystems in the Field (MoELP and MOF 1998)
- Weyerhaeuser Canada Ltd., Okanagan Falls, Vegetation Resource Inventory Information.
- Soil Survey of the Okanagan and Similkameen Valleys, British Columbia (Kelley and Spilsbury 1949)

3.1.3 Working Legend Development

Draft working legends were developed following the initial field reconnaissance and compilation of existing data. The development of the working legends was an ongoing process, strengthened by further field sampling and consultation with Dennis Lloyd, Kamloops Regional Ecologist.

3.2 Pretyping Air Photos

The most recent aerial photos (1996 1:15,000 scale color photography) were organized into lines, boxed, and interpreted as per Terrestrial Ecosystem Mapping Guidelines (RIC 1998a). The primary purpose of preliminary mapping was to gain an understanding of the general terrain, landform, and vegetation features associated with the study area. Preliminary interpreted aerial photos also provided valuable information that aided in the selection of site and field traverses. Pretyping, as outlined in RIC (1995 and 1998a), can be divided into the two following components.

3.2.1 Initial Ecoregion/Biogeoclimatic Mapping

Initial ecoregion and biogeoclimatic maps were consulted during the pretyping stage allowing the latest biogeoclimatic linework to be redrawn at the project map scale. Subalpine Parkland boundaries were delineated on the aerial photos, thus providing an initial boundary from which other ecosystem map units could be drawn.

3.2.2 Initial Ecosystem Mapping

Initial ecosystem mapping consists of a "bioterrain" approach. This approach integrates vegetation, terrain, and soils features, both in terms of delineation criteria and database attributes resulting in map units that portray ecosystem units (site series, site modifiers and structural stages) with their associated terrain attributes (genetic materials, surface expression, qualifiers, geomorphic processes, soil drainage). Initially, bioterrain pretyping consists of interpreting aerial photos based primarily on slope, drainage, aspect, and vegetation patterns. As the minimum map unit size is .75 cm^2, bioterrain units generally did not include more than one slope class. Some polygons less than the minimum polygon size were also delineated for biodiversity reasons. A preliminary code was placed within each unit to identify parent materials, surface expression, slope and drainage. This information was then utilised in the development of a field sampling strategy.

3.3 Field Sampling

Field sampling and verification is an essential component of the bioterrain and ecosystem mapping process. Field sampling data was used to develop and refine the classification of ecosystem units and to confirm map unit designations and boundaries. It also enabled the resulting classification to be extrapolated and applied to portions of the study area not sampled.

3.3.1 Sampling Plan Development

Prior to the field inventory program, a sampling plan was prepared and submitted to Dennis Lloyd, (Kamloops Regional Ecologist) and Carmen Cadrin (Project Correlator). This sampling plan addressed the following issues:

- timing / schedule of the field program, person days, crew composition
- access, including vehicle and helicopter transects
- number and types of plots to be established
- estimation of percentages of BEC units within the study area
- location of existing MoELP and MOF data

- Field sampling priorities and logistics.

3.3.2 Conducting Field Inspections and Plot Sampling

This project included both a field reconnaissance (January 1998) and intensive field-sampling program (summer of 1998) as outlined in RIC (1998a). The reconnaissance portion of the project allowed for the development of numerous concepts before initial mapping was completed. These concepts included an initial understanding of: ecosystem distribution and landscape processes, relationships between biogeoclimatic unit and ecoregions, study area access, field sampling logistics and relationships between air photo features and ground features.

Three levels of sampling were used in this project - detailed plots, ground inspections and reconnaissance plots. Plot selection was determined by existing standards outlined in RIC (1998a). Approximately 20% of the polygons within the study area were visited, of which 5% were described using detailed plots and the remaining 95 percent by ground inspection (20 %) and reconnaissance plots (75 %).

3.3.2.1 Detailed Plots

Detailed plot data are recorded on Ecosystem Field Forms (FS882 [1-7]), and provide the most detailed ecological data for a point sample. They are intended for classification of site series, confirmation or classification of biogeoclimatic units, and development of ecosystem unit descriptions and summary statistics. Data collection procedures for detailed plots followed Standards for Terrestrial Ecosystem Mapping and Ministry of Environments (RIC 1998a), Field Manual for Describing Ecosystems in the Field (MoELP and MOF 1998). Site, soil, vegetation and wildlife habitat description forms cited by MoELP and MOF (1998) were utilized and minimum data requirements met. Within the study area, geographic and ecosystem unit coverage was stratified to the best of our ability, constrained by field budgets and study area access. A total of 42 detailed plots were completed within the TFL.

3.3.2.2 Ground Inspections

Ground inspections represent the intermediate form of field inspection and were performed to establish or confirm the map unit designation where detailed sampling was not possible or where familiar ecosystem patterns were repeated. Ground inspections also provide very valuable data for characterizing various ecosystem attributes often supplying the main form of sampling for wetlands, parkland and other non-forested ecosystems. Minimum data requirements, as cited by RIC (1998a), were met and recorded on Ground Inspection Forms (GIF). In total, 106 ground inspections were completed within the study area.

3.3.2.3 Visual Inspections

Visual inspections represent the most “open-ended” form of field data sampling. Typically, these inspections comprise the greatest portion of the field data component, however they generally consist of the least intensive method of field data collection. This allows field surveyors to quickly assess or confirm polygons for one or more of the following: site series, site modifiers, structural stage, terrain attributes, soil textures, soil depths, brief vegetation descriptions, assess biogeoclimatic mapping, record ecosystem or terrain component percentages, evaluate polygon boundaries, or note special features (MoELP and MOF 1998). These types of field notes generally provide mappers with additional information to supplement the detailed plots and ground inspections with larger sampling sizes.

Visual inspections allow surveyors to quickly assess large areas of terrain and can be conducted on the ground, from the air, or from viewscapes. However, emphasis was placed on making inspections on the ground to improve data reliability. In total 429 visual inspections were performed within the boundaries of TFL15.

3.4 Data Synthesis and Analysis

Appropriate data management software and / or standards were secured in order to maintain data compatibility and data quality with Weyerhaeuser and British Columbia government standards. Detailed plot forms were computer coded in VENUS 3.0 format while Ground Inspection Forms were coded in GRAVITI format. Data from the Visual Inspections were entered in a MS Excel spreadsheet.

Data from VENUS and GRAVITI was then summarized into vegetation and environmental tables for classification and review purposes.

3.5 Final Mapping

Final mapping for this project can be separated into bioterrain and ecosystem mapping phases.

3.5.1 Final Bioterrain Mapping

Bioterrain maps are a primary component of ecological maps. Procedures are based largely on the terrain and soil mapping standards of Ryder (1994) and RIC (1998a). Final bioterrain mapping provides a thematic base product through which most of the earth's parameters influencing ecological diversity across a landscape are captured. Mapping was completed on aerial photos using polygons coincidental to those of the ecosystem map. Information was legibly hand-drafted on aerial photos and included terrain texture, surficial materials and soil drainage as well as other applicable bioterrain enhancement symbology.

3.5.2 Final Ecosystem Unit Mapping

Biogeoclimatic lines developed during the pretyping phase of this project were refined and ecosection lines finalized during this stage. Final labelling of ecosystem unit polygons was completed through the evaluation of polygons on the photos (including the bioterrain information), field data, forest cover maps and working legends. Each ecosystem polygon may contain up to three ecosystem units with the percentage of each component within the polygon being estimated. Most of the forested site series were identified by site descriptions outlined within Lloyd et al. (1990). Unclassified site series were identified and developed in conjunction with Dennis Lloyd (MOF, Kamloops Regional Ecologist) and provincial correlators (Carmen Cadrin etc.) in Victoria.

The symbology used in the final ecosystem mapping stage followed the standards listed in RIC (1998a). Ecosection and biogeoclimatic polygons were labelled according to the ecosection and biogeoclimatic units they represent (see Figures 3 and 4).

Within ecosection and biogeoclimatic units, the ecosection mapping approach recognizes ecosystem units. The ecosystem unit symbol used in this project includes site series, site modifiers, and structural stage (see Figure 5).

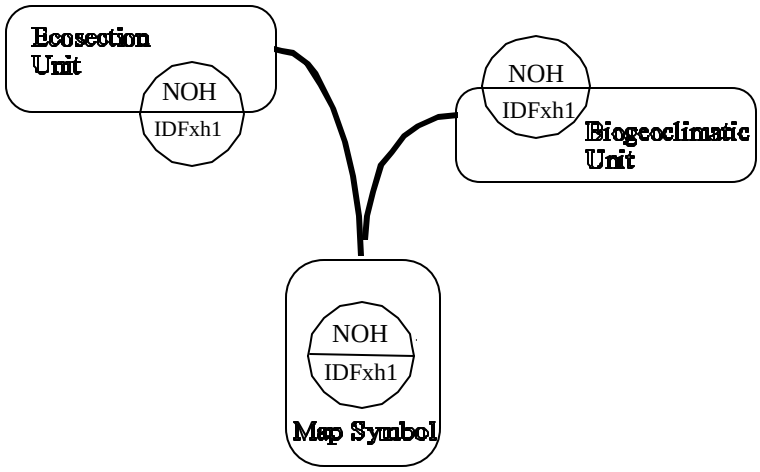


Figure 3. Symbology for Ecosystem and Biogeoclimatic Units (adapted from RIC 1995)

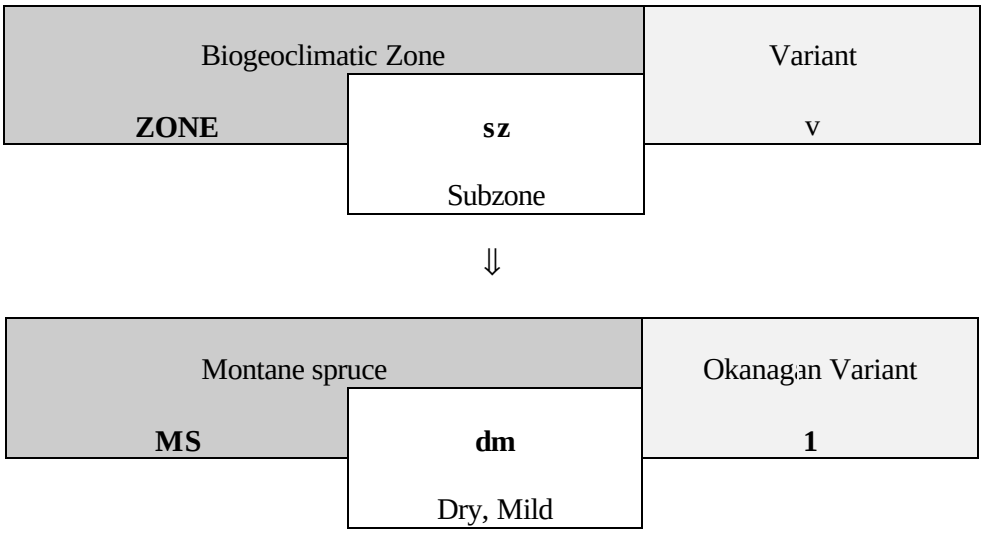
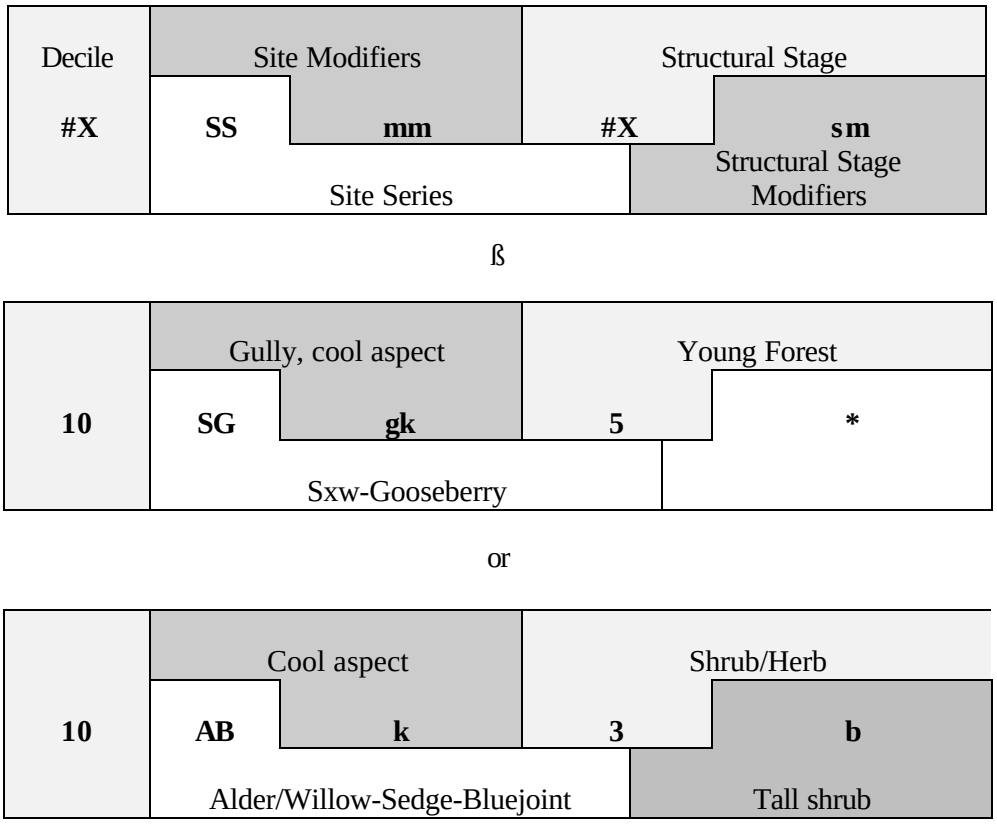


Figure 4. Symbology for Biogeoclimatic Units



*No structural stage modifiers have been mapped for structural stages 4,5,6, and 7 within TFL 15 TEM project

Figure 5. Symbology for Ecosystem Units

3.5.3 Final Digital Mapping

Ecosystem unit polygons were captured digitally using Bentley Systems MicroStation 95 software. 1:20 000 scale TRIM digital base files obtained from Weyerhaeuser Canada Ltd. were utilized for georeferencing during digitizing of polygons. The study area is encompassed within 10 separate TRIM bases (93E003, 4, 13-15, 23-25, 33-35). Ecosystem unit polygons on each TRIM base were digitized separately and edge-matched in IGDS format. Ecosection units and biogeoclimatic units were also digitized separately and merged into coverages to facilitate assignment of different line symbology on final map products.

Files in IGDS format were then exported to ARC/INFO, cleaned and linked to database attributes. Map legends were then incorporated and final map products produced. Coverage files were then created in .E00 format for delivery to clients.

3.5.4 Map Legend

The final Terrestrial Ecosystem Map legend provides a summarized and abbreviated description of all map unit components and map symbols, together with other supporting information including survey objectives, survey intensity, location, field sampling, other data sources, air

photography, and map credits. Legend formats that have been provided by RIC (1998a) and Mitchell et al. (1989) were consulted as required.

3.5.5 Polygon Database Development

RIC (1998a) identifies the greatest value of ecosystem classification and mapping to be the provision of interpretations for a variety of disciplines, including wildlife habitat capability and habitat management as is proposed for this project. Polygon attributes form the basis for ecosystem and interpretive maps and include all data recorded for each polygon in the map database. Traditional examples of polygon attribute data include polygon number, site series, moisture regime, and genetic material, however wildlife habitat availability and use may also be included in Terrestrial Ecosystem Mapping (TEM) databases. Core polygon attributes required for baseline ecosystem maps have been described by RIC (1998b).

Two polygon databases were developed for this project: database for terrestrial ecosystem polygon data and database for bioterrain polygon data. These two databases were eventually combined into one database for the final submission.

3.6 Wildlife Habitat Evaluation

Wildlife habitat evaluation is the process of assigning value to defined geographic areas based on the occurrence, either actual or potential, of particular wildlife species or populations. Since vegetation cover type is actually an expression of a variety of biophysical conditions such as soil moisture, aspect, and relief, it generally offers a current and valid prediction of habitat for many terrestrial wildlife species, at least at broad scales. Thus, the TEM product provides a sound base from which to predict wildlife habitat values. Wildlife habitat evaluation was completed as an interpretive product of TEM for five species in TFL 15: white-headed woodpecker (*Picoides albolarvatus*), Williamson's sapsucker (*Sphyrapicus thyroideus thyroideus*), Canada lynx (*Lynx canadensis*), mule deer (*Odocoileus hemionus*), and elk (*Cervus elaphus*).

The British Columbia Ministry of Environment, Lands and Parks has developed and standardized methods for rating habitat suitability in the province (RIC 1999, and earlier versions). Habitat ***suitability*** is used to identify the current ability of an ecosystem unit to provide a given wildlife species with its life requisites, or the environmental conditions needed for cover, food, and space. The provincial standards and procedures described in RIC (1999 and earlier versions) provide key criteria with which the reader must be familiar in order to fully comprehend the habitat ratings and assessments completed for this project. These methods, as applied to TFL 15, are also further detailed in the accompanying report, *Terrestrial Ecosystem Mapping with Wildlife Interpretations for Weyerhaeuser TFL 15: Volume 2 - Wildlife Habitat Suitability Models* (Saxena and Bilyk 2000 in prep.), but can be summarized here as follows.

The habitat requirements of a species vary seasonally depending on sex, age, and reproductive status. Some habitat components, such as vegetation or snow cover, undergo dramatic seasonal fluctuations or gradual successional changes that influence the suitability of a particular area. Therefore, before accurate ratings of habitat suitability could be determined for individual species

in TFL 15, an adequate information base of their habitat needs and the factors influencing these needs was first required. Given this prerequisite, the following steps were completed for each species habitat model:

1. Developed species habitat profile.
2. Assigned preliminary habitat ratings based on the species habitat profile.
3. Field truthed preliminary ratings.
4. Refined habitat ratings based on field work and any additional information.
5. Refined the species habitat profile, as required.

The species habitat profile was essentially a written description of the model for each species. It presented the ecology and life requisites for the species, along with assumptions used in assigning habitat suitability ratings. Preliminary habitat suitability ratings for each species were hypothesized ratings based on the habitat relationships described in the species profile. Preliminary and final ratings were assigned using the criteria described in RIC (1999 and earlier versions) and in Saxena and Bilyk (2000, in prep). The primary features of the RIC-approved process of habitat suitability rating are:

1. Ratings for each species were always provided for a combination of a particular life requisite in a particular season of use (for example, feeding winter or reproducing spring);

2. Habitats were always rated against a provincial benchmark, which was defined as the best habitat for that species' life requisite/season in the province; and

3. Ratings were provided for every ecosystem unit mapped in the TFL (i.e., every site series-modifier-structural stage combination).

Because the knowledge of various species and their habitat uses vary considerably, there was a need for different rating schemes. Thus, the wildlife suitability rating scheme implemented for each species considered whether the known information on the species' life requisites was detailed, intermediate, or limited (Table 4, RIC 1999).

Table 4: Habitat Suitability Rating Schemes for Three Levels of Knowledge About a Species' Habitat Use

% of Provincial Best	Substantial Knowledge of Habitat Use		Intermediate Knowledge of Habitat Use		Limited Knowledge of Habitat Use	
	Rating	Code	Rating	Code	Rating	Code
>76 - 100 %	High	1	High	H	Habitat Useable	U
>51 - 76 %	Moderately High	2	Moderate	M		
>26 – 50 %	Moderate	3				
>6 – 25%	Low	4	Low	L		
>1 - 5%	Very Low	5			Likely No Value	X
0 %	Nil	6	Nil	N		

Of the five species for which habitat suitability was evaluated in TFL 15, two (elk and mule deer) were evaluated using a detailed six-class rating scheme, while the other three (lynx, white-headed woodpecker, and Williamson's sapsucker) were evaluated using a broader four-class rating scheme.

3.7 Quality Control and Correlation

Quality control during this project was ensured by strict adherence to the Terrestrial Ecosystem Mapping standards outlined in RIC (1998a) and by the frequent communication that existed between ***GEOWEST*** and personnel from Ministry of Environment, Lands and Parks, and Ministry of Forests. The Project Managers and senior mapping personnel on behalf of Geowest Environmental Consultants Ltd. were responsible for ensuring quality control, correlation, and reliability of all products. Consistent mapping methodologies and high quality standards are considered imperative if the TEM product is to function as a basis on which to design wildlife habitat treatment procedures. Thus, the Project Managers reviewed and evaluated all products during their development. Constant communication with the Ministry of Environment and Ministry of Forests personnel at regional and provincial levels also ensured a quality product.

Formal submission of project materials to provincial correlators occurred at the following stages:

- bioterrain pre-typing
- parkland boundaries
- field sampling strategy
- field data forms and audit of field data collection methods
- new site series development and comparison of these to existing site series
- data analysis (site series classification)
- biogeoclimatic boundaries
- final bioterrain mapping
- preliminary ecosystem mapping
- final ecosystem mapping
- final expanded legend/report
- final polygon databases
- digital map files
- map legends, expanded legends, and report

4.0 TERRESTRIAL ECOSYSTEM MAPPING RESULTS

4.1 Biogeoclimatic Units

The following biogeoclimatic subzone variants were mapped within the TFL:

PPxh1	**Okanagan Very Dry Hot Ponderosa Pine Variant**
IDFxh1	**Okanagan Very Dry Hot Interior Douglas-fir Variant**
IDFdm1	**Kettle Dry Mild Interior Douglas-fir Variant**
MSdm1	**Okanagan Dry Mild Montane Spruce Variant**
ESSFdc1	**Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Variant**
ESSFdcu	**Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Upper Elevational Variant**
ESSFdcp1	**Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Parkland Variant**

4.2 Ecosections

The following ecosections were mapped within the TFL:

NOH	**Northern Okanagan Highland**
SOB	**Southern Okanagan Basin**

4.3 Ecosystem Units

The following ecosystem units were mapped within the TFL (Tables 5 - 11):

Table 5: Ecosystem Units in the Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
SB	00	Selaginella-Bluebunch wheatgrass	j,m,s	gentle upper slope, shallow, medium-textured soil	very xeric-xeric	h,k,q,r,v,w,z
PT	02	Py-Red three-awn	d,c,w	significant slope, warm aspect; deep, coarse-textured soil	very xeric-subxeric	h,j,k,n,r,s,v,z
SW	03	Big sage-Bluebunch wheatgrass-Balsamroot	d,j,m	gentle slope; deep, medium-textured soil	subxeric	c,h,k,r,s,t,w,z
PC	04	Py-Bluebunch wheatgrass-Cheatgrass	d,j,m	gentle slope; deep, medium-textured soil	subxeric-mesic	c,h,k,n,q,r,s,t,v,w,z
PW	01	Py-Bluebunch wheatgrass-Idaho fescue	d,j,m	gentle slope; deep, medium-textured soil	mesic	c,g,h,k,n,q,s,t,w
PF	05	Py-Bluebunch wheatgrass-Rough fescue	d,j,m	gentle slope; deep, medium-textured soil	mesic	k,s
SP	06	FdPy-Snowberry-Pinegrass	d,j,m	gentle, moisture receiving sites; deep, medium-textured soil	subhygric	a,g,k,s,t,w
DS	07	FdPy-Snowberry-Spirea	d,j,m	gentle slope; moist, rich sites; deep, medium-textured soil	subhygric	k
DM	08	Fd-Water birch-Douglas maple	d,m	level slope; moist, rich sites; deep, medium-textured soil	subhygric-hygric	

Table 6: Ecosystem Units in the Okanagan Very Dry Hot Interior Douglas-fir Variant (IDFxh1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
AS	00	Antelope brush-Selaginella	j,m,s	gentle slope, crest position; shallow, medium-textured soil	xeric-very xeric	h,k,w,z
WA	92	Big sage-Bluebunch wheatgrass-Balsamroot	d,m,w	significant slope, warm aspect; deep, medium-textured soil	xeric -submesic	k,s
WB	93	Bluebunch wheatgrass-Balsamroot	d,m,w	significant slope, warm aspect; deep, medium-textured soil	subxeric -submesic	c,h,j,k,s
SF	94	Big sage-Bluebunch wheatgrass-Idaho fescue	d,j,m	gentle slope; deep, medium-textured soil	submesic -mesic	g,s,w
FW	91	Fescue-Bluebunch wheatgrass	d,j,m	gentle slope; deep, medium-textured soil	submesic -mesic	c,h,k,s,w
BN	96	Kentucky bluegrass-Stiff needlegrass	d,j,m	gentle, lower slope position; deep, medium-textured soil	subhygric	w
PB	02	FdPy-Bluebunch wheatgrass-Balsamroot	s,w	significant slope, warm aspect; shallow soil	xeric	h,j,k,v,z
DW	03	FdPy-Bluebunch wheatgrass-Pinegrass	d,m,w	significant slope, warm aspect; deep, medium-textured soil	xeric -subxeric	c,g,h,j,k,r,s,v
SP	04	FdPy-Snowbrush-Pinegrass	d,j,m	gentle slope; deep, medium-textured soil	subxeric -submesic	c,g,h,k,n,q,s,t,v,w
DP	01	FdPy-Pinegrass	d,j,m	gentle slope; deep, medium-textured soil	mesic	c,g,h,k,n,s,w
PF	05	FdPy-Pinegrass-Idaho fescue	d,j,m	gentle slope; deep, medium-textured soil	mesic	h,k,s,w
DF	06	FdPy-Spirea-Feathermoss	d,j,m	gentle slope; moist receiving sites; deep, medium-textured soil	subhygric	g,k,s,w
DS	07	FdPy-Snowberry-Spirea	d,j,m	gentle slope; moist receiving sites deep, medium-textured soil	subhygric	g
SD	08	SxwFd-Douglas maple-Dogwood	j,m	gentle slope to level sites; moist, medium-textured soil	subhygric	a,g,k,n,t,w
AB	00	Alder-Sedge	d,j,m	gentle, level fluvial sites with associated seepage; deep, medium-textured soil	hygric	
WS	09	Willow-Sedge	d,j,m	depressional, mineral wetland; deep, medium-textured soil	hygric-subhydric	p
CT	00	Cattail Marsh	d,j,m	level sites; deep, medium-textured soil	hydric-subhydric	

Table 7: Ecosystem Units in the Kettle Dry Mild Interior Douglas-fir Variant (IDFdm1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
PJ	00	Penstemon-Juniper	j,m,s	gentle, upper slopes, medium-textured shallow soil	very xeric-xeric	h,k,r,v,w
WJ	02	Bluebunch wheatgrass-Junegrass	d,m,w	significant slope, warm aspect; deep, medium-textured soil	xeric -subxeric	g,h,j,k,r,s
DW	03	FdPy-Bluebunch wheatgrass-Pinegrass	d,m,w	significant slope, warm aspect; deep, medium-textured soil	xeric -subxeric	c,g,h,j,k,n,r,s
DP	04	Fd-Pinegrass-Kinnikinnick	d,j,m	gentle slope; deep, medium-textured soil	subxeric -submesic	c,h,k,n,q,r,s,t,v,w
DT	01	FdPl-Pinegrass-Twinflower	d,j,m	gentle slope; deep, medium-textured soil	submesic -mesic	c,g,h,k,n,s,t,w
SP	05	FdLw-Spruce-Pinegrass	d,j,m	gentle slope; deep, medium-textured soil	mesic -subhygric	c,g,h,k,n,s,t,w
SD	06	SxwFd-Dogwood-Gooseberry	d,j,m	gentle lower slope, receiving sites; deep, medium-textured soil	subhygric	a,c,g,h,k,n,t
SH	07	Sxw-Horsetail	j	gentle lower slope, receiving sites	subhygric-hygric	g,p
AB	00	Alder/Willow-Sedge-Bluejoint	d,j,m	gentle, level fluvial sites with associated seepage; deep, medium-textured soil	hygric	k
SM	00	Sedge wet meadow	a,d,j,m	level fluvial sites with associated seepage; deep, medium-textured soil	subhydric-hygric	g,w
SE	00	Sedge fen	p	level sites; organic soil	hydric-subhydric	
CT	00	Cattail Marsh	d,j,m	level sites; deep, medium-textured soil	hydric	

Table 8: Ecosystem Units in the Okanagan Dry Mild Montane Spruce Variant (MSdm1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
SP	02	Fd-Big sage-Pinegrass	j,r,s	gentle slope; crest position; shallow soil	very xeric	d,k,w
DP	00*	Fd-Penstemon-Pinegrass	j,r,s	gentle upper slope; crest position; shallow soil	very xeric	d,h,k,v,w
PJ	00	Pl-Juniper-Pinegrass	j,m,s	Gentle slope, crest position; shallow, medium-textured soil	xeric -subxeric	h,k,q,r,w
PG	03	Pl-Grouseberry-Cladonia	d,j,m	gentle slope; deep, medium-textured soil	xeric -subxeric	c,h,k,n,r,s, t,w,
PP	04	Pl-Pinegrass-Kinnikinnick	d,j,m	gentle slope; deep, medium-textured soil	subxeric -submesic	c,h,k,n,q,r, s,t,v,w
SF	01	Sxw-Falsebox-Feathermoss	d,j,m	gentle slope; deep, medium-textured soil	mesic	c,g,h,k,s,t, w
ST	05	Sxw-Trapper's tea-Grouseberry	d,j,m	gentle lower slope, receiving sites; deep, medium-textured soil	subhygric	a,c,g,h,k,n, s,t,w
SG	06	Sxw-Gooseberry	d,j,m	gentle lower slope, receiving sites; deep, medium-textured soil	subhygric -hygric	a,c,g,h,k,t, w
SH	07	Sxw-Trapper's tea-Horsetail	d,j,m	gentle lower slope, receiving sites; deep, medium-textured soil	hygric -subhydric	a,p,t
AB	00	Alder/Willow-Sedge-Bluejoint	d,j,m	gentle, level fluvial sites with associated seepage; deep, medium-textured soil	hygric-subhydric	a,g,k,w
WS	08	Willow-Sedge	p	organic wetland	subhydric	a
SW	00	Sedge wetlands	p	organic wetland	subhydric-hydric	
SM	00	Sedge wet meadow	d,j,m	deep, level, medium-textured soil	subhydric - hydric	

* DP is the NELSON Field Guide's "02" unit

Table 9: Ecosystem Units in the Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Variant (ESSFdc1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
PJ	00	Pl-Juniper-Cladonia	j,m,s	Gentle slope, crest position; shallow, medium textured soil	xeric–very xeric	h,k,w
EP	02	PlSe–Pinegrass	d,m,w	significant slope; warm aspect; deep, medium-textured soil	subxeric	g,k,s
FG	03	Bl-Grouseberry-Cladonia	c,d	significant slope; deep, coarse-textured soil	subxeric -submesic	h,j,k,m, r,s,v,w,z
FR	01	Bl-Rhododendron-Grouseberry	d,j,m	gentle slope; deep, medium-textured soil	mesic	c,g,h,k,s,w
RV	04	Bl-Rhododendron-Valerian	d,j,m	gentle lower slope, receiving position; deep, medium-textured soil	subhygric	
FT	05	Bl-Trapper's tea	d,j,m	gentle lower slope, receiving position; deep, medium-textured soil	subhygric	a,g,h,k,w
FH	06	Bl-Horsetail-Glow moss	d,m	level, high water table; deep, medium-textured mineral soil	hygric	g,p,s
SM	00	Sedge wet meadow	d,j,m	gentle slope; deep, medium-textured soil	hygric-subhydric	a,k,w
SS	07	Sedge-Sphagnum	p	organic wetland	subhydric	
CC	00	Cottongrass-Clubrush	d,j	deep, level morainal sites	subhydric-hydric	p

Table 10: Ecosystem Units in the Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Upper Elevational Variant (ESSFdcu)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
PJ	00	PlBl-Juniper-Grouseberry	j,m,s	gentle upper slopes; shallow, medium-textured soil	xeric-subxeric	k,r,w
PP	00	Pl-Pinegrass	j,m,s	gentle slope; shallow, medium-textured soil	subxeric-submesic	w
FH	00	BlPl- Pink mountain heather-Grouseberry	d,j,m	gentle slope; deep, medium-textured soil	mesic-submesic	h,k,r,s,w
FV	00	Bl-Valerian	d,j,m	gentle slope; deep, medium-textured soil	subhygric-hygric	g,k,s,w
SG	00	Sedge-Glow moss wet meadow	d,j,m	level to gentle slope; deep, medium-textured soil	hygric	
CC	00	Cottongrass-Clubrush	d,j,m	level slope; deep, medium-textured soil	subhydric-hydric	

Table 11: Ecosystem Units in the Okanagan Dry Cold Engelmann Spruce–Subalpine Fir Parkland Variant (ESSFdcp1)

Site Series Symbol	Site Series Number	Site Series Name	Assumed Modifiers	Typical Situation	Typical Moisture Regime	Mapped Modifiers
HL	00	Pink mountain heather-Lichen	j,m,s	gentle slope; shallow, medium-textured soil	subxeric-submesic	w
FH	00	BlPa- Pink mountain heather-Grouseberry	j,m,s	gentle slope; shallow, medium-textured soil	mesic-submesic	h,k,w
SF	00	Sedge-Alpine fescue	j,m,s	level to gentle slope; shallow, medium-textured soil	mesic	k
VG	00	Valerian-Globeflower herbaceous meadow	j,m,s	level to gentle slope; shallow, medium-textured soil	subhygric	
FV	00	Bl-Valerian-Pink mountain heather	j,m,s	gentle slope; shallow, medium-textured soil	subhygric-hygric	d,k,v
SR	00	Black alpine sedge-Rush	j,m,s	level to gentle slope; shallow, medium-textured soil; late-lying snow areas	hygric	h

Site series ecological relationships are demonstrated on diagrams presented in the expanded legends, at the beginning of each BEC zone.

4.4 Non-vegetated, Sparsely Vegetated, and Anthropogenic Units

Table 12. illustrates the non-vegetated, sparsely vegetated and anthropogenic units mapped within TFL15.

Table 12. Non-vegetated, Sparsely vegetated and Anthropogenic Units Mapped within TFL15 (after RIC 1998a)

Symbol	Ecosystem Unit	Definition	Mapped Modifiers	Structural Stage	BEC zone location
BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions		1	IDFxh1
BF	Blockfields, Blockslopes, Blockstreams	Level or gently sloping areas that are covered with moderately sized or large, angular blocks of rock derived from the underlying bedrock or drift by weathering and/or frost heave, and that have not undergone any significant downslope movement	k,w	1	ESSFdc1, IDFdm1, IDFxh1, MSdm1
CL	Cliff	A steep, vertical or overhanging rock face	q,z	1	ESSFdc1, ESSFdcu IDFdm1,IDFxh1, MSdm1, PPxh1
CO	Cultivated Orchard	An agricultural area composed of single or multiple tree species planted in rows.		3	PPxh1
ES	Exposed Soil	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mudslides, debris torrents, avalanches, and human-made disturbances where vegetation cover is less than 5%	k,w	1	IDFdm1, IDFxh1, MSdm1, PPxh1
GB	Gravel Bar	An elongated landform generated by waves and currents and usually running parallel to the shore. It is composed of unconsolidated small rounded cobbles, pebbles, stones and sand	not applicable	1	IDFxh1, PPxh1
GP	Gravel Pit	An area exposed through the removal of sand and gravel		1	IDFdm1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable	ESSFdc1, ESSFdcu, IDFdm1, IDFxh1, MSdm1, PPxh1
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable	ESSFdc1, ESSFdcu, IDFdm1, MSdm1, PPxh1
RE	Reservoir	An artificial basin created by the impoundment of water behind a human-made structure such as a dam, berm, dyke or wall	not applicable	not applicable	IDFxh1
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial	not applicable	not applicable	IDFdm1, IDFxh1, MSdm1, PPxh1
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1	All
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable	ESSFdc1, IDFdm1, IDFxh1, MSdm1, PPxh1
RR	Rural	Any area in which residences and other human developments are scattered and intermingled with forest, range, farm land, and native vegetation or cultivated areas	not applicable	not applicable	IDFxh1
RU	Rubble	Rubble is common on the ground surface in and adjacent to alpine areas, on ridgetops, gentle slopes and flat areas due to the effects of frost heaving	k,w	1	IDFxh1, MSdm1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	h,k,n,q,w, z	1	All
UR	Urban/Suburban	An are in which residences and other human developments form an almost continuous covering of the landscape.	not applicable	not applicable	IDFxh1, MSdm1

4.5 Site Modifier Symbols

The following site modifier symbols were used in this project.

Table 13. Site Modifier Symbols Mapped within TFL15 (after RIC 1998a).

Symbol	Name	Criteria
Topography		
a	active floodplain	the site series occurs on an active fluvial floodplain (level or very gently sloping surface bordering a river that has been formed by river erosion and deposition), where evidence of active sedimentation and deposition is present
g	gullying occurring	the site series occurs within a gully, indicating a certain amount of variation from the typical, or the site series has gullying throughout the area being delineated
h	hummocky terrain	the site series occurs on hummocky terrain, suggesting a certain amount of variability. Commonly, hummocky conditions are indicated by the terrain surface expression but occasionally they occur in a situation not described by terrain features
j	gentle slope	the sites series occurs on gently sloping topography (less than 25% in the interior)
k	cool aspect	the site series occurs on cool, northerly or easterly aspects (285^o - 135^o) on moderately steep slopes (25% - 100% slope in the interior)
n	fan	the site series occurs on a fluvial fan, or on a colluvial fan or cone
q	very steep cool aspect	the site series occurs on very steep slopes (greater that 100% slope) with cool, northerly or easterly aspects (285^o - 135^o)
r	ridge	the site series occurs throughout an area of ridged terrain, or it occurs on a ridge crest
t	terrace	the site series occurs on a fluvial or glaciofluvial terrace, lacustrine terrace, or a rock cut terrace
w	warm aspect	the site series occurs on warm, southerly or westerly aspects (135^o - 285^o) on moderately steep slopes (25% - 100% slope in the interior)
z	very steep warm aspect	the site series occurs on very steep slopes (greater that 100% slope) warm, southerly or westerly aspects (135^o - 285^o)
Soil		
c	coarse-textured soils	the site series occurs on soils with a coarse texture, including sand and loamy sand; and also sandy loam, loam, and sandy clay loam with greater than 70% coarse fragment volume
d	deep soil	the site series occurs on soils greater than 100 cm to bedrock
f	fine-textured soils	the site series occurs on soils with a fine texture including silt and silt loam with less than 20% coarse fragment volume; and clay, silty clay, silty clay loam, clay loam, sandy clay and heavy clay with less than 35% coarse fragment volume)
m	medium-textured soils	the site series occurs on soils with a medium texture, including sandy loam, loam, and sandy clay loam with less than 70% coarse fragment volume; silt and silt loam with more than 20% coarse fragment volume; and clay, silty clay, silty clay loam, clay loam, sandy clay and heavy clay with more than 35% coarse fragment volume
p	peaty material	the site series occurs on deep organics or a peaty surface (15-60 cm) over mineral materials
s	shallow soils	the site series occurs where soils are considered to be shallow to bedrock (20 cm - 100 cm)
v	very shallow soil	the site series occurs where soils are considered to be very shallow to bedrock (less than 20 cm)

4.6 Structural Stage

The following structural stage codes were taken from RIC (1998a) and utilized in this project.

Table 14. Structural Stage Codes Mapped within TFL15.

Structural Stage	Substages	Description
Post-disturbance stages or environmentally induced structural development		
1 Sparse/bryoid		Initial stages of primary and secondary succession; bryophytes and lichens often dominant, can be up to 100%; time since disturbance less than 20 years for normal forest succession, may be prolonged (50-100+ years) where there is little or no soil development (bedrock, boulder fields); total shrub and herb cover less than 20%; total tree layer cover less than 10%.
	1a Sparse	Less than 10% vegetation cover
	1b Bryoid	Bryophyte- and lichen-dominated communities (greater than ½ of total vegetation cover)
Stand initiation stages or environmentally induced structural development		
2 Herb		Early successional stage or herbaceous communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by herbs; some invading or residual shrubs and trees may be present; tree cover less than 10%, shrub layer cover less than or equal to 20% or less than or equal to 20% or less than 1/3 of total cover, herb-layer cover greater than 20%, or greater than or equal to 1/3 of total cover; time since disturbance less than 20 years for normal forest succession; many herbaceous communities are perpetually maintained in this stage
	2a Forb-dominated	Herbaceous communities dominated (greater than ½ of the total herb cover) by non-graminoid herbs
	2b Graminoid-dominated	Herbaceous communities dominated (greater than ½ of the total herb cover) by grasses, sedges, reeds, and rushes
	2c Aquatic	Herbaceous communities dominated (greater than ½ of the total herb cover) by floating or submerged aquatic plants; does not include sedges growing in marshes with standing water
	2d Dwarf shrub	Communities dominated (greater than ½ of the total herb cover) by dwarf woody species
3 Shrub/Herb		Early successional stage or shrub communities maintained by environmental conditions or disturbance (e.g., snow fields, avalanche tracks, wetlands, grasslands, flooding, intensive grazing, intense fire damage); dominated by shrubby vegetation; seedlings and advance regeneration; tree cover less than 10%, shrub layer cover greater than 20% or greater than 1/3 of total cover
	3a Low shrub	Communities dominated by shrub layer vegetation less than 2 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 20 years for normal forest succession
	3b Tall shrub	Communities dominated by shrub layer vegetation that are 2-10 m tall; may be perpetuated indefinitely by environmental conditions or repeated disturbance; seedlings and advance regeneration may be abundant; time since disturbance less than 40 years for normal forest succession

Stem exclusion stages	
4 Pole/Sapling	Trees greater than 10 m tall, typically densely stocked, have overtopped shrub and herb layers; younger stands are vigorous (usually greater than 10-15 years old); older stagnated stands (up to 100 years old) are also included; self-thinning and vertical structure not yet evident in the canopy – this often occurs by age 30 in vigorous broadleaf stands, which are generally younger than coniferous stands at the same structural stage; time since disturbance is usually less than 40 years for normal forest succession; up to 100+ years for dense (5000-15,000+ stems per hectare) stagnant stands
5 Young Forest	Self-thinning has become evident and the forest canopy has begun differentiation into distinct layers (dominant, main canopy, and overtopped); vigorous growth and a more open stand than in the pole/sapling stage; time since disturbance is generally 40-80 years but may begin as early as age 30, depending on tree species and ecological conditions
Understory reinitiation stage	
6 Mature Forest	Trees established after the last disturbance have matured; a second cycle of shade tolerant trees may have become established; understories become well-developed as the canopy opens up; time since disturbance is generally 80-140 years for biogeoclimatic group A[1] and 80-250 years for group B[2]
Old-growth stage	
7 Old Forest	Old, structurally complex stands composed mainly of shade-tolerant and regenerating tree species, although older seral and long-lived trees form a disturbance such as fire may still dominate in the upper canopy; snags and coarse woody debris in all stages of decomposition typical; as are patchy understories; understories may include tree species uncommon in the canopy, due to inherent limitations of these species under the given conditions; time since disturbance generally greater than 140 years for group A[1] and greater than 250 years for group B[2]

1 Biogeoclimatic Group A within Tree Farm License 15 includes ESSFdc1, MSdm1.
2 Biogeoclimatic Group B within Tree Farm License 15 includes IDFdm1, IDFxh1 and PPxh1

4.7 Rare Plant Associations

Twenty different site series, corresponding to rare plant associations, were mapped in this project. The CDC has already recognized nineteen of these as rare (see Table 3).

One additional ecosystem unit, the *Purshia tridentata-Selaginella* (Antelope brush-Selaginella) site series, was described and mapped within the IDFxh1 Variant for the first time in this project. This association resembles another association dominated by antelope brush, *Purshia tridentata-Stipa comata* (Antelope brush-Needle-and-thread grass) (BGxh1/02), which has been provincially ranked as S2 as well as being red-listed. The antelope brush ecosystem of the south Okanagan Valley is recognized as one of the four most endangered ecosystems in Canada (MoLFP 1995). It accounts for only 0.2 percent of B.C.'s grassland area, which itself covers only 0.3% of the province. Furthermore, only 9% of the original antelope brush ecosystem remains relatively undisturbed. As a part of the antelope brush ecosystem of the Okanagan, the Antelope brush-Selaginella Ecosystem Unit should, therefore, be included in the list of rare and endangered associations in British Columbia.

It is important to protect genetic variation and ecosystem diversity to maintain B.C.'s overall biological diversity (MoELP 2000). Rare plant associations provide habitat for many rare plants and animals (i.e. 22% of all endangered and threatened vertebrates in BC are found in the endangered antelope brush ecosystem), as well as perform functions that influence their environment, therefore setting the stage for the complex interactions between organisms. Loss of these plant associations would affect the species that depend on them, and may also have far reaching effects that are not fully understood. If maintained in a natural state, rare associations can also serve as "benchmarks" against which to measure the success in managing BC's natural resources, and as a reference point for restoring ecosystems that have been altered or destroyed (MoELP 2000). Because most rare plant associations in B.C. have become rare due to human activities such as logging, agriculture, livestock grazing, urban development, flood control, fire suppression, and invasion of non-native species (MoELP 2000), special management considerations should be given to those areas within TFL 15 that support rare plant associations.

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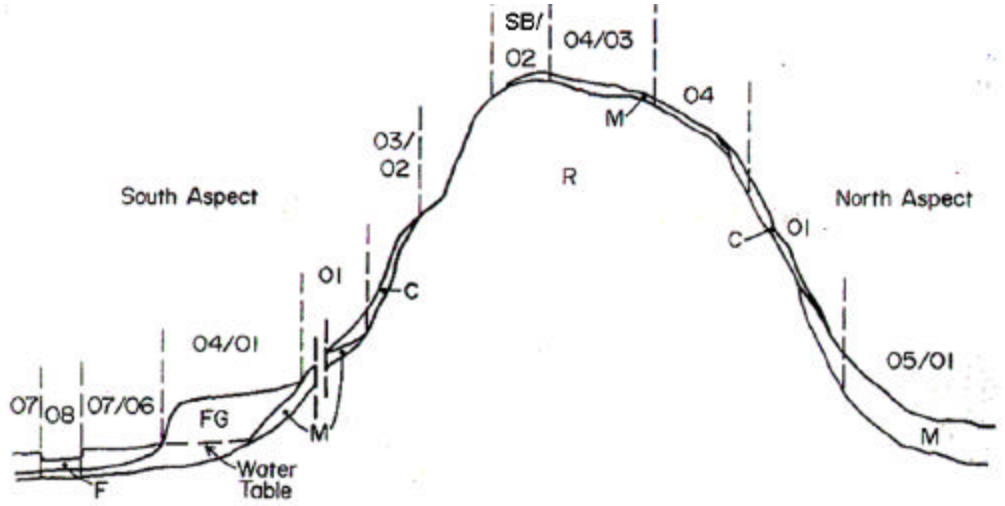
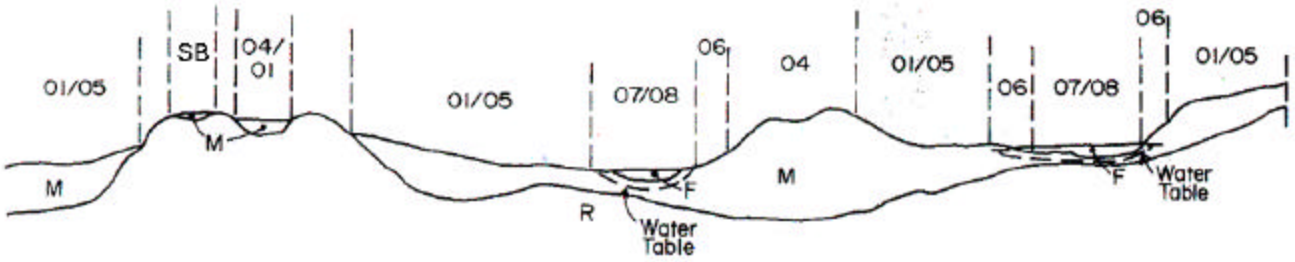
Appendix 1
Expanded Legend for Ecosystems found in the PPxh1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR PPxh1		
SB	00	Selaginella-Bluebunch wheatgrass
PT	02	Py-Red three-awn
SW	03	Big sage-Bluebunch wheatgrass-Balsamroot
PC	04	Py-Bluebunch wheatgrass-Cheatgrass
PW	01	Py-Bluebunch wheatgrass-Idaho fescue
PF	05	Py-Bluebunch wheatgrass-Rough fescue
SP	06	FdPy-Snowberry-Pinegrass
DS	07	FdPy-Snowberry-Spirea
DM	08	Fd-Water birch-Douglas maple



BEC= **PPxh1/00**

Map Unit	Description
SB	Selaginella-Bluebunch wheatgrass; typic ecosystem unit
SBh	Selaginella-Bluebunch wheatgrass; hummocky ecosystem unit
SBhv	Selaginella-Bluebunch wheatgrass; hummocky, very shallow soil ecosystem unit
SBk	Selaginella-Bluebunch wheatgrass; cool aspect ecosystem unit
SBq	Selaginella-Bluebunch wheatgrass; very steep cool aspect ecosystem unit
SBr	Selaginella-Bluebunch wheatgrass; ridged ecosystem unit
SBvw	Selaginella-Bluebunch wheatgrass; very shallow soil, warm aspect ecosystem unit
SBw	Selaginella-Bluebunch wheatgrass; warm aspect ecosystem unit
SBz	Selaginella-Bluebunch wheatgrass; very steep warm aspect ecosystem unit

Selaginella-Bluebunch wheatgrass (SB) occurs on shallow, medium-textured soil, very xeric to xeric, gentle upper slopes on moraine, colluvium and eolian materials
SBh occurs on hummocky moraine and eolian materials
SBhv occurs on very shallow soil, hummocky moraine
SBk occurs on cool aspects, moderately sloping moraine and colluvium
SBq occurs on cool aspects, very steep moraine and colluvium
SBr occurs on ridged moraine
SBvw occurs on very shallow soil, warm aspects, moderately sloping colluvium
SBw occurs on warm aspects, moderately sloping moraine and colluvium
SBz occurs on warm aspects, very steep colluvium

Map Symbol	**SB2a** **SBh2a** **SBhv2a** **SBk2a** **SBq2a** **SBr2a** **SBvw2a** **SBw2a** **SBz2a**	**SB2b** **SBh2b** **SBhv2b** **SBk2b** **SBq2b** **SBr2b** **SBvw2b** **SBw2b** **SBz2b**	**SB3a** **SBh3a** **SBhv3a** **SBk3a** **SBq3a** **SBr3a** **SBvw3a** **SBw3a** **SBz3a**	**SB3b** **SBh3b** **SBhv3b** **SBk3b** **SBq3b** **SBr3b** **SBvw3b** **SBw3b** **SBz3b**
Plant Species	Forb-dominated (2a)[1]	Graminoid-dominated (2b)	Low Shrub (3a)	Tall Shrub (3b)
Dominants	compact selaginella pin cherry bluebunch wheatgrass juniper haircap moss	bluebunch wheatgrass compact selaginella juniper haircap moss pin cherry	compact selaginella bluebunch wheatgrass juniper haircap moss ponderosa pine	compact selaginella juniper haircap moss bluebunch wheatgrass ponderosa pine
Associates	saskatoon ponderosa pine Douglas-fir yarrow cheatgrass Rocky Mountain juniper shrubby penstemon western cliff fern	saskatoon ponderosa pine Douglas-fir yarrow cheatgrass Rocky Mountain juniper shrubby penstemon western cliff fern	Douglas-fir pin cherry saskatoon yarrow cheatgrass Rocky Mountain juniper shrubby penstemon western cliff fern	Douglas-fir pin cherry saskatoon yarrow cheatgrass Rocky Mountain juniper shrubby penstemon western cliff fern
Plots	9650023			

[1]One units was mapped as SB 5 because it had more than 10% of tree cover.

BEC= **PPxh1/02**

Map Unit	Description
PT	Py-Red three-awn; typic ecosystem unit
PTh	Py-Red three-awn; hummocky ecosystem unit
PThs	Py-Red three-awn; hummocky, shallow soil ecosystem unit
PTj	Py-Red three-awn; gentle slope ecosystem unit
PTjn	Py-Red three-awn; gentle slope, fan ecosystem unit
PTjs	Py-Red three-awn; gentle slope, shallow soil ecosystem unit
PTk	Py-Red three-awn; cool aspect ecosystem unit
PTks	Py-Red three-awn; cool aspect, shallow soil ecosystem unit
PTr	Py-Red three-awn; ridged ecosystem unit
PTrs	Py-Red three-awn; ridged, shallow soil ecosystem unit
PTs	Py-Red three-awn; shallow soil ecosystem unit
PTsz	Py-Red three-awn; shallow soil, very steep warm aspect ecosystem unit
PTv	Py-Red three-awn; very shallow soil ecosystem unit
PTvz	Py-Red three-awn; very shallow soil, very steep warm aspect ecosystem unit
PTz	Py-Red three-awn; very steep warm aspect ecosystem unit

Py-Red three-awn (PT) occurs on deep, coarse-textured soil, very xeric to subxeric, significantly sloping, warm aspects on moraine, colluvium, and glaciofluvial materials
PTh occurs on hummocky moraine
PThs occurs on shallow soil, hummocky moraine
PTj occurs on gently sloping moraine, colluvium, fluvial and glaciofluvial materials
PTjn occurs on gently sloping fluvial fan
PTjs occurs on shallow soil, gently sloping moraine
PTk occurs on cool aspects, moderately sloping moraine and glaciofluvial materials
PTks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PTr occurs on ridged moraine
PTrs occurs on shallow soil, ridged moraine
PTs occurs on shallow moraine and colluvium
PTsz occurs on shallow soil, warm aspects, very steep colluvium
PTv occurs on very shallow moraine and colluvium
PTvz occurs on very shallow soil, warm aspects, very steep colluvium
PTz occurs on warm aspects, very steep colluvium

Map Symbol	**PT2** **PTh2** **PThs2** **PTj2** **PTjn2** **PTjs2** **PTk2** **PTks2** **PTr2** **PTrs2** **PTs2** **PTsz2** **PTv2** **PTvz2** **PTz2**	**PT3** **PTh3** **PThs3** **PTj3** **PTjn3** **PTjs3** **PTk3** **PTks3** **PTr3** **PTrs3** **PTs3** **PTsz3** **PTv3** **PTvz3** **PTz3**	**PT4** **PTh4** **PThs4** **PTj4** **PTjn4** **PTjs4** **PTk4** **PTks4** **PTr4** **PTrs4** **PTs4** **PTsz4** **PTv4** **PTvz4** **PTz4**	**PT5** **PTh5** **PThs5** **PTj5** **PTjn5** **PTjs5** **PTk5** **PTks5** **PTr5** **PTrs5** **PTs5** **PTsz5** **PTv5** **PTvz5** **PTz5**	**PT6** **PTh6** **PThs6** **PTj6** **PTjn6** **PTjs6** **PTk6** **PTks6** **PTr6** **PTrs6** **PTs6** **PTsz6** **PTv6** **PTvz6** **PTz6**	**PT7** **PTh7** **PThs7** **PTj7** **PTjn7** **PTjs7** **PTk7** **PTks7** **PTr7** **PTrs7** **PTs7** **PTsz7** **PTv7** **PTvz7** **PTz7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass antelope-brush compact selaginella	compact selaginella antelope-brush bluebunch wheatgrass	ponderosa pine antelope-brush bluebunch wheatgrass	antelope-brush bluebunch wheatgrass ponderosa pine	antelope-brush bluebunch wheatgrass ponderosa pine	antelope-brush bluebunch wheatgrass ponderosa pine
Associates	snow buckwheat ponderosa pine brittle prickly-pear cactus red three-awn cheatgrass mock-orange needle-and-thread grass	ponderosa pine red three-awn needle-and-thread grass snow buckwheat arrow-leaved balsamroot brittle prickly-pear cactus	compact selaginella red three-awn needle-and-thread grass arrow-leaved balsamroot brittle prickly-pear cactus snow buckwheat	compact selaginella red three-awn arrow-leaved balsamroot needle-and-thread grass brittle prickly-pear cactus snow buckwheat	compact selaginella red three-awn arrow-leaved balsamroot needle-and-thread grass brittle prickly-pear cactus snow buckwheat	compact selaginella red three-awn arrow-leaved balsamroot needle-and-thread grass brittle prickly-pear cactus snow buckwheat
Plots		2-88, r381				

BEC= **PPxh1/03**

Map Unit	Description
SW	Big sage-Bluebunch wheatgrass-Balsamroot; typic ecosystem unit
SWct	Big sage-Bluebunch wheatgrass-Balsamroot; coarse textured soil, terraced ecosystem unit
SWcw	Big sage-Bluebunch wheatgrass-Balsamroot; coarse textured soil, warm aspect ecosystem unit
SWh	Big sage-Bluebunch wheatgrass-Balsamroot; hummocky ecosystem unit
SWhs	Big sage-Bluebunch wheatgrass-Balsamroot; hummocky, shallow soil ecosystem unit
SWk	Big sage-Bluebunch wheatgrass-Balsamroot; cool aspect ecosystem unit
SWks	Big sage-Bluebunch wheatgrass-Balsamroot; cool aspect, shallow soil ecosystem unit
SWr	Big sage-Bluebunch wheatgrass-Balsamroot; ridged ecosystem unit
SWs	Big sage-Bluebunch wheatgrass-Balsamroot; shallow soil ecosystem unit
SWsw	Big sage-Bluebunch wheatgrass-Balsamroot; shallow soil, warm aspect ecosystem unit
SWsz	Big sage-Bluebunch wheatgrass-Balsamroot; shallow soil, very steep warm aspect ecosystem unit
SWw	Big sage-Bluebunch wheatgrass-Balsamroot; warm aspect ecosystem unit

Big sage-Bluebunch wheatgrass-Balsamroot (SW) occurs on deep, medium-textured soil, subxeric to submesic, level to gently sloping moraine and colluvium
SWct occurs on coarse textured soil, on glaciofluvial terraces
SWcw occurs on coarse textured soil, warm aspects, moderately sloping moraine
SWh occurs on hummocky moraine
SWhs occurs on shallow soil, hummocky moraine
SWk occurs on cool aspects, moderately sloping moraine
SWks occurs on shallow soil, cool aspects, moderately sloping moraine
SWr occurs on ridged moraine
SWs occurs on shallow moraine
SWsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
SWsz occurs on shallow soil, warm aspects, very steep colluvium
SWw occurs on warm aspects, moderately sloping moraine

Map Symbol	**SW2b** **SWct2b** **SWcw2b** **SWh2b** **SWhs2b** **SWk2b** **SWks2b** **SWr2b** **SWs2b** **SWsw2b** **SWsz2b** **SWw2b**	**SW3a** **SWct3a** **SWcw3a** **SWh3a** **SWhs3a** **SWk3a** **SWks3a** **SWr3a** **SWs3a** **SWsw3a** **SWsz3a** **SWw3a**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)
Dominants	bluebunch wheatgrass compact selaginella arrow-leaved balsamroot antelope-brush	bluebunch wheatgrass big sage antelope-brush arrow-leaved balsamroot
Associates	yarrow cheatgrass Sandberg's bluegrass big sage	compact selaginella Sandberg's bluegrass yarrow
Plots	1-14,9650024	9650036,V00016

BEC= **PPxh1/04**

Map Unit	Description
PC	Py-Bluebunch wheatgrass-Cheatgrass; typic ecosystem unit
PCcs	Py-Bluebunch wheatgrass-Cheatgrass; coarse-textured, shallow soil ecosystem unit
PCh	Py-Bluebunch wheatgrass-Cheatgrass; hummocky ecosystem unit
PChs	Py-Bluebunch wheatgrass-Cheatgrass; hummocky, shallow soil ecosystem unit
PCkn	Py-Bluebunch wheatgrass-Cheatgrass; cool aspect, cone ecosystem unit
PCks	Py-Bluebunch wheatgrass-Cheatgrass; cool aspect, shallow soil ecosystem unit
PCkv	Py-Bluebunch wheatgrass-Cheatgrass; cool aspect, very shallow soil ecosystem unit
PCq	Py-Bluebunch wheatgrass-Cheatgrass; very steep cool aspect ecosystem unit
PCqs	Py-Bluebunch wheatgrass-Cheatgrass; very steep cool aspect, shallow soil ecosystem unit
PCrs	Py-Bluebunch wheatgrass-Cheatgrass; ridged, shallow soil ecosystem unit
PCs	Py-Bluebunch wheatgrass-Cheatgrass; shallow soil ecosystem unit
PCsw	Py-Bluebunch wheatgrass-Cheatgrass; shallow soil, warm aspect ecosystem unit
PCt	Py-Bluebunch wheatgrass-Cheatgrass; terraced ecosystem unit
PCvw	Py-Bluebunch wheatgrass-Cheatgrass; very shallow soil, warm aspect ecosystem unit
PCw	Py-Bluebunch wheatgrass-Cheatgrass; warm aspect ecosystem unit
PCz	Py-Bluebunch wheatgrass-Cheatgrass; very steep warm aspect ecosystem unit

Py-Bluebunch wheatgrass-Cheatgrass (PC) occurs on deep, medium-textured soil, subxeric to mesic, level to gently sloping morainal and glaciofluvial materials
PCcs occurs on shallow, coarse-textured moraine
PCh occurs on hummocky moraine
PChs occurs on shallow soil, hummocky moraine and colluvium
PCkn occurs on cool aspects, moderately sloping colluvial cone
PCks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PCkv occurs on very shallow soil, cool aspects, moderately sloping moraine and colluvium
PCq occurs on cool aspects, very steep colluvium
PCqs occurs on shallow soil, cool aspects, very steep colluvium
PCrs occurs on shallow soil, ridged moraine
PCs occurs on shallow soil
PCsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
PCt occurs on fluvial terraces
PCvw occurs on very shallow soil, warm aspects, moderately sloping moraine and colluvium
PCw occurs on warm aspects, moderately sloping moraine and colluvium
PCz occurs on warm aspects, very steep colluvium

Map Symbol	**PC2** **PCcs2** **PCh2** **PChs2** **PCkn2** **PCks2** **PCkv2** **PCq2** **PCqs2** **PCrs2** **PCs2** **PCsw2** **PCt2** **PCvw2** **PCw2** **PCz2**	**PC3** **PCcs3** **PCh3** **PChs3** **PCkn3** **PCks3** **PCkv3** **PCq3** **PCqs3** **PCrs3** **PCs3** **PCsw3** **PCt3** **PCvw3** **PCw3** **PCz3**	**PC4** **PCcs4** **PCh4** **PChs4** **PCkn4** **PCks4** **PCkv4** **PCq4** **PCqs4** **PCrs4** **PCs4** **PCsw4** **PCt4** **PCvw4** **PCw4** **PCz4**	**PC5** **PCcs5** **PCh5** **PChs5** **PCkn5** **PCks5** **PCkv5** **PCq5** **PCqs5** **PCrs5** **PCs5** **PCsw5** **PCt5** **PCvw5** **PCw5** **PCz5**	**PC6** **PCcs6** **PCh6** **PChs6** **PCkn6** **PCks6** **PCkv6** **PCq6** **PCqs6** **PCrs6** **PCs6** **PCsw6** **PCt6** **PCvw6** **PCw6** **PCz6**	**PC7** **PCcs7** **PCh7** **PChs7** **PCkn7** **PCks7** **PCkv7** **PCq7** **PCqs7** **PCrs7** **PCs7** **PCsw7** **PCt7** **PCvw7** **PCw7** **PCz7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	cheatgrass bluebunch wheatgrass	cheatgrass bluebunch wheatgrass antelope-brush	bluebunch wheatgrass antelope-brush ponderosa pine cheatgrass	bluebunch wheatgrass antelope-brush ponderosa pine	bluebunch wheatgrass antelope-brush ponderosa pine	bluebunch wheatgrass antelope-brush ponderosa pine
Associates	antelope-brush ponderosa pine yarrow squaw currant	ponderosa pine yarrow squaw currant lemonweed gromwell	yarrow squaw currant lemonweed gromwell	cheatgrass yarrow squaw currant lemonweed gromwell	yarrow cheatgrass squaw currant lemonweed gromwell	yarrow cheatgrass squaw currant lemonweed gromwell
Plots		9650020			V00004	

BEC= **PPxh1/01**

Map Unit	Description
PW	Py-Bluebunch wheatgrass-Idaho fescue; typic ecosystem unit
PWck	Py-Bluebunch wheatgrass-Idaho fescue; coarse-textured soil, cool aspect ecosystem unit
PWgw	Py-Bluebunch wheatgrass-Idaho fescue; gully, warm aspect ecosystem unit
PWh	Py-Bluebunch wheatgrass-Idaho fescue; hummocky ecosystem unit
PWhs	Py-Bluebunch wheatgrass-Idaho fescue; hummocky, shallow soil ecosystem unit
PWk	Py-Bluebunch wheatgrass-Idaho fescue; cool aspect ecosystem unit
PWkn	Py-Bluebunch wheatgrass-Idaho fescue; cool aspect, cone ecosystem unit
PWks	Py-Bluebunch wheatgrass-Idaho fescue; cool aspect, shallow soil ecosystem unit
PWn	Py-Bluebunch wheatgrass-Idaho fescue; fan ecosystem unit
PWq	Py-Bluebunch wheatgrass-Idaho fescue; very steep cool aspect ecosystem unit
PWs	Py-Bluebunch wheatgrass-Idaho fescue; shallow soil ecosystem unit
PWsw	Py-Bluebunch wheatgrass-Idaho fescue; shallow soil, warm aspect ecosystem unit
PWt	Py-Bluebunch wheatgrass-Idaho fescue; terraced ecosystem unit
PWw	Py-Bluebunch wheatgrass-Idaho fescue; warm aspect ecosystem unit

Py-Bluebunch wheatgrass-Idaho fescue (PW) occurs on deep, medium-textured soil, mesic, level to moderately sloping moraine, fluvial, and glaciofluvial materials
PWck occurs on coarse-textured soil, cool aspects, moderately sloping moraine and colluvium
PWgw occurs in gullies, on warm aspects, moderately sloping moraine
PWh occurs on hummocky moraine
PWhs occurs on shallow soil, hummocky moraine
PWk occurs on cool aspects, moderately sloping moraine and colluvium
PWkn occurs on cool aspects, moderately sloping colluvial cone
PWks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PWn occurs on fluvial fan
PWq occurs on cool aspects, very steep colluvium
PWs occurs on shallow moraine
PWsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
PWt occurs on fluvial terraces
PWw occurs on warm aspects, moderately sloping moraine and glaciofluvial materials

Map Symbol	**PW2** **PWck2** **PWgw2** **PWh2** **PWhs2** **PWk2** **PWkn2** **PWks2** **PWn2** **PWq2** **PWs2** **PWsw2** **PWt2** **PWw2**	**PW3** **PWck3** **PWgw3** **PWh3** **PWhs3** **PWk3** **PWkn3** **PWks3** **PWn3** **PWq3** **PWs3** **PWsw3** **PWt3** **PWw3**	**PW4** **PWck4** **PWgw4** **PWh4** **PWhs4** **PWk4** **PWkn4** **PWks4** **PWn4** **PWq4** **PWs4** **PWsw4** **PWt4** **PWw4**	**PW5** **PWck5** **PWgw5** **PWh5** **PWhs5** **PWk5** **PWkn5** **PWks5** **PWn5** **PWq5** **PWs5** **PWsw5** **PWt5** **PWw5**	**PW6** **PWck6** **PWgw6** **PWh6** **PWhs6** **PWk6** **PWkn6** **PWks6** **PWn6** **PWq6** **PWs6** **PWsw6** **PWt6** **PWw6**	**PW7** **PWck7** **PWgw7** **PWh7** **PWhs7** **PWk7** **PWkn7** **PWks7** **PWn7** **PWq7** **PWs7** **PWsw7** **PWt7** **PWw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass arrow-leaved balsamroot	arrow-leaved balsamroot bluebunch wheatgrass ponderosa pine	ponderosa pine arrow-leaved balsamroot bluebunch wheatgrass	ponderosa pine arrow-leaved balsamroot bluebunch wheatgrass	ponderosa pine bluebunch wheatgrass arrow-leaved balsamroot	ponderosa pine bluebunch wheatgrass arrow-leaved balsamroot
Associates	ponderosa pine yarrow timber milk-vetch umber pussytoes silky lupine compact selaginella	silky lupine yarrow umber pussytoes timber milk-vetch Idaho fescue	silky lupine yarrow umber pussytoes timber milk-vetch Idaho fescue	silky lupine yarrow umber pussytoes timber milk-vetch Idaho fescue	silky lupine timber milk-vetch umber pussytoes yarrow Idaho fescue	timber milk-vetch umber pussytoes silky lupine yarrow Idaho fescue
Plots				1-73,1-74	V00005, V00041	

BEC= **PPxh1/05**

Map Unit	Description
PF	Py-Bluebunch wheatgrass-Rough fescue; typic ecosystem unit
PFks	Py-Bluebunch wheatgrass-Rough fescue; cool aspect, shallow soil ecosystem unit
PFs	Py-Bluebunch wheatgrass-Rough fescue; shallow soil ecosystem unit

Py-Bluebunch wheatgrass- Rough fescue (PF) occurs on deep, medium-textured soil, mesic, level to gently sloping morainal and glaciofluvial materials
PFks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PFs occurs on shallow moraine

Map Symbol	**PF2** **PFks2** **PFs2**	**PF3** **PFks3** **PFs3**	**PF4** **PFks4** **PFs4**	**PF5** **PFks5** **PFs5**	**PF6** **PFks6** **PFs6**	**PF7** **PFks7** **PFs7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass Idaho fescue yarrow	bluebunch wheatgrass ponderosa pine Idaho fescue	ponderosa pine bluebunch wheatgrass Idaho fescue	ponderosa pine bluebunch wheatgrass Idaho fescue	ponderosa pine bluebunch wheatgrass Idaho fescue	bluebunch wheatgrass ponderosa pine Idaho fescue
Associates	ponderosa pine arrow-leaved balsamroot junegrass rough fescue saskatoon	yarrow arrow-leaved balsamroot saskatoon Douglas-fir junegrass rough fescue	arrow-leaved balsamroot saskatoon Douglas-fir yarrow junegrass rough fescue	arrow-leaved balsamroot Douglas-fir saskatoon junegrass yarrow rough fescue timber milk-vetch	arrow-leaved balsamroot Douglas-fir saskatoon junegrass rough fescue yarrow timber milk-vetch	Douglas-fir arrow-leaved balsamroot saskatoon junegrass rough fescue timber milk-vetch yarrow
Plots					V00018,V00029,V00042	

BEC= **PPxh1/06**

Map Unit	Description
SP	FdPy-Snowberry-Pinegrass; typic ecosystem unit
SPa	FdPy-Snowberry-Pinegrass; active floodplain ecosystem unit
SPg	FdPy-Snowberry-Pinegrass; gully ecosystem unit
SPgk	FdPy-Snowberry-Pinegrass; gully, cool aspect ecosystem unit
SPgw	FdPy-Snowberry-Pinegrass; gully, warm aspect ecosystem unit
SPk	FdPy-Snowberry-Pinegrass; cool aspect ecosystem unit
SPks	FdPy-Snowberry-Pinegrass; cool aspect, shallow soil ecosystem unit
SPs	FdPy-Snowberry-Pinegrass; shallow soil ecosystem unit
SPt	FdPy-Snowberry-Pinegrass; terraced ecosystem unit

FdPy-Snowberry-Pinegrass (SP) occurs on deep, medium-textured soil, subhygric, gentle to moderately sloping moisture receiving sites including fluvial and morainal materials
SPa occurs on active fluvial plains
SPg occurs in gullies, on moraine and colluvium
SPgk occurs in gullies, on cool aspects, moderately sloping moraine
SPgw occurs in gullies, on warm aspects, moderately sloping moraine
SPk occurs on cool aspects, moderately sloping moraine
SPks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
SPs occurs on shallow soil where bedrock impedes soil drainage, on moraine
SPt occurs on fluvial terraces

Map Symbol	**SP2** **SPa2** **SPg2** **SPgk2** **SPgw2** **SPk2** **SPks2** **SPs2** **SPt2**	**SP3** **SPa3** **SPg3** **SPgk3** **SPgw3** **SPk3** **SPks3** **SPs3** **SPt3**	**SP4** **SPa4** **SPg4** **SPgk4** **SPgw4** **SPk4** **SPks4** **SPs4** **SPt4**	**SP5** **SPa5** **SPg5** **SPgk5** **SPgw5** **SPk5** **SPks5** **SPs5** **SPt5**	**SP6** **SPa6** **SPg6** **SPgk6** **SPgw6** **SPk6** **SPks6** **SPs6** **SPt6**	**SP7** **SPa7** **SPg7** **SPgk7** **SPgw7** **SPk7** **SPks7** **SPs7** **SPt7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	Kentucky bluegrass common snowberry	Kentucky bluegrass trembling aspen	trembling aspen Kentucky bluegrass	trembling aspen ponderosa pine	trembling aspen ponderosa pine	ponderosa pine Douglas-fir
Associates	trembling aspen tall-Oregon grape pinegrass Nootka rose skunk currant ponderosa pine	tall-Oregon grape common snowberry pinegrass Nootka rose ponderosa pine skunk currant Douglas-fir	ponderosa pine tall-Oregon grape common snowberry Nootka rose skunk currant pinegrass Douglas-fir	Kentucky bluegrass tall-Oregon grape Nootka rose common snowberry Douglas-fir pinegrass skunk currant saskatoon	Kentucky bluegrass Douglas-fir tall-Oregon grape common snowberry Nootka rose pinegrass skunk currant saskatoon	trembling aspen common snowberry Kentucky bluegrass tall-Oregon grape Nootka rose pinegrass skunk currant saskatoon
Plots		r384, 9650025			V00006,V00032	

BEC= **PPxh1/07**

Map Unit	Description
DS	FdPy-Snowberry-Spirea; typic ecosystem unit
DSk	FdPy-Snowberry-Spirea; cool aspect ecosystem unit

FdPy-Snowberry-Spirea (DS) occurs on deep, medium-textured soil, subhygric, level to gently sloping moisture receiving rich sites including moraine, colluvium, fluvial and glaciofluvial materials
DSk occurs on cool aspects, moderately sloping moraine

Map Symbol	**DS2** **DSk2**	**DS3** **DSk3**	**DS4** **DSk4**	**DS5** **DSk5**	**DS6** **DSk6**	**DS7** **DSk7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	Kentucky bluegrass birch-leaved spirea common snowberry	Kentucky bluegrass Douglas-fir birch-leaved spirea	Douglas-fir Kentucky bluegrass birch-leaved spirea	Douglas-fir ponderosa pine	ponderosa pine Douglas-fir	ponderosa pine Douglas-fir
Associates	Douglas-fir Nootka rose ponderosa pine tall-Oregon grape yarrow northern bedstraw	tall-Oregon grape common snowberry Nootka rose ponderosa pine yarrow northern bedstraw	ponderosa pine common snowberry tall-Oregon grape Nootka rose yarrow northern bedstraw	Kentucky bluegrass birch-leaved spirea common snowberry tall-Oregon grape Nootka rose yarrow northern bedstraw saskatoon	Kentucky bluegrass birch-leaved spirea common snowberry tall-Oregon grape Nootka rose yarrow northern bedstraw saskatoon	common snowberry Kentucky bluegrass birch-leaved spirea tall-Oregon grape Nootka rose yarrow northern bedstraw saskatoon
Plots		r218				

BEC= **PPxh1/08**

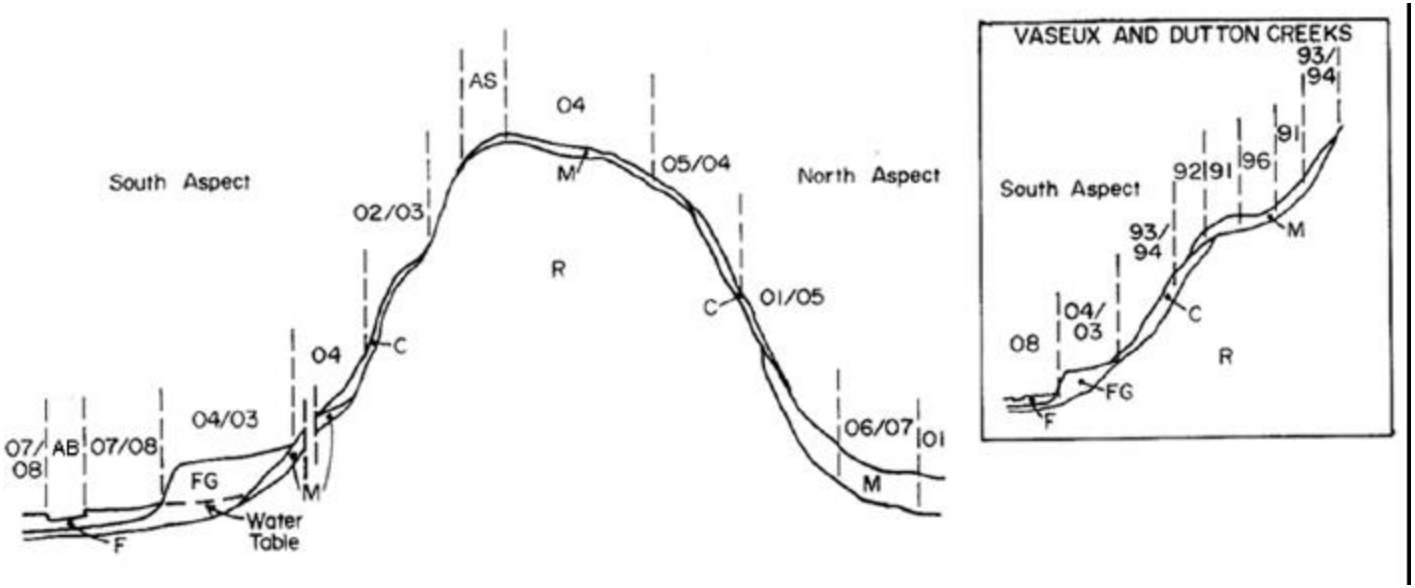
Map Unit	Description
DM	Fd-Water birch-Douglas maple; typic ecosystem unit

Fd-Water birch-Douglas maple (DM) occurs on deep, medium-textured soil, subhygric to hygric, level to gently sloping, rich moisture receiving sites including moraine and fluvial materials

Map Symbol	**DM2**	**DM3**	**DM4**	**DM5**	**DM6**	**DM7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	Kentucky bluegrass common snowberry star-flowered false Solomon's-seal	Kentucky bluegrass common snowberry trembling aspen	trembling aspen Kentucky bluegrass common snowberry	trembling aspen common snowberry tall Oregon grape	Douglas-fir tall Oregon grape common snowberry water birch	Douglas-fir water birch common snowberry tall Oregon grape
Associates	*Viola* spp. tall Oregon grape trembling aspen Douglas maple water birch Douglas-fir	star-flowered false Solomon's-seal tall Oregon grape Douglas-fir Douglas maple water birch *Viola* spp.	tall Oregon grape Douglas maple Douglas-fir star-flowered false Solomon's-seal water birch *Viola* spp.	Douglas-fir Kentucky bluegrass water birch Douglas maple star-flowered false Solomon's-seal *Viola* spp.	trembling aspen Douglas maple Kentucky bluegrass star-flowered false Solomon's-seal *Viola* spp.	Douglas maple Kentucky bluegrass star-flowered false Solomon's-seal trembling aspen *Viola* spp.
Plots					V00020	

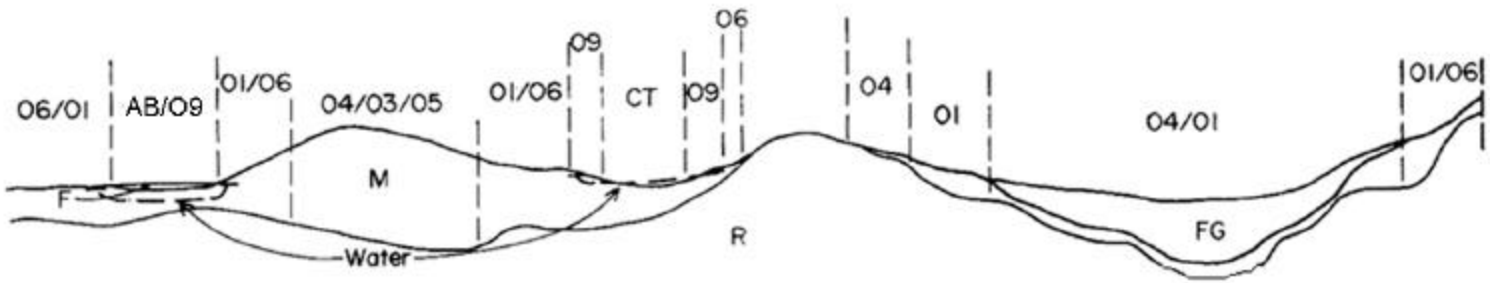
Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within PPxh1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
CL	Cliff	A steep, vertical or overhanging rock face	q,z	1
CO	Cultivated Orchard	An agricultural area composed of single or multiple tree species planted in rows.		3
ES	Exposed Soil	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mudslides, debris torrents, avalanches, and human-made disturbances where vegetation cover is less than 5%	k	1
GB	Gravel Bar	An elongated landform generated by waves and currents and usually running parallel to the shore. It is composed of unconsolidated small rounded cobbles, pebbles, stones and sand	not applicable	1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	h,k,n,q,w	1

Appendix 2
Expanded Legend for Ecosystems found in the IDFxh1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR IDFxh1					
00	AS	Antelope brush-Selaginella	01	DP	FdPy-Pinegrass
92	WA	Big sage-Bluebunch wheatgrass-Balsamroot	05	PF	FdPy-Pinegrass-Idaho fescue
93	WB	Bluebunch wheatgrass-Balsamroot	06	DF	FdPy-Spirea-Feathermoss
94	SF	Big sage-Bluebunch wheatgrass-Idaho fescue	07	DS	FdPy-Snowberry-Spirea
91	FW	Fescue-Bluebunch wheatgrass	08	SD	SxwFd-Douglas maple-Dogwood
96	BN	Kentucky bluegrass-Stiff needlegrass	00	AB	Alder-Sedge
02	PB	FdPy-Bluebunch wheatgrass-Balsamroot	09	WS	Willow-Sedge
03	DW	FdPy-Bluebunch wheatgrass-Pinegrass	00	CT	Cattail Marsh
04	SP	FdPy-Snowbrush-Pinegrass			


06/01
AB/09
01/06
04/03/05
01/06
09
CT
09
06
04
01
04/01
01/06
M
F
R
FG
Water

BEC= **IDFxh1/00**	
Map Unit	Description
AS	Antelope brush-Selaginella; typic ecosystem unit
ASh	Antelope brush-Selaginella; hummocky ecosystem unit
ASk	Antelope brush-Selaginella; cool aspect ecosystem unit
ASw	Antelope brush-Selaginella; warm aspect ecosystem unit
ASz	Antelope brush-Selaginella; very steep warm aspect ecosystem unit
Antelope brush-Selaginella (AS) occurs on shallow, medium-textured soil, xeric to very xeric, gentle, upper slope and crests on moraine and eolian materials **ASh** occurs on hummocky moraine **ASk** occurs on cool aspects, moderately sloping moraine and colluvium **ASw** occurs on warm aspects, moderately sloping moraine and colluvium **ASz** occurs on warm aspects, very steep moraine and colluvium	

Map Symbol	**AS2a** **ASh2a** **ASk2a** **ASw2a** **ASz2a**	**AS2b** **ASh2b** **ASk2b** **ASw2b** **ASz2b**
Plant Species	Forb-dominated (2a)	Graminoid-dominated (2b)
Dominants	compact selaginella bluebunch wheatgrass juniper haircap moss antelope-brush	bluebunch wheatgrass antelope-brush compact selaginella
Associates	junegrass red three-awn old man's whiskers snowbrush downy brome	juniper haircap moss junegrass red three-awn old man's whiskers snowbrush downy brome
Plots	2-89	1-9

BEC= **IDFxh1a/92**

Map Unit	Description
WA	Big sage-Bluebunch wheatgrass-Balsamroot; typic ecosystem unit
WAk	Big sage-Bluebunch wheatgrass-Balsamroot; cool aspect ecosystem unit
WAs	Big sage-Bluebunch wheatgrass-Balsamroot; shallow soils ecosystem unit

Big sage-Bluebunch wheatgrass-Balsamroot (WA) occurs on deep, medium-textured soil, xeric to submesic, significantly sloping moraine and colluvium on warm aspects
WAk occurs on cool aspects, moderately sloping moraine and colluvium
WAs occurs on shallow moraine and colluvium

Map Symbol	**WA2b** **WAk2b** **WAs2b**	**WA3a** **Wak3a** **Was3a**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)
Dominants	downy brome arrow-leaved balsamroot bluebunch wheatgrass Sandberg's bluegrass	big sage downy brome arrow-leaved balsamroot bluebunch wheatgrass
Associates	big sage silky lupine yarrow small-flowered blue-eyed mary parsnip-flowered buckwheat	Sandberg's bluegrass silky lupine yarrow small-flowered blue-eyed mary parsnip-flowered buckwheat
Plots	9650004,9650005,V00010	

BEC= **IDFxh1a/93**

Map Unit	Description
WB	Bluebunch wheatgrass-Balsamroot; typic ecosystem unit
WBc	Bluebunch wheatgrass-Balsamroot; coarse-textured soil ecosystem unit
WBh	Bluebunch wheatgrass-Balsamroot; hummocky ecosystem unit
WBhs	Bluebunch wheatgrass-Balsamroot; hummocky, shallow soil ecosystem unit
WBj	Bluebunch wheatgrass-Balsamroot; gentle slope ecosystem unit
WBjs	Bluebunch wheatgrass-Balsamroot; gentle slope, shallow soil ecosystem unit
WBks	Bluebunch wheatgrass-Balsamroot; cool aspect, shallow soil ecosystem unit
WBs	Bluebunch wheatgrass-Balsamroot; shallow soil ecosystem unit

Bluebunch wheatgrass-Balsamroot (WB) occurs on deep, medium-textured soil, subxeric to submesic, significantly sloping moraine, colluvium, and glaciofluvial materials on warm aspects
WBc occurs on coarse-textured moraine
WBh occurs on hummocky moraine
WBhs occurs on shallow soil, hummocky moraine
WBj occurs on gently sloping moraine
WBjs occurs on shallow soil, gently sloping moraine
WBks occurs on shallow soil, cool aspect, moderately sloping moraine and colluvium
WBs occurs on shallow moraine and colluvium

Map Symbol	**WB2b** **WBc2b** **WBh2b** **WBhs2b** **WBj2b** **WBjs2b** **WBks2b** **WBs2b**
Plant Species	Graminoid-dominated (2b)
Dominants	bluebunch wheatgrass junegrass compact selaginella Sandberg's bluegrass
Associates	Kentucky bluegrass ponderosa pine arrow-leaved balsamroot yarrow
Plots	1-12,1-15, 9650037,V00036

BEC= **IDFxh1a/94**

Map Unit	Description
SF	Big sage-Bluebunch wheatgrass-Idaho fescue; typic ecosystem unit
SFg	Big sage-Bluebunch wheatgrass-Idaho fescue; gully ecosystem unit
SFs	Big sage-Bluebunch wheatgrass-Idaho fescue; shallow soil ecosystem unit
SFsw	Big sage-Bluebunch wheatgrass-Idaho fescue; shallow soil, warm aspect ecosystem unit
SFw	Big sage-Bluebunch wheatgrass-Idaho fescue; warm aspect ecosystem unit

Big sage-Bluebunch wheatgrass-Idaho fescue (SF) occurs on deep, medium-textured soil, submesic to mesic, gentle to moderately sloping moraine and colluvium
SFg occurs in gullies, on glaciofluvial materials
SFs occurs on shallow moraine
SFsw occurs on shallow soil, warm aspects, moderately sloping moraine
SFw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**SF2b** **SFg2b** **SFs2b** **SFsw2b** **SFw2b**	**SF3a** **SFg3a** **SFs3a** **SFsw3a** **SFw3a**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)[1]
Dominants	bluebunch wheatgrass big sage arrow-leaved balsamroot	big sage bluebunch wheatgrass Idaho fescue
Associates	bitterroot junegrass parsnip-flowered buckwheat Idaho fescue lemonweed	arrow-leaved balsamroot bitterroot junegrass parsnip-flowered buckwheat lemonweed
Plots	1-29,V00011,V00021,V00026,V00033,V00034	

[1] In one occasions SF map units contained more than 10% cover of tree cover. This map unit was labeled as structural stage 6.

BEC= **IDFxh1a/91**

Map Unit	Description
FW	Fescue-Bluebunch wheatgrass; typic ecosystem unit
FWck	Fescue-Bluebunch wheatgrass; coarse-textured soil, cool aspect ecosystem unit
FWh	Fescue-Bluebunch wheatgrass; hummocky ecosystem unit
FWk	Fescue-Bluebunch wheatgrass; cool aspect ecosystem unit
FWks	Fescue-Bluebunch wheatgrass; cool aspect, shallow soil ecosystem unit
FWs	Fescue-Bluebunch wheatgrass; shallow soil ecosystem unit
FDsw	Fescue-Bluebunch wheatgrass; shallow soil, warm aspect ecosystem unit
FWw	Fescue-Bluebunch wheatgrass; warm aspect ecosystem unit

Fescue-Bluebunch wheatgrass (FW) occurs on deep, medium-textured soil, submesic to mesic, gentle to moderately sloping moraine
FWck occurs on coarse-textured soil, cool aspects, moderately sloping moraine and glaciofluvial materials
FWh occurs on hummocky moraine
FWk occurs on cool aspects, moderately sloping moraine and glaciofluvial materials
FWks occurs on shallow soil, cool aspects, moderately sloping moraine
FWs occurs on shallow moraine
FDsw occurs on shallow soil, warm aspects, moderately sloping moraine
FWw occurs on warm aspects, moderately sloping moraine and glaciofluvial materials

Map Symbol	**FW2b** **FWck2b** **FWh2b** **FWk2b** **FWks2b** **FWs2b** **FDsw2b** **FWw2b**
Plant Species	Graminoid-dominated (2b) [1]
Dominants	bluebunch wheatgrass downy brome arrow-leaved balsamroot compact selaginella
Associates	Kentucky bluegrass Idaho fescue diffuse fleabane junegrass juniper haircap moss small-flowered blue-eyed mary
Plots	9650026

[1]Three units were mapped as FW 6, and one as FW 3a because they had more than 10% tree cover or 20% low shrub cover (respectively). Despite of the higher tree or shrub cover, these units had all of the characteristics indicating FW site series.

BEC= **IDFxh1a/96**

Map Unit	Description
BN	Kentucky bluegrass-Stiff needlegrass; typic ecosystem unit
BNw	Kentucky bluegrass-Stiff needlegrass; warm aspect ecosystem unit

Kentucky bluegrass-Stiff needlegrass (BN) occurs on deep, medium-textured soil, subhygric, level to gently sloping moraine
BNw occurs on warm aspects, moderately sloping moraine, lower slope, moisture receiving sites

Map Symbol	**BN2b** **BNw2b**
Plant Species	Graminoid-dominated (2b)
Dominants	Kentucky bluegrass yarrow lemonweed
Associates	arrow-leaved groundsel orchardgrass bluebunch wheatgrass silky lupine bluejoint
Plots	1-27,1-28,1-71

BEC= **IDFxh1/02**

Map Unit	Description
PB	FdPy-Bluebunch wheatgrass-Balsamroot; typic ecosystem unit
PBh	FdPy-Bluebunch wheatgrass-Balsamroot; hummocky ecosystem unit
PBj	FdPy-Bluebunch wheatgrass-Balsamroot; gentle slope ecosystem unit
PBk	FdPy-Bluebunch wheatgrass-Balsamroot; cool aspect ecosystem unit
PBv	FdPy-Bluebunch wheatgrass-Balsamroot; very shallow soil ecosystem unit
PBvz	FdPy-Bluebunch wheatgrass-Balsamroot; very shallow soil, very steep warm aspect ecosystem unit
PBz	FdPy-Bluebunch wheatgrass-Balsamroot; very steep warm aspect ecosystem unit

FdPy-Bluebunch wheatgrass-Balsamroot (PB) occurs on shallow soil, significantly sloping, warm aspect, subxeric to xeric, moraine, colluvial and glaciofluvial materials
PBh occurs on hummocky moraine
PBj occurs on gentle sloping moraine
PBk occurs on cool aspects, moderately sloping moraine
PBv occurs on very shallow moraine and colluvium
PBvz occurs on very shallow soil, warm aspects, very steep colluvium
PBz occurs on warm aspects, very steep colluvium

Map Symbol	**PB2** **PBh2** **PBj2** **PBk2** **PBv2** **PBvz2** **PBz2**	**PB3** **PBh3** **PBj3** **PBk3** **PBv3** **PBvz3** **PBz3**	**PB4** **PBh4** **PBj4** **PBk4** **PBv4** **PBvz4** **PBz4**	**PB5** **PBh5** **PBj5** **PBk5** **PBv5** **PBvz5** **PBz5**	**PB6** **PBh6** **PBj6** **PBk6** **PBv6** **PBvz6** **PBz6**	**PB7** **PBh7** **PBj7** **PBk7** **PBv7** **PBvz7** **PBz7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass juniper haircap moss old man's whiskers compact selaginella	bluebunch wheatgrass juniper haircap moss Douglas-fir old man's whiskers	Douglas-fir bluebunch wheatgrass juniper haircap moss	Douglas-fir bluebunch wheatgrass ponderosa pine	bluebunch wheatgrass ponderosa pine Douglas-fir	bluebunch wheatgrass ponderosa pine Douglas-fir
Associates	Douglas-fir ponderosa pine Sandberg's bluegrass kinnikinnick arrow-leaved balsamroot western cliff fern shrubby penstemon sidewalk moss	ponderosa pine compact selaginella Sandberg's bluegrass kinnikinnick arrow-leaved balsamroot shrubby penstemon western cliff fern sidewalk moss	ponderosa pine old man's whiskers kinnikinnick arrow-leaved balsamroot compact selaginella Sandberg's bluegrass shrubby penstemon western cliff fern	kinnikinnick arrow-leaved balsamroot juniper haircap moss shrubby penstemon old man's whiskers compact selaginella Sandberg's bluegrass	arrow-leaved balsamroot kinnikinnick shrubby penstemon juniper haircap moss Sandberg's bluegrass old man's whiskers compact selaginella	juniper haircap moss Sandberg's bluegrass arrow-leaved balsamroot kinnikinnick shrubby penstemon old man's whiskers compact selaginella
Plots	1-2,1-23					

BEC= **IDFxh1/03**

Map Unit	Description
DW	FdPy-Bluebunch wheatgrass-Pinegrass; typic ecosystem unit
DWc	FdPy-Bluebunch wheatgrass-Pinegrass; coarse-textured soil ecosystem unit
DWg	FdPy-Bluebunch wheatgrass-Pinegrass; gully ecosystem unit
DWh	FdPy-Bluebunch wheatgrass-Pinegrass; hummocky ecosystem unit
DWhs	FdPy-Bluebunch wheatgrass-Pinegrass; hummocky, shallow soil ecosystem unit
DWj	FdPy-Bluebunch wheatgrass-Pinegrass; gentle slope ecosystem unit
DWjs	FdPy-Bluebunch wheatgrass-Pinegrass; gentle slope, shallow soil ecosystem unit
DWk	FdPy-Bluebunch wheatgrass-Pinegrass; cool aspect ecosystem unit
DWks	FdPy-Bluebunch wheatgrass-Pinegrass; cool aspect, shallow soil ecosystem unit
DWkv	FdPy-Bluebunch wheatgrass-Pinegrass; cool aspect, very shallow soil ecosystem unit
DWr	FdPy-Bluebunch wheatgrass-Pinegrass; ridged ecosystem unit
DWs	FdPy-Bluebunch wheatgrass-Pinegrass; shallow soil ecosystem unit

FdPy-Bluebunch wheatgrass-Pinegrass (DW) occurs on deep, medium-textured soil, significantly sloping, warm aspect, xeric to subxeric, moraine, colluvium and glaciofluvial materials
DWc occurs on coarse-textured moraine and colluvium
DWg occurs in gullies, on moraine
DWh occurs on hummocky moraine and glaciofluvial materials
DWhs occurs on shallow soil, hummocky moraine
DWj occurs on gentle sloping moraine
DWjs occurs on shallow soil, gentle sloping moraine
DWk occurs on cool aspects, moderately sloping moraine and colluvium
DWks occurs on shallow soil, cool aspects, moderately sloping moraine
DWkv occurs on very shallow soil, cool aspects, moderately sloping moraine
DWr occurs on ridged moraine and glaciofluvial materials
DWs occurs on shallow moraine, colluvium, and glaciofluvial materials

Map Symbol	**DW2** **DWc2** **DWg2** **DWh2** **DWhs2** **DWj2** **DWjs2** **DWk2** **DWks2** **DWkv2** **DWr2** **DWs2**	**DW3** **DWc3** **DWg3** **DWh3** **DWhs3** **DWj3** **DWjs3** **DWk3** **DWks3** **DWkv3** **DWr3** **DWs3**	**DW4** **DWc4** **DWg4** **DWh4** **DWhs4** **DWj4** **DWjs4** **DWk4** **DWks4** **DWkv4** **DWr4** **DWs4**	**DW5** **DWc5** **DWg5** **DWh5** **DWhs5** **DWj5** **DWjs5** **DWk5** **DWks5** **DWkv5** **DWr5** **DWs5**	**DW6** **DWc6** **DWg6** **DWh6** **DWhs6** **DWj6** **DWjs6** **DWk6** **DWks6** **DWkv6** **DWr6** **DWs6**	**DW7** **DWc7** **DWg7** **DWh7** **DWhs7** **DWj7** **DWjs7** **DWk7** **DWks7** **DWkv7** **DWr7** **DWs7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass spreading needlegrass rosy pussytoes downy brome compact selaginella	bluebunch wheatgrass junegrass Douglas-fir ponderosa pine compact selaginella	bluebunch wheatgrass Douglas-fir junegrass ponderosa pine	bluebunch wheatgrass Douglas-fir ponderosa pine	bluebunch wheatgrass Douglas-fir ponderosa pine	bluebunch wheatgrass ponderosa pine Idaho fescue Douglas-fir
Associates	ponderosa pine Douglas-fir junegrass kinnikinnick Idaho fescue pinegrass yarrow arrow-leaved balsamroot	rosy pussytoes Idaho fescue kinnikinnick downy brome yarrow arrow-leaved balsamroot spreading needlegrass pinegrass	Idaho fescue kinnikinnick compact selaginella arrow-leaved balsamroot downy brome kinnikinnick yarrow rosy pussytoes pinegrass	Idaho fescue junegrass arrow-leaved balsamroot kinnikinnick compact selaginella pinegrass downy brome yarrow	Idaho fescue arrow-leaved balsamroot junegrass kinnikinnick pinegrass compact selaginella saskatoon yarrow	arrow-leaved balsamroot junegrass kinnikinnick pinegrass compact selaginella saskatoon yarrow
Plots		1-70,2-90				1-58

BEC= **IDFxh1/04**

Map Unit	Description
SP	FdPy-Snowbrush-Pinegrass; typic ecosystem unit
SPc	FdPy-Snowbrush-Pinegrass; coarse-textured soil ecosystem unit
SPcs	FdPy-Snowbrush-Pinegrass; coarse-textured, shallow soil ecosystem unit
SPcw	FdPy-Snowbrush-Pinegrass; coarse-textured soil, warm aspect ecosystem unit
SPg	FdPy-Snowbrush-Pinegrass; gully ecosystem unit
SPgw	FdPy-Snowbrush-Pinegrass; gully, warm aspect ecosystem unit
SPh	FdPy-Snowbrush-Pinegrass; hummocky ecosystem unit
SPhs	FdPy-Snowbrush-Pinegrass; hummocky, shallow soil ecosystem unit
SPk	FdPy-Snowbrush-Pinegrass; cool aspect ecosystem unit
SPks	FdPy-Snowbrush-Pinegrass; cool aspect, shallow soil ecosystem unit
SPkv	FdPy-Snowbrush-Pinegrass; cool aspect, very shallow soil ecosystem unit
SPn	FdPy-Snowbrush-Pinegrass; fluvial fan ecosystem unit
SPqs	FdPy-Snowbrush-Pinegrass; very steep cool aspect, shallow soil ecosystem unit
SPs	FdPy-Snowbrush-Pinegrass; shallow soil ecosystem unit
SPsw	FdPy-Snowbrush-Pinegrass; shallow soil, warm aspect ecosystem unit
SPt	FdPy-Snowbrush-Pinegrass; terraces ecosystem unit
SPw	FdPy-Snowbrush-Pinegrass; warm aspect ecosystem unit

FdPy-Snowbrush-Pinegrass (SP) occurs on deep, medium-textured soil, subxeric to submesic, level to gently sloping morainal, fluvial and glaciofluvial materials
SPc occurs on coarse-textured moraine and glaciofluvial materials
SPcs occurs on coarse-textured soil, shallow moraine
SPcw occurs on coarse-textured soil, warm aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
SPg occurs in gullies, on moraine
SPgw occurs in gullies, on warm aspects, moderately sloping moraine and glaciofluvial materials
SPh occurs on hummocky moraine and glaciofluvial materials
SPhs occurs on shallow soil, hummocky moraine and colluvium
SPk occurs on cool aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
SPks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
SPkv occurs on very shallow soil, cool aspects, moderately sloping moraine
SPn occurs on fluvial fan
SPqs occurs on shallow soil, cool aspects, very steep colluvium
SPs occurs on shallow moraine and eolian materials
SPsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
SPt occurs on glaciofluvial terraces
SPw occurs on warm aspects, moderately sloping moraine, colluvium, and glaciofluvial materials

Map Symbol	**SP2** **SPc2** **SPcs2** **SPcw2** **SPg2** **SPgw2** **SPh2** **SPhs2** **SPk2** **SPks2** **SPkv2** **SPn2** **SPqs2** **SPs2** **SPsw2** **SPt2** **SPw2**	**SP3** **SPc3** **SPcs3** **SPcw3** **SPg3** **SPgw3** **SPh3** **SPhs3** **SPk3** **SPks3** **SPkv3** **SPn3** **SPqs3** **SPs3** **SPsw3** **SPt3** **SPw3**	**SP4** **SPc4** **SPcs4** **SPcw4** **SPg4** **SPgw4** **SPh4** **SPhs4** **SPk4** **SPks4** **SPkv4** **SPn4** **SPqs4** **SPs4** **SPsw4** **SPt4** **SPw4**	**SP5** **SPc5** **SPcs5** **SPcw5** **SPg5** **SPgw5** **SPh5** **SPhs5** **SPk5** **SPks5** **SPkv5** **SPn6** **SPqs5** **SPs5** **SPsw5** **SPt5** **SPw5**	**SP6** **SPc6** **SPcs6** **SPcw6** **SPg6** **SPgw6** **SPh6** **SPhs6** **SPk6** **SPks6** **SPkv6** **SPn6** **SPqs6** **SPs6** **SPsw6** **SPt6** **SPw6**	**SP7** **SPc7** **SPcs7** **SPcw7** **SPg7** **SPgw7** **SPh7** **SPhs7** **SPk7** **SPks7** **SPkv7** **SPn7** **SPqs7** **SPs7** **SPsw7** **SPt7** **SPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass kinnikinnick yarrow silky lupine	pinegrass kinnikinnick saskatoon Douglas-fir	Douglas-fir pinegrass kinnikinnick ponderosa pine	Douglas-fir pinegrass ponderosa pine kinnikinnick	ponderosa pine kinnikinnick pinegrass Douglas-fir	ponderosa pine kinnikinnick pinegrass Douglas-fir
Associates	saskatoon Douglas-fir shrubby penstemon arrow-leaved balsamroot ponderosa pine timber milk-vetch	ponderosa pine yarrow silky lupine shrubby penstemon arrow-leaved balsamroot timber milk-vetch	yarrow silky lupine saskatoon arrow-leaved balsamroot small-flowered penstemon timber milk-vetch	yarrow silky lupine arrow-leaved balsamroot small-flowered penstemon timber milk-vetch saskatoon	arrow-leaved balsamroot silky lupine small-flowered penstemon yarrow saskatoon timber milk-vetch	arrow-leaved balsamroot timber milk-vetch silky lupine small-flowered penstemon yarrow saskatoon
Plots		r230		1-150	1-6,1-7	

BEC= **IDFxh1/01**

Map Unit	Description
DP	FdPy-Pinegrass; typic ecosystem unit
DPc	FdPy-Pinegrass; coarse-textured soil ecosystem unit
DPck	FdPy-Pinegrass; coarse-textured soil, cool aspect ecosystem unit
DPcw	FdPy-Pinegrass; coarse-textured soil, warm aspect ecosystem unit
DPg	FdPy-Pinegrass; gully ecosystem unit
DPgk	FdPy-Pinegrass; gully, cool aspect ecosystem unit
DPgw	FdPy-Pinegrass; gully, warm aspect ecosystem unit
DPh	FdPy-Pinegrass; hummocky ecosystem unit
DPhs	FdPy-Pinegrass; hummocky, shallow soil ecosystem unit
DPk	FdPy-Pinegrass; cool aspect ecosystem unit
DPks	FdPy-Pinegrass; cool aspect, shallow soil ecosystem unit
DPn	FdPy-Pinegrass; fan ecosystem unit
DPnw	FdPy-Pinegrass; cone, warm aspect ecosystem unit
DPs	FdPy-Pinegrass; shallow soils ecosystem unit
DPsw	FdPy-Pinegrass; shallow soils, warm aspect ecosystem unit
DPw	FdPy-Pinegrass; warm aspect ecosystem unit

FdPy-Pinegrass (DP) occurs on deep, medium-textured soil, mesic, level to gently sloping moraine, colluvium, fluvial and glaciofluvial materials
DPc occurs on coarse-textured moraine and glaciofluvial materials
DPck occurs on coarse-textured soil, cool aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
DPcw occurs on coarse-textured soil, warm aspects, moderately sloping moraine, fluvial and glaciofluvial materials
DPg occurs in gullies, on moraine
DPgk occurs in gullies, on cool aspects, moderately sloping moraine and colluvium
DPgw occurs in gullies, on warm aspects, moderately sloping moraine and glaciofluvial materials
DPh occurs on hummocky moraine
DPhs occurs on shallow soil, hummocky moraine
DPk occurs on cool aspects, moderately sloping moraine, colluvium and glaciofluvial materials
DPks occurs on shallow soil, cool aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
DPn occurs on fluvial fan
DPnw occurs on warm aspects, moderately sloping colluvial cone
DPs occurs on shallow moraine
DPsw occurs on shallow soil, warm aspects, moderately sloping moraine
DPw occurs on warm aspects, moderately sloping moraine, colluvium, and glaciofluvial materials

Map Symbol	**DP2** **DPc2** **DPck2** **DPcw2** **DPg2** **DPgk2** **DPgw2** **DPh2** **DPhs2** **DPk2** **DPks2** **DPn2** **DPnw2** **DPs2** **DPsw2** **DPw2**	**DP3** **DPc3** **DPck3** **DPcw3** **DPg3** **DPgk3** **DPgw3** **DPh3** **DPhs3** **DPk3** **DPks3** **DPn3** **DPnw3** **DPs3** **DPsw3** **DPw3**	**DP4** **DPc4** **DPck4** **DPcw4** **DPg4** **DPgk4** **DPgw4** **DPh4** **DPhs4** **DPk4** **DPks4** **DPn4** **DPnw4** **DPs4** **DPsw4** **DPw4**	**DP5** **DPc5** **DPck5** **DPcw5** **DPg5** **DPgk5** **DPgw5** **DPh5** **DPhs5** **DPk5** **DPks5** **DPn5** **DPnw5** **DPs5** **DPsw5** **DPw5**	**DP6** **DPc6** **DPck6** **DPcw6** **DPg6** **DPgk6** **DPgw6** **DPh6** **DPhs6** **DPk6** **DPks6** **DPn6** **DPnw6** **DPs6** **DPsw6** **DPw6**	**DP7** **DPc7** **DPck7** **DPcw7** **DPg7** **DPgk7** **DPgw7** **DPh7** **DPhs7** **DPk7** **DPks7** **DPn7** **DPnw7** **DPs7** **DPsw7** **DPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	birch-leaved spirea pinegrass saskatoon	saskatoon birch-leaved spirea pinegrass	birch-leaved spirea Douglas-fir pinegrass	Douglas-fir pinegrass birch-leaved spirea	pinegrass Douglas-fir birch-leaved spirea	pinegrass Douglas-fir birch-leaved spirea
Associates	kinnikinnick silky lupine small-flowered penstemon Kentucky bluegrass Douglas-fir ponderosa pine	Nootka rose Douglas-fir kinnikinnick tall Oregon-grape common snowberry ponderosa pine Kentucky bluegrass	saskatoon Nootka rose kinnikinnick ponderosa pine tall Oregon-grape common snowberry	Nootka rose ponderosa pine tall Oregon-grape saskatoon common snowberry kinnikinnick	ponderosa pine Nootka rose tall Oregon-grape common snowberry kinnikinnick saskatoon	ponderosa pine tall Oregon-grape common snowberry Nootka rose kinnikinnick saskatoon
Plots	1-8				RC6535	

BEC= **IDFxh1/05**

Map Unit	Description
PF	FdPy-Pinegrass-Idaho fescue; typic ecosystem unit
PFh	FdPy-Pinegrass-Idaho fescue; hummocky ecosystem unit
PFhs	FdPy-Pinegrass-Idaho fescue; hummocky, shallow soil ecosystem unit
PFk	FdPy-Pinegrass-Idaho fescue; cool aspect ecosystem unit
PFks	FdPy-Pinegrass-Idaho fescue; cool aspect, shallow soil ecosystem unit
PFs	FdPy-Pinegrass-Idaho fescue; shallow soil ecosystem unit
PFsw	FdPy-Pinegrass-Idaho fescue; shallow soil, warm aspect ecosystem unit
PFw	FdPy-Pinegrass-Idaho fescue; warm aspect ecosystem unit

FdPy-Pinegrass-Idaho fescue (PF) occurs on deep, medium-textured soil, mesic, level to gently sloping morainal, fluvial and glaciofluvial materials.
PFh occurs on hummocky moraine
PFhs occurs on shallow soil, hummocky moraine
PFk occurs on cool aspect, moderately sloping moraine and colluvium
PFks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PFs occurs on shallow moraine and eolian materials
PFsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
PFw occurs on warm aspects, moderately sloping moraine

Map Symbol	**PF2** **PFh2** **PFhs2** **PFk2** **PFks2** **PFs2** **PFsw2** **PFw2**	**PF3** **PFh3** **PFhs3** **PFk3** **PFks3** **PFs3** **PFsw3** **PFw3**	**PF4** **PFh4** **PFhs4** **PFk4** **PFks4** **PFs4** **PFsw4** **PFw4**	**PF5** **PFh5** **PFhs5** **PFk5** **PFks5** **PFs5** **PFsw5** **PFw5**	**PF6** **PFh6** **PFhs6** **PFk6** **PFks6** **PFs6** **PFsw6** **PFw6**	**PF7** **PFh7** **PFhs7** **PFk7** **PFks7** **PFs7** **PFsw7** **PFw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass Kentucky bluegrass old man's whiskers round-leaved alumroot	pinegrass Kentucky bluegrass Douglas-fir bluebunch wheatgrass	Douglas-fir bluebunch wheatgrass ponderosa pine	Douglas-fir ponderosa pine bluebunch wheatgrass	ponderosa pine bluebunch wheatgrass Douglas-fir	ponderosa pine bluebunch wheatgrass Douglas-fir
Associates	bluebunch wheatgrass yarrow Idaho fescue silky lupine ponderosa pine kinnikinnick Douglas-fir downy brome timber milk-vetch	ponderosa pine old man's whiskers round-leaved alumroot yarrow Idaho fescue silky lupine kinnikinnick timber milk-vetch	pinegrass Idaho fescue Kentucky bluegrass kinnikinnick yarrow timber milk-vetch old man's whiskers silky lupine round-leaved alumroot	pinegrass Idaho fescue kinnikinnick timber milk-vetch old man's whiskers silky lupine Kentucky bluegrass yarrow round-leaved alumroot	pinegrass Idaho fescue kinnikinnick timber milk-vetch old man's whiskers silky lupine round-leaved alumroot yarrow Kentucky bluegrass	pinegrass Idaho fescue kinnikinnick timber milk-vetch old man's whiskers silky lupine round-leaved alumroot yarrow Kentucky bluegrass
Plots	r092,r215,r334				1-13,V00025,V00037, V00049	

BEC= **IDFxh1/06**

Map Unit	Description
DF	FdPy-Spirea-Feathermoss; typic ecosystem unit
DFg	FdPy-Spirea-Feathermoss; gully ecosystem unit
DFgk	FdPy-Spirea-Feathermoss; gully, cool aspect ecosystem unit
DFgw	FdPy-Spirea-Feathermoss; gully, warm aspect ecosystem unit
DFk	FdPy-Spirea-Feathermoss; cool aspect ecosystem unit
DFks	FdPy-Spirea-Feathermoss; cool aspect, shallow soil ecosystem unit
DFs	FdPy-Spirea-Feathermoss; shallow soil ecosystem unit
DFw	FdPy-Spirea-Feathermoss; warm aspect ecosystem unit

FdPy-Spirea-Feathermoss (DF) occurs on deep, medium-textured soil, subhygric, gentle, moist receiving sites on morainal, fluvial and glaciofluvial materials
DFg occurs in gullies, on moraine and glaciofluvial materials
DFgk occurs in gullies, on cool aspects, moderately sloping moraine and colluvium
DFgw occurs in gullies, on warm aspects, moderately sloping, lower moisture receiving sites, on moraine
DFk occurs on cool aspects, moderately sloping moraine and colluvium
DFks occurs on shallow soil, cool aspect, moderately sloping sites, where bedrock impedes soil drainage, on moraine
DFs occurs on shallow soil, where bedrock impedes soil drainage, on moraine
DFw occurs on warm aspects, moderately sloping, lower moisture receiving sites, on moraine and on glaciofluvial materials

Map Symbol	**DF2** **DFg2** **DFgk2** **DFgw2** **DFk2** **DFks2** **DFs2** **DFw2**	**DF3** **DFg3** **DFgk3** **DFgw3** **DFk3** **DFks3** **DFs3** **DFw3**	**DF4** **DFg4** **DFgk4** **DFgw4** **DFk4** **DFks4** **DFs4** **DFw4**	**DF5** **DFg5** **DFgk5** **DFgw5** **DFk5** **DFks5** **DFs5** **DFw5**	**DF6** **DFg6** **DFgk6** **DFgw6** **DFk6** **DFks6** **DFs6** **DFw6**	**DF7** **DFg7** **DFgk7** **DFgw7** **DFk7** **DFks7** **DFs7** **DFw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint fireweed Sitka alder Kentucky bluegrass showy aster	Sitka alder fireweed bluejoint Kentucky bluegrass showy aster	pinegrass heart-leaved arnica star-flowered Solomon's seal Sitka alder	Douglas-fir pinegrass heart-leaved arnica star-flowered Solomon's seal	Douglas-fir pinegrass heart-leaved arnica star-flowered Solomon's seal	pinegrass Douglas-fir heart-leaved arnica star-flowered Solomon's seal
Associates	star-flowered Solomon's seal common snowberry Douglas-fir Douglas maple birch-leaved spirea	star-flowered Solomon's seal Douglas-fir pinegrass Douglas maple heart-leaved arnica common snowberry birch-leaved spirea	Douglas-fir showy aster Douglas maple fireweed birch-leaved spirea stink currant red-osier dogwood Kentucky bluegrass common snowberry	showy aster Douglas maple birch-leaved spirea bluejoint stink currant Sitka alder red-osier dogwood common snowberry	birch-leaved spirea showy aster Douglas maple stink currant red-osier dogwood common snowberry bluejoint	birch-leaved spirea Douglas maple red-osier dogwood showy aster common snowberry stink currant
Plots					V00044, V00058	

BEC= **IDFxh1/07**

Map Unit	Description
DS	FdPy-Snowberry-Spirea; typic ecosystem unit
DSg	FdPy-Snowberry-Spirea; gully ecosystem unit

FdPy-Snowberry-Spirea (DS) occurs on deep, medium-textured soil, subhygric, gentle, moist receiving sites on morainal and fluvial materials
DSg occurs in gullies, on moraine

Map Symbol	**DS2** **DSg2**	**DS3** **DSg3**	**DS4** **DSg4**	**DS5** **DSg5**	**DS6** **DSg6**	**DS7** **DSg7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint fireweed Sitka alder Kentucky bluegrass	common snowberry bluejoint fireweed	common snowberry Douglas-fir Douglas maple	common snowberry Douglas-fir Douglas maple	Douglas-fir common snowberry Douglas maple	Douglas-fir common snowberry Douglas maple hybrid white spruce
Associates	common snowberry Douglas-fir Douglas maple birch-leaved spirea	Sitka alder Douglas-fir Douglas maple Kentucky bluegrass birch-leaved spirea pinegrass	Kentucky bluegrass birch-leaved spirea bluejoint fireweed pinegrass saskatoon hybrid white spruce	pinegrass birch-leaved spirea saskatoon hybrid white spruce Kentucky bluegrass bluejoint tall Oregon grape	hybrid white spruce pinegrass saskatoon birch-leaved spirea Kentucky bluegrass tall Oregon-grape bluejoint	pinegrass saskatoon birch-leaved spirea Kentucky bluegrass tall Oregon-grape bluejoint
Plots						

BEC= **IDFxh1/08**

Map Unit	Description
SD	SxwFd-Douglas maple-Dogwood; typic ecosystem unit
SDa	SxwFd-Douglas maple-Dogwood; active floodplain ecosystem unit
SDg	SxwFd-Douglas maple-Dogwood; gully ecosystem unit
SDgk	SxwFd-Douglas maple-Dogwood; gully, cool aspect ecosystem unit
SDk	SxwFd-Douglas maple-Dogwood; cool aspect ecosystem unit
SDn	SxwFd-Douglas maple-Dogwood; fan ecosystem unit
SDt	SxwFd-Douglas maple-Dogwood; terraced ecosystem unit
SDw	SxwFd-Douglas maple-Dogwood; warm aspect ecosystem unit

SxwFd-Douglas maple-Dogwood (SD) occurs on deep, medium-textured soil, subhygric, gently sloping to level sites on morainal and fluvial and glaciofluvial materials.
SDa occurs on active fluvial floodplains
SDg occurs in gullies, on moraine and glaciofluvial materials
SDgk occurs in gullies, on cool aspects, moderately sloping moraine and colluvium
SDk occurs on cool slopes, moderately sloping moraine
SDn occurs on fluvial fan
SDt occurs on fluvial terraces
SDw occurs on warm aspects, moderate slope, lower slope position, moisture receiving sites, on moraine

Map Symbol	**SD2** **SDa2** **SDg2** **SDgk2** **SDk2** **SDn2** **SDt2** **SDw2**	**SD3** **SDa3** **SDg3** **SDgk3** **SDk3** **SDn3** **SDt3** **SDw3**	**SD4** **SDa4** **SDg4** **SDgk4** **SDk4** **SDn4** **SDt4** **SDw4**	**SD5** **SDa5** **SDg5** **SDgk5** **SDk5** **SDn5** **SDt5** **SDw5**	**SD6** **SDa6** **SDg6** **SDgk6** **SDk6** **SDn6** **SDt6** **SDw6**	**SD7** **SDa7** **SDg7** **SDgk7** **SDk7** **SDn7** **SDt7** **SDw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	Kentucky bluegrass fireweed Sitka alder bluejoint	Kentucky bluegrass Sitka alder fireweed common snowberry bluejoint	bluejoint hybrid white spruce Kentucky bluegrass Sitka alder common snowberry	bluejoint hybrid white spruce common snowberry black gooseberry	common snowberry black gooseberry bluejoint hybrid white spruce	common snowberry black gooseberry bluejoint hybrid white spruce Sitka alder
Associates	common snowberry black gooseberry Douglas maple lady fern clasping twistedstalk hybrid white spruce	black gooseberry hybrid white spruce Douglas maple lady fern clasping twistedstalk Douglas-fir	fireweed black gooseberry Douglas maple lady fern clasping twistedstalk Douglas-fir red-osier dogwood	Sitka alder Kentucky bluegrass Douglas maple fireweed lady fern clasping twistedstalk Douglas-fir red-osier dogwood	Sitka alder Douglas maple lady fern fireweed Douglas-fir Kentucky bluegrass red-osier dogwood clasping twistedstalk	Douglas maple lady fern fireweed red-osier dogwood clasping twistedstalk Douglas-fir Kentucky bluegrass
Plots					1-1	

BEC= **IDFxh1/00**	
Map Unit	Description
AB	Alder-Sedge; typic ecosystem unit
Alder-Sedge (AB) occurs on deep, medium-textured soil, hygric, level moraine and fluvial sites with associated seepage	

Map Symbol	**AB2b**	**AB3a**	**AB3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	soft-leaved sedge bluejoint northern black currant black gooseberry	soft-leaved sedge northern black currant black gooseberry mountain alder	soft-leaved sedge mountain alder northern black currant black gooseberry
Associates	mountain alder little meadow foxtail hybrid white spruce lady fern common horsetail common leafy moss	bluejoint little meadow foxtail hybrid white spruce lady fern common horsetail common leafy moss	little meadow foxtail bluejoint hybrid white spruce lady fern common horsetail common leafy moss
Plots			1-152

BEC= **IDFxh1/09**

Map Unit	Description
WS	Willow-Sedge; typic ecosystem unit
WSp	Willow-Sedge; peaty ecosystem unit

Willow-Sedge (WS) occurs on deep, medium-textured soil, subhydric to hydric, level moraine, fluvial, glaciofluvial and seepage sites

WSp occurs on peaty (organic) soil

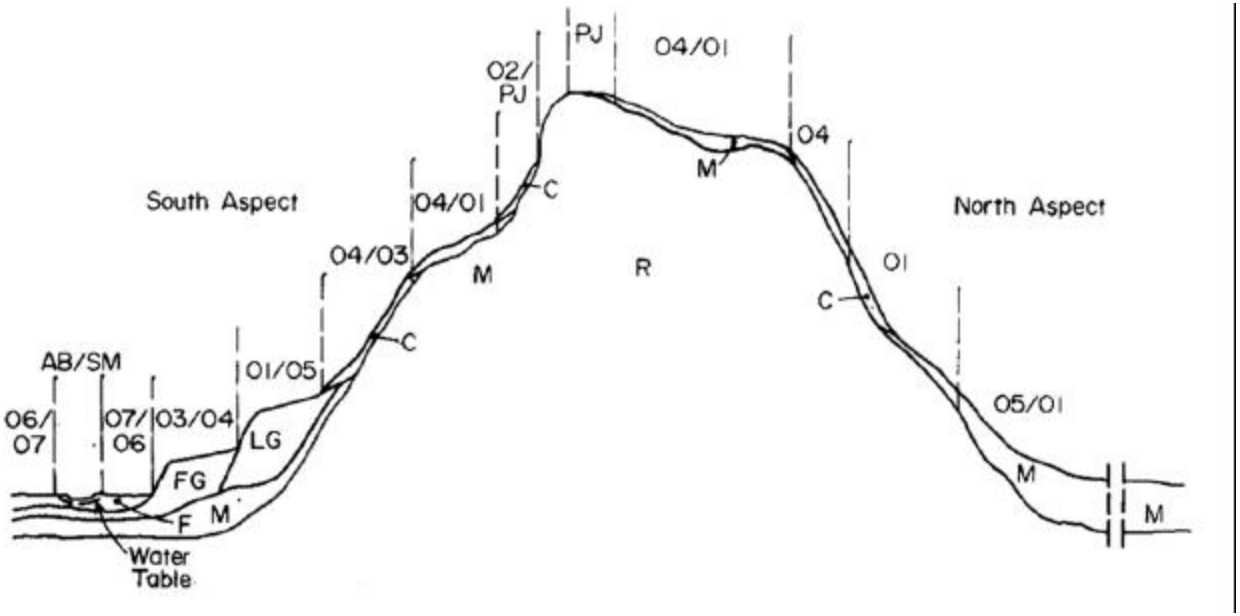
Map Symbol	**WS2b** **WSp2b**	**WS3a** **WSp3a**	**WS3b** **WSp3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	water sedge bluejoint mountain alder *Salix* spp.	water sedge mountain alder *Salix* spp. bluejoint	water sedge *Salix* spp. mountain alder bluejoint
Associates	beaked sedge large-leaved avens marsh scullcap lady fern common leafy moss	beaked sedge large-leaved avens marsh scullcap lady fern common leafy moss	beaked sedge large-leaved avens marsh scullcap lady fern common leafy moss
Plots	9650000		

BEC= **IDFxh1/00**	
Map Unit	Description
CT	Cattail Marsh; typic ecosystem unit
Cattail Marsh (CT) occurs on deep, medium-textured soil, hydric to subhydric, level moraine and fluvial sites	

Map Symbol	**CT2b**
Plant Species	Graminoid-dominated (2b)
Dominants	common cattail *Carex* spp. small-flowered forget-me-not
Associates	small-flowered bulrush kneeling angelica common horsetail common spike-rush
Plots	1-3

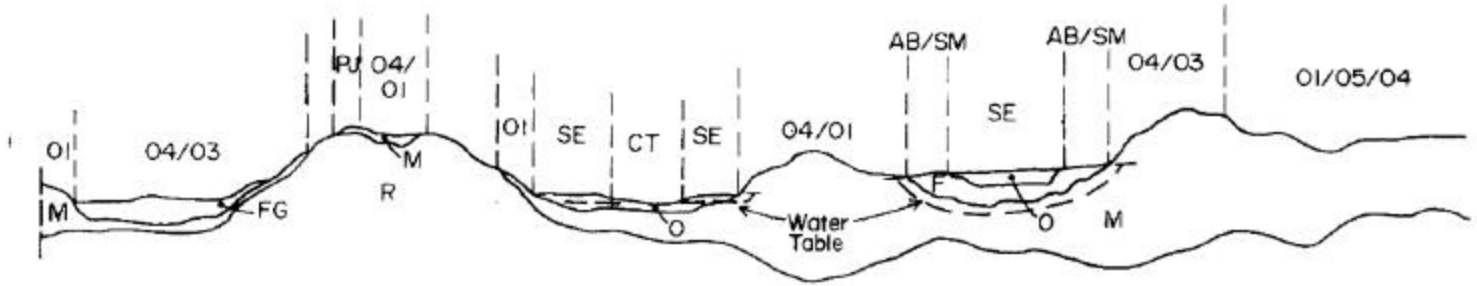
Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within IDFxh1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
BA	Barren	Land devoid of vegetation due to extreme climatic or edaphic conditions		1
BF	Blockfields, Blockslopes, Blockstreams	Level or gently sloping areas that are covered with moderately sized or large, angular blocks of rock derived from the underlying bedrock or drift by weathering and/or frost heave, and that have not undergone any significant downslope movement	w	1
CL	Cliff	A steep, vertical or overhanging rock face	q,z	1
ES	Exposed Soil	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mudslides, debris torrents, avalanches, and human-made disturbances where vegetation cover is less than 5%	w	1
GB	Gravel Bar	An elongated landform generated by waves and currents and usually running parallel to the shore. It is composed of unconsolidated small rounded cobbles, pebbles, stones and sand	not applicable	1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
RE	Reservoir	An artificial basin created by the impoundment of water behind a human-made structure such as a dam, berm, dyke or wall	not applicable	not applicable
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable
RR	Rural	Any area in which residences and other human developments are scattered and intermingled with forest, range, farm land, and native vegetation or cultivated areas	not applicable	not applicable
RU	Rubble	Rubble is common on the ground surface in and adjacent to alpine areas, on ridgetops, gentle slopes and flat areas due to the effects of frost heaving	w	1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	k,n,q,w,z	1
UR	Urban/Suburban	An are in which residences and other human developments form an almost continuous covering of the landscape.	not applicable	not applicable

Appendix 3
Expanded Legend for Ecosystems found in the IDFdm1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
LG	Glaciolacustrine
M	Moranial
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR IDFdm1					
00	PJ	Penstemon-Juniper	06	SD	SxwFd-Dogwood-Gooseberry
02	WJ	Bluebunch wheatgrass-Junegrass	07	SH	Sxw-Horsetail
03	DW	FdPy-Bluebunch wheatgrass-Pinegrass	00	AB	Alder/Willow-Sedge-Bluejoint
04	DP	Fd-Pinegrass-Kinnikinnick	00	SM	Sedge wet meadow
01	DT	FdPl-Pinegrass-Twinflower	00	SE	Sedge fen
05	SP	FdLw-Spruce-Pinegrass	00	CT	Cattail Marsh


01
04/03
M
FG
PJ
04/
01
M
R
01
SE
CT
SE
O
04/01
Water
Table
AB/SM
AB/SM
04/03
SE
01/05/04
O
M

BEC= **IDFdm1/00**

Map Unit	Description
PJ	Penstemon-Juniper; typic ecosystem unit
PJh	Penstemon-Juniper; hummocky ecosystem unit
PJk	Penstemon-Juniper; cool aspect ecosystem unit
PJkv	Penstemon-Juniper; cool aspect, very shallow soil ecosystem unit
PJr	Penstemon-Juniper; ridged ecosystem unit
PJv	Penstemon-Juniper; very shallow soil ecosystem unit
PJvw	Penstemon-Juniper; very shallow soil, warm aspects ecosystem unit
PJw	Penstemon-Juniper; warm aspect ecosystem unit

Penstemon-Juniper (PJ) occurs on shallow, medium-textured soil, very xeric to xeric, gentle upper slopes on moraine and colluvium
PJh occurs on hummocky moraine and colluvium
PJk occurs on cool aspects, moderately sloping moraine and colluvium
PJkv occurs on very shallow soil, cool aspects, moderately sloping colluvium and moraine
PJr occurs on ridged moraine
PJv occurs on very shallow soil, on moraine
PJvw occurs on very shallow soil, warm aspects, moderately sloping colluvium and moraine
PJw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**PJ2a** **PJh2a** **PJk2a** **PJkv2a** **PJr2a** **PJv2a** **PJvw2a** **PJw2a**	**PJ3a** **PJh3a** **PJk3a** **PJkv3a** **PJr3a** **PJv3a** **PJvw3a** **PJw3a**
Plant Species	Forb-dominated (2a)	Low shrub (3a)
Dominants	awned haircap moss common juniper junegrass kinnikinnick bluebunch wheatgrass	shrubby penstemon awned haircap moss common juniper bluebunch wheatgrass
Associates	compact selaginella shrubby penstemon juniper haircap moss Douglas-fir squaw currant yarrow ponderosa pine	kinnikinnick junegrass compact selaginella juniper haircap moss Douglas-fir squaw currant yarrow ponderosa pine
Plots	1-155	

BEC= **IDFdm1/02**

Map Unit	Description
WJ	Bluebunch wheatgrass-Junegrass; typic ecosystem unit
WJg	Bluebunch wheatgrass-Junegrass; gully ecosystem unit
WJhs	Bluebunch wheatgrass-Junegrass; hummocky, shallow soils ecosystem unit
WJjs	Bluebunch wheatgrass-Junegrass; gentle slope, shallow soil ecosystem unit
WJks	Bluebunch wheatgrass-Junegrass; cool aspect, shallow soil ecosystem unit
WJrs	Bluebunch wheatgrass-Junegrass; ridged, shallow soil ecosystem unit
WJs	Bluebunch wheatgrass-Junegrass; shallow soil ecosystem unit

Bluebunch wheatgrass-Junegrass (WJ) occurs on deep, medium-textured soil, xeric to subxeric, significantly sloping moraine and colluvium on warm aspects, and on glaciofluvial materials
WJg occurs in gullies, on moderately steep moraine
WJhs occurs on shallow soil, hummocky moraine
WJjs occurs on shallow soil, gentle sloping moraine
WJks occurs on shallow soil, cool aspect, moderately sloping moraine and colluvium
WJrs occurs on shallow soil, ridged moraine
WJs occurs on shallow moraine and colluvium

Map Symbol	**WJ2b** **WJg2b** **WJhs2b** **WJjs2b** **WJks2b** **WJrs2b** **WJs2b**
Plant Species	Graminoid-dominated (2b)[1]
Dominants	bluebunch wheatgrass birch-leaved spirea saskatoon yarrow
Associates	junegrass kinnikinnick ponderosa pine Douglas-fir
Plots	1-5

[1]Two units were mapped as WJ3b because they are dominated by tall shrub. Despite of higher shrub cover these units have all of the characteristics indicating WJ site series.

BEC= **IDFdm1/03**

Map Unit	Description
DW	FdPy-Bluebunch wheatgrass-Pinegrass; typic ecosystem unit
DWc	FdPy-Bluebunch wheatgrass-Pinegrass; coarse-textured soil ecosystem unit
DWcg	FdPy-Bluebunch wheatgrass-Pinegrass; coarse-textured soil, gully ecosystem unit
DWhs	FdPy-Bluebunch wheatgrass-Pinegrass; hummocky, shallow soil ecosystem unit
DWj	FdPy-Bluebunch wheatgrass-Pinegrass; gentle slope ecosystem unit
DWjs	FdPy-Bluebunch wheatgrass-Pinegrass; gentle slope, shallow soil ecosystem unit
DWks	FdPy-Bluebunch wheatgrass-Pinegrass; cool aspect, shallow soils ecosystem unit
DWn	FdPy-Bluebunch wheatgrass-Pinegrass; fan ecosystem unit
DWrs	FdPy-Bluebunch wheatgrass-Pinegrass; ridged, shallow soil ecosystem unit
DWs	FdPy-Bluebunch wheatgrass-Pinegrass; shallow soil ecosystem unit

FdPy-Bluebunch wheatgrass-Pinegrass (DW) occurs on deep, medium-textured soil, xeric to subxeric, significantly sloping moraine, colluvium and glaciofluvial materials on warm aspects
DWc occurs on coarse-textured moraine and glaciofluvial materials
DWcg occurs in gullies, on coarse-textured moraine
DWhs occurs on shallow soil, hummocky moraine
DWj occurs on gently sloping moraine
DWjs occurs on shallow soil, gently sloping moraine
DWks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
DWn occurs on colluvial fans
DWrs occurs on shallow soil, ridged moraine
DWs occurs on shallow moraine, colluvium, and glaciofluvial materials

Map Symbol	**DW2** **DWc2** **DWcg2** **DWhs2** **DWj2** **DWjs2** **DWks2** **DWn2** **DWrs2** **DWs2**	**DW3** **DWc3** **DWcg3** **DWhs3** **DWj3** **DWjs3** **DWks3** **DWn3** **DWrs3** **DWs3**	**DW4** **DWc4** **DWcg4** **DWhs4** **DWj4** **DWjs4** **DWks4** **DWn4** **DWrs4** **DWs4**	**DW5** **DWc5** **DWcg5** **DWhs5** **DWj5** **DWjs5** **DWks5** **DWn5** **DWrs5** **DWs5**	**DW6** **DWc6** **DWcg6** **DWhs6** **DWj6** **DWjs6** **DWks6** **DWn6** **DWrs6** **DWs6**	**DW7** **DWc7** **DWcg7** **DWhs7** **DWj7** **DWjs7** **DWks7** **DWn7** **DWrs7** **DWs7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluebunch wheatgrass kinnikinnick small-flowered blue-eye Mary	bluebunch wheatgrass kinnikinnick Douglas-fir	Douglas-fir bluebunch wheatgrass kinnikinnick	Douglas-fir bluebunch wheatgrass kinnikinnick	Douglas-fir bluebunch wheatgrass kinnikinnick	bluebunch wheatgrass Douglas-fir ponderosa pine
Associates	juniper haircap moss Douglas-fir yarrow fire moss pinegrass	juniper haircap moss small-flowered blue-eye Mary yarrow fire moss pinegrass	yarrow fire moss pinegrass juniper haircap moss small-flowered blue-eye Mary ponderosa pine	yarrow fire moss ponderosa pine pinegrass juniper haircap moss junegrass silky lupine	ponderosa pine junegrass yarrow fire moss silky lupine pinegrass	kinnikinnick junegrass yarrow fire moss silky lupine pinegrass
Plots	1-65, 9650009					1-57

BEC= **IDFdm1/04**

Map Unit	Description
DP	Fd-Pinegrass-Kinnikinnick; typic ecosystem unit
DPc	Fd-Pinegrass-Kinnikinnick; coarse-textured soil ecosystem unit
DPch	Fd-Pinegrass-Kinnikinnick; coarse-textured soil, hummocky ecosystem unit
DPck	Fd-Pinegrass-Kinnikinnick; coarse-textured soil, cool aspect ecosystem unit
DPct	Fd-Pinegrass-Kinnikinnick; coarse-textured soil, terraced ecosystem unit
DPcw	Fd-Pinegrass-Kinnikinnick; coarse-textured soil, warm aspect ecosystem unit
DPh	Fd-Pinegrass-Kinnikinnick; hummocky ecosystem unit
DPhs	Fd-Pinegrass-Kinnikinnick; hummocky, shallow soil ecosystem unit
DPhv	Fd-Pinegrass-Kinnikinnick; hummocky, very shallow soil ecosystem unit
DPk	Fd-Pinegrass-Kinnikinnick; cool aspect ecosystem unit
DPks	Fd-Pinegrass-Kinnikinnick; cool aspect, shallow soil ecosystem unit
DPkv	Fd-Pinegrass-Kinnikinnick; cool aspect, very shallow soil ecosystem unit
DPnw	Fd-Pinegrass-Kinnikinnick; cone, warm aspect ecosystem unit
DPqs	Fd-Pinegrass-Kinnikinnick; very steep cool aspect, shallow soil ecosystem unit
DPrs	Fd-Pinegrass-Kinnikinnick; ridged, shallow soil ecosystem unit
DPs	Fd-Pinegrass-Kinnikinnick; shallow soil ecosystem unit
DPsw	Fd-Pinegrass-Kinnikinnick; shallow soil, warm aspect ecosystem unit
DPt	Fd-Pinegrass-Kinnikinnick; terraced ecosystem unit
DPv	Fd-Pinegrass-Kinnikinnick; very shallow soil ecosystem unit
DPw	Fd-Pinegrass-Kinnikinnick; warm aspect ecosystem unit

Fd-Pinegrass-Kinnikinnick (DP) occurs on deep, medium-textured soil, subxeric to submesic, level to gently sloping moraine, colluvium, fluvial and on glaciofluvial materials
DPc occurs on coarse-textured moraine and glaciofluvial materials
DPch occurs on coarse-textured soil, hummocky moraine and glaciofluvial materials
DPck occurs on coarse-textured soil, cool aspects, moderately sloping moraine and glaciofluvial materials
DPct occurs on coarse-textured soil, glaciofluvial terraces
DPcw occurs coarse-textured soil, warm aspects, moderately sloping moraine, colluvium and glaciofluvial materials
DPh occurs on hummocky moraine, fluvial and glaciofluvial materials
DPhs occurs on shallow soil, hummocky moraine, colluvium and glaciofluvial materials
DPhv occurs on very shallow soil, hummocky moraine
DPk occurs on cool aspects, moderately sloping moraine, colluvium and glaciofluvial materials
DPks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
DPkv occurs on very shallow soil, cool aspects, moderately sloping moraine
DPnw occurs on warm aspects, moderately sloping colluvial cones
DPqs occurs on shallow soil, cool aspects, very steeply sloping colluvium
DPrs occurs on shallow soil, ridged moraine
DPs occurs on shallow moraine, colluvium, and glaciofluvial materials
DPsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
DPt occurs on glaciofluvial terraces
DPv occurs on very shallow moraine
DPw occurs on warm aspects, moderately sloping moraine, colluvium, and glaciofluvial materials

Map Symbol	**DP2** **DPc2** **DPch2** **DPck2** **DPct2** **DPcw2** **DPh2** **DPhs2** **DPhv2** **DPk2** **DPks2** **DPkv2** **DPnw2** **DPqs2** **DPrs2** **DPs2** **DPsw2** **DPt2** **DPv2** **DPw2**	**DP3** **DPc3** **DPch3** **DPck3** **DPct3** **DPcw3** **DPh3** **DPhs3** **DPhv3** **DPk3** **DPks3** **DPkv3** **DPnw3** **DPqs3** **DPrs3** **DPs3** **DPsw3** **DPt3** **DPv3** **DPw3**	**DP4** **DPc4** **DPch4** **DPck4** **DPct4** **DPcw4** **DPh4** **DPhs4** **DPhv4** **DPk4** **DPks4** **DPkv4** **DPnw4** **DPqs4** **DPrs4** **DPs4** **DPsw4** **DPt4** **DPv4** **DPw4**	**DP5** **DPc5** **DPch5** **DPck5** **DPct5** **DPcw5** **DPh5** **DPhs5** **DPhv5** **DPk5** **DPks5** **DPkv5** **DPnw5** **DPqs5** **DPrs5** **DPs5** **DPsw5** **DPt5** **DPv5** **DPw5**	**DP6** **DPc6** **DPch6** **DPck6** **DPct6** **DPcw6** **DPh6** **DPhs6** **DPhv6** **DPk6** **DPks6** **DPkv6** **DPnw6** **DPqs6** **DPrs6** **DPs6** **DPsw6** **DPt6** **DPv6** **DPw6**	**DP7** **DPc7** **DPch7** **DPck7** **DPct7** **DPcw7** **DPh7** **DPhs7** **DPhv7** **DPk7** **DPks7** **DPkv7** **DPnw7** **DPqs7** **DPrs7** **DPs7** **DPsw7** **DPt7** **DPv7** **DPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	kinnikinnick pinegrass wild strawberry	pinegrass lodgepole pine kinnikinnick	lodgepole pine pinegrass	Douglas-fir pinegrass	Douglas-fir pinegrass	pinegrass Douglas-fir ponderosa pine
Associates	heart-leaved arnica lodgepole pine birch-leaved spirea Douglas-fir western larch cheatgrass	wild strawberry birch-leaved spirea Douglas-fir western larch heart-leaved arnica cheatgrass	Douglas-fir kinnikinnick birch-leaved spirea western larch wild strawberry soopolallie	birch-leaved spirea lodgepole pine kinnikinnick western larch soopolallie	birch-leaved spirea lodgepole pine ponderosa pine kinnikinnick western larch soopolallie	birch-leaved spirea kinnikinnick western larch soopolallie
Plots	1-53,1-56,1-61,1-62, 1-69, 9650003	1-25,r520		1-52,r519		1-4

BEC= **IDFdm1/01**

Map Unit	Description
DT	FdPl-Pinegrass-Twinflower; typic ecosystem unit
DTc	FdPl-Pinegrass-Twinflower; coarse-textured soil ecosystem unit
DTck	FdPl-Pinegrass-Twinflower; coarse-textured soil, cool aspect ecosystem unit
DTcw	FdPl-Pinegrass-Twinflower; coarse-textured soil, warm aspect ecosystem unit
DTg	FdPl-Pinegrass-Twinflower; gully ecosystem unit
DTgk	FdPl-Pinegrass-Twinflower; gully, cool aspect ecosystem unit
DTgw	FdPl-Pinegrass-Twinflower; gully, warm aspect ecosystem unit
DTh	FdPl-Pinegrass-Twinflower; hummocky ecosystem unit
DThs	FdPl-Pinegrass-Twinflower; hummocky, shallow soils ecosystem unit
DTk	FdPl-Pinegrass-Twinflower; cool aspect ecosystem unit
DTks	FdPl-Pinegrass-Twinflower; cool aspect, shallow soil ecosystem unit
DTnw	FdPl-Pinegrass-Twinflower; cone, warm aspect ecosystem unit
DTs	FdPl-Pinegrass-Twinflower; shallow soil ecosystem unit
DTsw	FdPl-Pinegrass-Twinflower; shallow soil, warm aspect ecosystem unit
DTt	FdPl-Pinegrass-Twinflower; terraced ecosystem unit
DTw	FdPl-Pinegrass-Twinflower; warm aspect ecosystem unit

FdPl-Pinegrass-Twinflower (DT) occurs on deep medium-textured soil, level to gently sloping, submesic to mesic, generally on moraine, fluvial, glaciofluvial and glaciolacustrine materials
DTc occurs on coarse-textured moraine and glaciofluvial materials
DTck occurs on coarse-textured soil, cool aspects, moderately sloping moraine and glaciofluvial materials
DTcw occurs on coarse-textured soil, warm aspect, moderately sloping moraine and glaciofluvial materials
DTg occurs in gullies, on moraine and glaciofluvial materials
DTgk occurs in gullies, on cool aspects, moderately sloping moraine
DTgw occurs in gullies, on warm aspects, moderately sloping moraine and glaciofluvial materials
DTh occurs on hummocky moraine and glaciofluvial materials
DThs occurs on shallow soil, hummocky moraine
DTk occurs on cool aspects, moderately sloping moraine, colluvium, fluvial and glaciofluvial materials
DTks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
DTnw occurs on warm aspects, moderately sloping colluvial cone
DTs occurs on shallow moraine
DTsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
DTt occurs on glaciofluvial terraces
DTw occurs on warm aspects, moderately sloping moraine, colluvium and glaciofluvial materials

Map Symbol	**DT2** **DTc2** **DTck2** **DTcw2** **DTg2** **DTgk2** **DTgw2** **DTh2** **DThs2** **DTk2** **DTks2** **DTnw2** **DTs2** **DTsw2** **DTt2** **DTw2**	**DT3** **DTc3** **DTck3** **DTcw3** **DTg3** **DTgk3** **DTgw3** **DTh3** **DThs3** **DTk3** **DTks3** **DTnw3** **DTs3** **DTsw3** **DTt3** **DTw3**	**DT4** **DTc4** **DTck4** **DTcw4** **DTg4** **DTgk4** **DTgw4** **DTh4** **DThs4** **DTk4** **DTks4** **DTnw4** **DTs4** **DTsw4** **DTt4** **DTw4**	**DT5** **DTc5** **DTck5** **DTcw5** **DTg5** **DTgk5** **DTgw5** **DTh5** **DThs5** **DTk5** **DTks5** **DTnw5** **DTs5** **DTsw5** **DTt5** **DTw5**	**DT6** **DTc6** **DTck6** **DTcw6** **DTg6** **DTgk6** **DTgw6** **DTh6** **DThs6** **DTk6** **DTks6** **DTnw6** **DTs6** **DTsw6** **DTt6** **DTw6**	**DT7** **DTc7** **DTck7** **DTcw7** **DTg7** **DTgk7** **DTgw7** **DTh7** **DThs7** **DTk7** **DTks7** **DTnw7** **DTs7** **DTsw7** **DTt7** **DTw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	heart-leaved arnica wild strawberry kinnikinnick	twinflower pinegrass Sitka alder	twinflower pinegrass lodgepole pine	pinegrass Douglas-fir lodgepole pine twinflower	pinegrass Douglas-fir twinflower	pinegrass Douglas-fir twinflower
Associates	racemose pussytoes pinegrass twinflower Sitka alder lodgepole pine Douglas-fir	wild strawberry lodgepole pine kinnikinnick heart-leaved arnica saskatoon Douglas-fir	kinnikinnick saskatoon Douglas-fir Sitka alder heart-leaved arnica wild strawberry one-sided wintergreen	western larch kinnikinnick heart-leaved arnica saskatoon one-sided wintergreen fairyslipper Sitka alder	kinnikinnick western larch heart-leaved arnica saskatoon lodgepole pine one-sided wintergreen fairyslipper	kinnikinnick western larch heart-leaved arnica saskatoon one-sided wintergreen fairyslipper
Plots	1-10	1-51,1-75		1-11,1-153,1-72, 1-55	1-151,9650001	

BEC= **IDFdm1/05**

Map Unit	Description
SP	FdLw-Spruce-Pinegrass; typic ecosystem unit
SPc	FdLw-Spruce-Pinegrass; coarse-textured soil ecosystem unit
SPct	FdLw-Spruce-Pinegrass; coarse-textured soil, terraced ecosystem unit
SPg	FdLw-Spruce-Pinegrass; gully ecosystem unit
SPgk	FdLw-Spruce-Pinegrass; gully, cool aspect ecosystem unit
SPgw	FdLw-Spruce-Pinegrass; gully, warm aspect ecosystem unit
SPh	FdLw-Spruce-Pinegrass; hummocky ecosystem unit
SPk	FdLw-Spruce-Pinegrass; cool aspect ecosystem unit
SPn	FdLw-Spruce-Pinegrass; fan ecosystem unit
SPs	FdLw-Spruce-Pinegrass; shallow soil ecosystem unit
SPt	FdLw-Spruce-Pinegrass; terraced ecosystem unit
SPw	FdLw-Spruce-Pinegrass; warm aspect ecosystem unit

FdLw-Spruce-Pinegrass (SP) occurs on deep, medium-textured soil, mesic to subhygric, level to gently sloping moraine, fluvial, glaciofluvial and glaciolacustrine materials.
SPc occurs on coarse textured moraine and glaciofluvial plains
SPct occurs on coarse textured soil, fluvial terrace
SPg occurs in gullies, on moraine
SPgk occurs in gullies, on cool aspects, moderately sloping moraine, and on glaciofluvial materials
SPgw occurs in gullies, on warm aspects, moderately sloping moraine and glaciofluvial materials
SPh occurs on hummocky moraine, and glaciofluvial materials
SPk occurs on cool aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
SPn occurs on fluvial fan
SPs occurs on shallow soil, where bedrock impedes soil drainage, on moraine
SPt occurs on fluvial and glaciofluvial terraces
SPw occurs on warm aspects, moderate slope, lower moisture receiving sites, on moraine and glaciofluvial materials

Map Symbol	**SP2** **SPc2** **SPct2** **SPg2** **SPgk2** **SPgw2** **SPh2** **SPk2** **SPn2** **SPs2** **SPt2** **SPw2**	**SP3** **SPc3** **SPct3** **SPg3** **SPgk3** **SPgw3** **SPh3** **SPk3** **SPn3** **SPs3** **SPt3** **SPw3**	**SP4** **SPc4** **SPct4** **SPg4** **SPgk4** **SPgw4** **SPh4** **SPk4** **SPn4** **SPs4** **SPt4** **SPw4**	**SP5** **SPc5** **SPct5** **SPg5** **SPgk5** **SPgw5** **SPh5** **SPk5** **SPn5** **SPs5** **SPt5** **SPw5**	**SP6** **SPc6** **SPct6** **SPg6** **SPgk6** **SPgw6** **SPh6** **SPk6** **SPn6** **SPs6** **SPt6** **SPw6**	**SP7** **SPc7** **SPct7** **SPg7** **SPgk7** **SPgw7** **SPh7** **SPk7** **SPn7** **SPs7** **SPt7** **SPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint pinegrass	Sitka alder lodgepole pine pinegrass	lodgepole pine Sitka alder red-stemmed feathermoss	lodgepole pine red-stemmed feathermoss Sitka alder	red-stemmed feathermoss hybrid white spruce western larch	red-stemmed feathermoss hybrid white spruce Douglas-fir western larch
Associates	Sitka alder Kentucky bluegrass lodgepole pine heart-leaved arnica bunchberry hybrid white spruce streambank butterweed	heart-leaved arnica bunchberry red-stemmed feathermoss black twinberry bluejoint western larch Kentucky bluegrass hybrid white spruce	pinegrass heart-leaved arnica bunchberry black twinberry western larch hybrid white spruce Douglas-fir bluejoint	western larch heart-leaved arnica pinegrass Douglas-fir bunchberry hybrid white spruce black twinberry	lodgepole pine Douglas-fir bunchberry Sitka alder pinegrass black twinberry heart-leaved arnica	bunchberry pinegrass Sitka alder black twinberry heart-leaved arnica
Plots				1-54	1-64	

BEC= **IDFdm1/06**

Map Unit	Description
SD	SxwFd-Dogwood-Gooseberry; typic ecosystem unit
SDa	SxwFd-Dogwood-Gooseberry; active floodplain
SDc	SxwFd-Dogwood-Gooseberry; coarse-textured soil ecosystem unit
SDch	SxwFd-Dogwood-Gooseberry; coarse-textured soil, hummocky ecosystem unit
SDg	SxwFd-Dogwood-Gooseberry; gully ecosystem unit
SDgk	SxwFd-Dogwood-Gooseberry; gully, cool aspect ecosystem unit
SDgw	SxwFd-Dogwood-Gooseberry; gully, warm aspect ecosystem unit
SDk	SxwFd-Dogwood-Gooseberry; cool aspect ecosystem unit
SDn	SxwFd-Dogwood-Gooseberry; fan ecosystem unit
SDt	SxwFd-Dogwood-Gooseberry; terraced ecosystem unit

SxwFd-Dogwood-Gooseberry (SD) occurs on deep, medium-textured, subhygric, gentle lower slope receiving sites on moraine, fluvial and glaciofluvial materials.
SDa occurs on active fluvial materials
SDc occurs on coarse textured moraine and fluvioglacial materials
SDch occurs on coarse-textured soil, hummocky moraine and glaciofluvial materials
SDg occurs in gullies, on moraine, colluvium, fluvial plains and glaciofluvial materials
SDgk occurs in gullies, on cool aspects, moderately sloping moraine, colluvium and glaciofluvial materials
SDgw occurs in gullies, on warm aspects, moderately sloping, lower moisture receiving sites, on moraine
SDk occurs on cool aspects, moderately sloping moraine
SDn occurs on fluvial fan
SDt occurs on fluvial terraces

Map Symbol	**SD2** **SDa2** **SDc2** **SDch2** **SDg2** **SDgk2** **SDgw2** **SDk2** **SDn2** **SDt2**	**SD3** **SDa3** **SDc3** **SDch3** **SDg3** **SDgk3** **SDgw3** **SDk3** **SDn3** **SDt3**	**SD4** **SDa4** **SDc4** **SDch4** **SDg4** **SDgk4** **SDgw4** **SDk4** **SDn4** **SDt4**	**SD5** **SDa5** **SDc5** **SDch5** **SDg5** **SDgk5** **SDgw5** **SDk5** **SDn5** **SDt5**	**SD6** **SDa6** **SDc6** **SDch6** **SDg6** **SDgk6** **SDgw6** **SDk6** **SDn6** **SDt6**	**SD7** **SDa7** **SDc7** **SDch7** **SDg7** **SDgk7** **SDgw7** **SDk7** **SDn7** **SDt7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint Kentucky bluegrass	bluejoint Sitka alder	bluejoint hybrid white spruce lodgepole pine	bluejoint hybrid white spruce lodgepole pine	black gooseberry bluejoint hybrid white spruce	black gooseberry bluejoint hybrid white spruce
Associates	Sitka alder red-osier dogwood streambank butterweed lodgepole pine pinegrass hybrid white spruce western meadowrue	hybrid white spruce red-osier dogwood lodgepole pine sweet-scented bedstraw Kentucky bluegrass pinegrass western meadowrue	Sitka alder red-osier dogwood sweet-scented bedstraw western meadowrue pinegrass black gooseberry bunchberry Kentucky bluegrass	black gooseberry red-osier dogwood bunchberry Sitka alder sweet-scented bedstraw western meadowrue heart-leaved arnica	red-osier dogwood bunchberry sweet-scented bedstraw lodgepole pine heart-leaved arnica Sitka alder western meadowrue	red-osier dogwood bunchberry sweet-scented bedstraw heart-leaved arnica Sitka alder western meadowrue
Plots	r373	1-26,r330			1-60	

BEC= **IDFdm1/07**

Map Unit	Description
SH	Sxw-Horsetail; typic ecosystem unit
SHg	Sxw-Horsetail; gully ecosystem unit
SHp	Sxw-Horsetail; peaty ecosystem unit

Sxw-Horsetail (SH) occurs on subhygric to hygric, level to gentle lower moisture receiving morainal and fluvial materials
SHg occurs in gullies, on moraine and fluvial materials
SHp occurs on peaty (organic) soils

Map Symbol	**SH2** **SHg2** **SHp2**	**SH3** **SHg3** **SHp3**	**SH4** **SHg4** **SHp4**	**SH5** **SHg5** **SHp5**	**SH6** **SHg6** **SHp6**	**SH7** **SHg7** **SHp7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint common horsetail	mountain alder common horsetail	hybrid white spruce mountain alder common horsetail	mountain alder hybrid white spruce common horsetail	mountain alder common horsetail hybrid white spruce	mountain alder common horsetail hybrid white spruce
Associates	mountain alder Kentucky bluegrass hybrid white spruce trapper's tea dwarf scouring-rush *Carex* spp.	trapper's tea hybrid white spruce dwarf scouring-rush bluejoint star-flowered Solomon's seal *Carex* spp. Kentucky bluegrass	trapper's tea dwarf scouring-rush black gooseberry bunchberry trailing raspberry star-flowered Solomon's seal *Carex* spp.	trapper's tea bunchberry black gooseberry dwarf scouring-rush trailing raspberry star-flowered Solomon's seal *Carex* spp.	trapper's tea bunchberry black gooseberry dwarf scouring-rush trailing raspberry star-flowered Solomon's seal *Carex* spp.	trapper's tea bunchberry black gooseberry dwarf scouring-rush trailing raspberry star-flowered Solomon's seal *Carex* spp.
Plots		r046		1-24		

BEC= **IDFdm1/00**

Map Unit	Description
AB	Alder/Willow-Sedge-Bluejoint; typic ecosystem unit
ABk	Alder/Willow-Sedge-Bluejoint; cool aspect ecosystem unit

Alder/Willow-Sedge-Bluejoint (AB) occurs on deep, medium-textured soil, hygric, colluvium and level fluvial sites with associated seepage
ABk occurs on cool aspects, moderately sloping moraine

Map Symbol	**AB2b** **ABk2b**	**AB3a** **ABk3a**	**AB3b** **ABk3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	Beaked sedge water sedge grey sedge bluejoint	Beaked sedge mountain alder *Salix* spp. water sedge	Beaked sedge mountain alder *Salix* spp. water sedge
Associates	mountain alder *Salix* spp. arrow-leaved coltsfoot hybrid white spruce	grey sedge bluejoint arrow-leaved coltsfoot hybrid white spruce	grey sedge bluejoint arrow-leaved coltsfoot hybrid white spruce
Plots			9650029,1-50

BEC= **IDFdm1/00**

Map Unit	Description
SM	Sedge wet meadow; typic ecosystem unit
SMg	Sedge wet meadow; gully ecosystem unit
SMw	Sedge wet meadow; warm aspect ecosystem unit

Sedge wet meadow (SM) occurs on deep, medium-textured soil, subhydric to hygric, level moraine, fluvial and glaciofluvial sites with associated seepage
SMg occurs in gullies, on moraine
SMw occurs on warm aspects, moderate slope, lower moisture receiving sites, on moraine

Map Symbol	**SM2b** **SMg2b** **SMw2b**
Plant Species	Graminoid-dominated (2b)[1]
Dominants	water sedge Calliergon cordifolium woolly sedge
Associates	Bryum pseudotriquetrum Canada bluegrass alpine speedwell large-leaved avens
Plots	1-22, 9650022

[1] In two occasions SM map units contained more than 10% cover of tree cover. These map units were labeled as structural stage 6.

BEC= **IDFdm1/00**	
Map Unit	Description
SE[1]	Sedge fen; typic ecosystem unit
Sedge fen (SE) occurs on deep soil, hydric to subhydric, level organic sites	

Map Symbol	**SE2b**
Plant Species	Graminoid-dominated (2b)
Dominants	water sedge beaked sedge *Carex* spp.
Associates	glow moss Sitka alder kidney-leaved violet bluejoint large-leaved avens
Plots	1-16,1-59,9650021

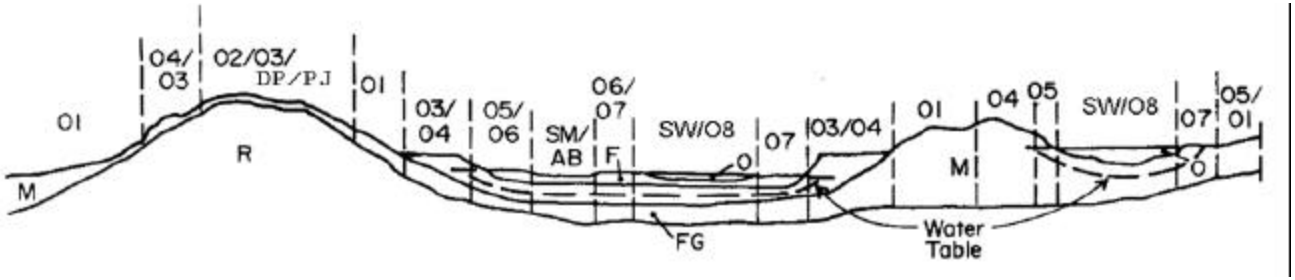
[1]One units was mapped as SE 3a because of the presence of more than 20% low shrub cover .
Despite of higher shrub cover, this unit had all of the characteristics indicating SE site series.

BEC= **IDFdm1/00**	
Map Unit	Description
CT	Cattail Marsh; typic ecosystem unit
Cattail Marsh (CT) occurs on hydric, level sites, thin organics	

Map Symbol	**CT2b**
Plant Species	Graminoid-dominated (2b)
Dominants	common cattail *Carex* spp. arrow-leaved coltsfoot
Associates	bluejoint Sitka alder common horsetail
Plots	1-154

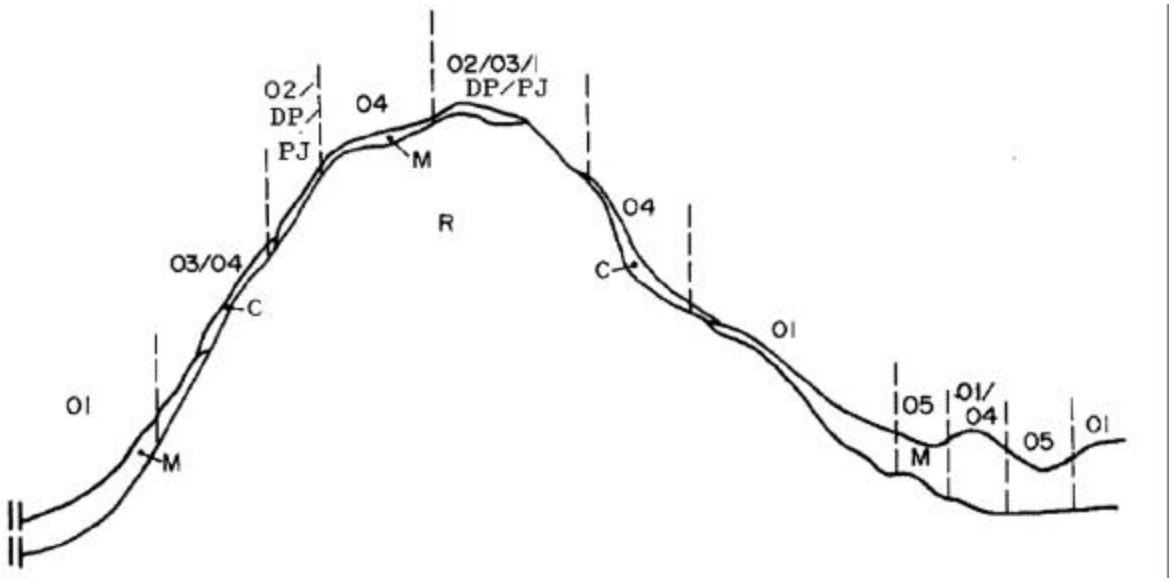
Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within IDFdm1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
BF	Blockfields, Blockslopes, Blockstreams	Level or gently sloping areas that are covered with moderately sized or large, angular blocks of rock derived from the underlying bedrock or drift by weathering and/or frost heave, and that have not undergone any significant downslope movement	k,w	1
CL	Cliff	A steep, vertical or overhanging rock face	q,z	1
ES	Exposed Soil	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mudslides, debris torrents, avalanches, and human-made disturbances where vegetation cover is less than 5%	k,w	1
GP	Gravel Pit	An area exposed through the removal of sand and gravel		1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	h,k,n,q,w	1

Appendix 4
Expanded Legend for Ecosystems found in the MSdm1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR MSdm1					
SP	02	Fd-Big sage-Pinegrass	SG	06	Sxw-Gooseberry
DP	00	Fd-Penstemon-Pinegrass	SH	07	Sxw-Trapper's tea-Horsetail
PJ	00	Pl-Juniper-Pinegrass	AB	00	Alder/Willow-Sedge-Bluejoint
PG	03	Pl-Grouseberry-Cladonia	WS	08	Willow-Sedge
PP	04	Pl-Pinegrass-Kinnikinnick	SW	00	Sedge wetlands
SF	01	Sxw-Falsebox-Feathermoss	SM	00	Sedge wet meadow
ST	05	Sxw-Trapper's tea-Grouseberry			


02/03/
DP/PJ
02/
DP/
PJ
04
M
R
04
C
03/04
C
01
01
M
05
01/
04
05
01
M

BEC= **MSdm1/02**

Map Unit	Description
SP	Fd-Big Sage-Pinegrass; typic ecosystem unit
SPdw	Fd-Big Sage-Pinegrass; deep soil, warm aspect ecosystem unit
SPk	Fd-Big Sage-Pinegrass; cool aspect ecosystem unit
SPw	Fd-Big Sage-Pinegrass; warm aspect ecosystem unit

Fd-Big Sage-Pinegrass (SP) occurs on shallow soil, very xeric, gentle, upper and crest slope positions on morainal and glaciofluvial materials
SPdw occurs on deep soil, warm aspects, moderately sloping moraine
SPk occurs on cool aspects, moderately sloping moraine and glaciofluvial materials
SPw occurs on warm aspects, moderately sloping moraine and glaciofluvial materials

Map Symbol	**SP2** **SPdw2** **SPk2** **SPw2**	**SP3** **SPdw3** **SPk3** **SPw3**	**SP4** **SPdw4** **SPk4** **SPw4**	**SP5** **SPdw5** **SPk5** **SPw5**	**SP6** **SPdw6** **SPk6** **SPw6**	**SP7** **SPdw7** **SPk7** **SPw7**
Plant Species	Herb (2)[1]	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	big sage Idaho fescue	big sage common juniper Idaho fescue	big sage common juniper Douglas-fir Idaho fescue	big sage Douglas-fir common juniper Idaho fescue	big sage common juniper Douglas-fir Idaho fescue old man's whiskers	big sage common juniper Idaho fescue Douglas-fir *Cladonia* lichens
Associates	Kentucky blugrass old man's whiskers yarrow junegrass Douglas-fir common juniper *Cladonia* lichens	Kentucky blugrass old man's whiskers junegrass Douglas-fir *Cladonia* lichens yarrow	Kentucky blugrass old man's whiskers junegrass *Cladonia* lichens Yarrow juniper haircup moss	Kentucky blugrass old man's whiskers junegrass *Cladonia* lichens juniper haircup moss yarrow	*Cladonia* lichens juniper haircup moss Kentucky blugrass junegrass yarrow	juniper haircup moss old man's whiskers Kentucky blugrass junegrass yarrow
Plots	2-551,V00014,V00015	851909,V00026				

[1]Only structural stage 3 has been mapped within TFL 15. This Site Series may finally reach structural stage 7, although it should be noted that some of the structural stages might not be easily observed (e.g. 4 and 5)

BEC= **MSdm1/00**

Map Unit	Description
DP[1]	Fd-Penstemon-Pinegrass; typic ecosystem unit
DPd	Fd-Penstemon-Pinegrass; deep soil ecosystem unit
DPdk	Fd-Penstemon-Pinegrass; deep soil, cool aspect ecosystem unit
DPdw	Fd-Penstemon-Pinegrass; deep soil, warm aspect ecosystem unit
DPh	Fd-Penstemon-Pinegrass; hummocky ecosystem unit
DPhv	Fd-Penstemon-Pinegrass; hummocky, very shallow soil ecosystem unit
DPk	Fd-Penstemon-Pinegrass; cool aspect ecosystem unit
DPkv	Fd-Penstemon-Pinegrass; cool aspect, very shallow soil ecosystem unit
DPw	Fd-Penstemon-Pinegrass; warm aspect ecosystem unit

Fd-Penstemon-Pinegrass (DP) occurs on shallow soil, very xeric, gentle, upper and crest slope positions on moraine and glaciofluvial materials
DPd occurs on deep moraine and glaciofluvial materials
DPdk occurs on deep soil, cool aspects, moderately sloping moraine and glaciofluvial materials
DPdw occurs on deep soil, warm aspects, moderately sloping moraine and glaciofluvial materials
DPh occurs on hummocky moraine
DPhv occurs on very shallow soil, hummocky moraine
DPk occurs on cool aspects, moderately sloping moraine and colluvium
DPkv occurs on very shallow soil, cool aspects, moderately sloping moraine
DPw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**DP2** **DPd2** **DPdk2** **DPdw2** **DPh2** **DPhv2** **DPk2** **DPkv2** **DPw2**	**DP3** **DPd3** **DPdk3** **DPdw3** **DPh3** **DPhv3** **DPk3** **DPkv3** **DPw3**	**DP4** **DPd4** **DPdk4** **DPdw4** **DPh4** **DPhv4** **DPk4** **DPkv4** **DPw4**	**DP5** **DPd5** **DPdk5** **DPdw5** **DPh5** **DPhv5** **DPk5** **DPkv5** **DPw5**	**DP6** **DPd6** **DPdk6** **DPdw6** **DPh6** **DPhv6** **DPk6** **DPkv6** **DPw6**	**DP7** **DPd7** **DPdk7** **DPdw7** **DPh7** **DPhv7** **DPk7** **DPkv7** **DPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	yarrow kinnikinnick	common juniper kinnikinnick	common juniper pinegrass Douglas-fir	common juniper pinegrass Douglas-fir	common juniper pinegrass Douglas-fir	common juniper pinegrass Douglas-fir
Associates	*Cladonia* lichens juniper haircap moss common juniper shrubby penstemon Douglas-fir compact selaginella	shrubby penstemon Douglas-fir juniper haircap moss *Cladonia* lichens yarrow pinegrass compact selaginella	kinnikinnick juniper haircap moss shrubby penstemon yarrow compact selaginella *Cladonia* lichens	juniper haircap moss shrubby penstemon yarrow compact selaginella kinnikinnick *Cladonia* lichens hybrid white spruce	juniper haircap moss shrubby penstemon hybrid white spruce yarrow compact selaginella kinnikinnick *Cladonia* lichens	juniper haircap moss hybrid white spruce shrubby penstemon kinnikinnick yarrow compact selaginella *Cladonia* lichens
Plots					9650033,V0013,V0027	

[1]DP is the NELSON Field Guide's "02" unit

BEC= **MSdm1/00**

Map Unit	Description
PJ	PL-Juniper-Pinegrass; typic ecosystem unit
PJh	PL-Juniper-Pinegrass; hummocky ecosystem unit
PJk	PL-Juniper-Pinegrass; cool aspect ecosystem unit
PJq	PL-Juniper-Pinegrass; very steep cool aspect ecosystem unit
PJr	PL-Juniper-Pinegrass; ridged ecosystem unit
PJw	PL-Juniper-Pinegrass; warm aspect ecosystem mapping

PL-Juniper-Pinegrass (PJ) occurs on shallow, medium-textured soil, xeric to subxeric, crest and upper slope positions on morainal materials. Often with associated bedrock outcrops
PJh occurs on hummocky moraine
PJk occurs on cool aspects, moderately sloping moraine and colluvium
PJq occurs on cool aspect, very steep colluvium
PJr occurs on ridged moraine
PJw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**PJ2** **PJh2** **PJk2** **PJq2** **PJr2** **PJw2**	**PJ3** **PJh3** **PJk3** **PJq3** **PJr3** **PJw3**	**PJ4** **PJh4** **PJk4** **PJq4** **PJr4** **PJw4**	**PJ5** **PJh5** **PJk5** **PJq5** **PJr5** **PJw5**	**PJ6** **PJh6** **PJk6** **PJq6** **PJr6** **PJw6**	**PJ7** **PJh7** **PJk7** **PJq7** **PJr7** **PJw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	northwestern sedge yarrow	lodgepole pine northwestern sedge yarrow	lodgepole pine northwestern sedge	lodgepole pine northwestern sedge	lodgepole pine northwestern sedge	lodgepole pine northwestern sedge
Associates	lodgepole pine stiff-leaved haircap moss spike trisetum common juniper pinegrass	stiff-leaved haircap moss spike trisetum common juniper pinegrass	yarrow common juniper stiff-leaved haircap moss pinegrass spike trisetum	common juniper pinegrass yarrow spike trisetum stiff-leaved haircap moss	common juniper pinegrass yarrow spike trisetum stiff-leaved haircap moss	common juniper pinegrass yarrow spike trisetum stiff-leaved haircap moss
Plots		2-44,2-84				

BEC= **MSdm1/03**

Map Unit	Description
PG	Pl-Grouseberry-Cladonia; typic ecosystem unit
PGc	Pl-Grouseberry-Cladonia; coarse-textured soil ecosystem unit
PGcw	Pl-Grouseberry-Cladonia; coarse-textured soil, warm aspect ecosystem unit
PGh	Pl-Grouseberry-Cladonia; hummocky ecosystem unit
PGhs	Pl-Grouseberry-Cladonia; hummocky, shallow soil ecosystem unit
PGk	Pl-Grouseberry-Cladonia; cool aspect ecosystem unit
PGks	Pl-Grouseberry-Cladonia; cool aspect, shallow soil ecosystem unit
PGn	Pl-Grouseberry-Cladonia; fan ecosystem unit
PGr	Pl-Grouseberry-Cladonia; ridged ecosystem unit
PGrs	Pl-Grouseberry-Cladonia; ridged, shallow soil ecosystem unit
PGs	Pl-Grouseberry-Cladonia; shallow soil ecosystem unit
PGsw	Pl-Grouseberry-Cladonia; shallow soil, warm aspect ecosystem unit
PGt	Pl-Grouseberry-Cladonia; terraced ecosystem unit
PGw	Pl-Grouseberry-Cladonia; warm aspect ecosystem unit

Pl-Grouseberry-Cladonia (PG) occurs on deep, medium-textured soil, xeric to subxeric, level to gently sloping moraine and glaciofluvial materials
PGc occurs on coarse-textured moraine
PGcw occurs on coarse-textured soil, warm aspects, moderately sloping moraine
PGh occurs on hummocky moraine
PGhs occurs on shallow soil, hummocky moraine
PGk occurs on cool aspects, moderately sloping moraine

PGks occurs on shallow soil, cool aspect, moderately sloping moraine and colluvium
PGn occurs on fluvial fan
PGr occurs on ridged moraine
PGrs occurs on shallow soil, ridged moraine
PGs occurs on shallow moraine
PGsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
PGt occurs on glaciofluvial terraces
PGw occurs on warm aspects, moderately sloping moraine

Map Symbol	**PG2** **PGc2** **PGcw2** **PGh2** **PGhs2** **PGk2** **PGks2** **PGn2** **PGr2** **PGrs2** **PGs2** **PGsw2** **PGt2** **PGw2**	**PG3** **PGc3** **PGcw3** **PGh3** **PGhs3** **PGk3** **PGks3** **PGn3** **PGr3** **PGrs3** **PGs3** **PGsw3** **PGt3** **PGw3**	**PG4** **PGc4** **PGcw4** **PGh4** **PGhs4** **PGk4** **PGks4** **PGn4** **PGr4** **PGrs4** **PGs4** **PGsw4** **PGt4** **PGw4**	**PG5** **PGc5** **PGcw5** **PGh5** **PGhs5** **PGk5** **PGks5** **PGn5** **PGr5** **PGrs5** **PGs5** **PGsw5** **PGt5** **PGw5**	**PG6** **PGc6** **PGcw6** **PGh6** **PGhs6** **PGk6** **PGks6** **PGn6** **PGr6** **PGrs6** **PGs6** **PGsw6** **PGt6** **PGw6**	**PG7** **PGc7** **PGcw7** **PGh7** **PGhs7** **PGk7** **PGks7** **PGn7** **PGr7** **PGrs7** **PGs7** **PGsw7** **PGt7** **PGw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	northwestern sedge white hawkweed	lodgepole pine juniper haircap moss	lodgepole pine	lodgepole pine grouseberry	lodgepole pine grouseberry *Cladonia* lichens	subalpine fir grouseberry *Cladonia* lichens
Associates	juniper haircap moss lodgepole pine grouseberry *Cladonia* lichens	grouseberry white hawkweed *Cladonia* lichens northwestern sedge	juniper haircap moss grouseberry *Cladonia* lichens kinnikinnick white hawkweed	kinnikinnick *Cladonia* lichens juniper haircap moss subalpine fir hybrid white spruce	kinnikinnick subalpine fir hybrid white spruce juniper haircap moss	lodgepole pine kinnikinnick hybrid white spruce
Plots		2-34,r146,r410		1-67,2-33,2-45,2-82,2-47 X780353,X780358		

BEC= **MSdm1/04**

Map Unit	Description
PP	Pl-Pinegrass-Kinnikinnick; typic ecosystem unit
PPc	Pl-Pinegrass-Kinnikinnick; coarse-textured soil ecosystem unit
PPct	Pl-Pinegrass-Kinnikinnick; coarse-textured soil, terraced ecosystem unit
PPcw	Pl-Pinegrass-Kinnikinnick; coarse-textured soil, warm aspect ecosystem unit
PPh	Pl-Pinegrass-Kinnikinnick; hummocky ecosystem unit
PPhs	Pl-Pinegrass-Kinnikinnick; hummocky, shallow soil ecosystem unit
PPhw	Pl-Pinegrass-Kinnikinnick; hummocky, warm aspect ecosystem unit
PPk	Pl-Pinegrass-Kinnikinnick; cool aspect ecosystem unit
PPkn	Pl-Pinegrass-Kinnikinnick; cool aspect, cone ecosystem unit
PPks	Pl-Pinegrass-Kinnikinnick; cool aspect, shallow soil ecosystem unit
PPqs	Pl-Pinegrass-Kinnikinnick; very steep cool aspect, shallow soil ecosystem unit
PPr	Pl-Pinegrass-Kinnikinnick; ridged ecosystem unit
PPrs	Pl-Pinegrass-Kinnikinnick; ridged, shallow soil ecosystem unit
PPs	Pl-Pinegrass-Kinnikinnick; shallow soil ecosystem unit
PPsw	Pl-Pinegrass-Kinnikinnick; shallow soil, warm aspect ecosystem unit
PPt	Pl-Pinegrass-Kinnikinnick; terraced ecosystem unit
PPv	Pl-Pinegrass-Kinnikinnick; very shallow soil ecosystem unit
PPw	Pl-Pinegrass-Kinnikinnick; warm aspect ecosystem unit

Pl-Pinegrass-Kinnikinnick (PP) occurs on deep, medium textured soil, subxeric to submesic, level to moderately sloping moraine, fluvial and glaciofluvial materials
PPc occurs on coarse textured moraine and glaciofluvial materials
PPct occurs on coarse-textured soil, on fluvial terraces
PPcw occurs on coarse-textured soil, warm aspects, moderately sloping moraine and colluvium
PPh occurs on hummocky moraine and glaciofluvial materials
PPhs occurs on shallow soil, hummocky moraine and glaciofluvial materials
PPhw occurs on warm aspects, moderately sloping, hummocky moraine and glaciofluvial materials
PPk occurs on cool aspects, moderately sloping moraine, colluvium, and glaciofluvial materials
PPkn occurs on cool aspects, moderately sloping colluvial cone
PPks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
PPqs occurs on shallow soil, cool aspects, very steep colluvium
PPr occurs on ridged moraine and glaciofluvial materials
PPrs occurs on shallow soil, ridged moraine
PPs occurs on shallow moraine
PPsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
PPt occurs on fluvial and glaciofluvial terraces
PPv occurs on very shallow moraine
PPw occurs on warm aspects, moderately sloping moraine, colluvium, fluvial and glaciofluvial materials

Map Symbol	**PP2** **PPc2** **PPct2** **PPcw2** **PPh2** **PPhs22** **PPhw2** **PPk2** **Ppkn2** **PPks2** **PPqs2** **PPr2** **PPrs2** **PPs2** **PPsw2** **PPt2** **PPv2** **PPw2**	**PP3** **PPc3** **PPct3** **PPcw3** **PPh3** **PPhs3** **PPhw3** **PPk3** **Ppkn3** **PPks3** **PPqs3** **PPr3** **PPrs3** **PPs3** **PPsw3** **PPt3** **PPv3** **PPw3**	**PP4** **PPc4** **PPct4** **PPcw4** **PPh4** **PPhs4** **PPhw4** **PPk4** **Ppkn4** **PPks4** **PPqs4** **PPr4** **PPrs4** **PPs4** **PPsw4** **PPt4** **PPv4** **PPw4**	**PP5** **PPc5** **PPct5** **PPcw5** **PPh5** **PPhs5** **PPhw5** **PPk5** **Ppkn5** **PPks5** **PPqs5** **PPr5** **PPrs5** **PPs5** **PPsw5** **PPt5** **PPv5** **PPw5**	**PP6** **PPc6** **PPct6** **PPcw6** **PPh6** **PPhs6** **PPhw6** **PPk6** **Ppkn6** **PPks6** **PPqs6** **PPr6** **PPrs6** **PPs6** **PPsw6** **PPt6** **PPv6** **PPw6**	**PP7** **PPc7** **PPct7** **PPcw7** **PPh7** **PPhs7** **PPhw7** **PPk7** **Ppkn7** **PPks7** **PPqs7** **PPr7** **PPrs7** **PPs7** **PPsw7** **PPt7** **PPv7** **PPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass grouseberry kinnikinnick	grouseberry pinegrass lodgepole pine	lodgepole pine grouseberry pinegrass	lodgepole pine grouseberry pinegrass	pinegrass lodgepole pine subalpine fir	pinegrass subalpine fir lodgepole pine
Associates	soopolallie wild strawberry white hawkweed lodgepole pine juniper haircap moss	kinnikinnick soopolallie wild strawberry juniper haircap moss	soopolallie kinnikinnick wild strawberry juniper haircap moss	soopolallie kinnikinnick subalpine fir wild strawberry juniper haircap moss	grouseberry soopolallie kinnikinnick wild strawberry juniper haircap moss	grouseberry soopolallie wild strawberry kinnikinnick juniper haircap moss
Plots	2-79	r203	r504	1-17,2-77,2-80,X770040, X780352	1-63,X780359	

BEC= **MSdm1/01**

Map Unit	Description
SF	Sxw-Falsebox-Feathermoss; typic ecosystem unit
SFc	Sxw-Falsebox-Feathermoss; coarse-textured soil ecosystem unit
SFck	Sxw-Falsebox-Feathermoss; coarse-textured soil, cool aspect ecosystem unit
SFg	Sxw-Falsebox-Feathermoss; gully ecosystem unit
SFgw	Sxw-Falsebox-Feathermoss; gully, warm aspect ecosystem unit
SFh	Sxw-Falsebox-Feathermoss; hummocky ecosystem unit
SFk	Sxw-Falsebox-Feathermoss; cool aspect ecosystem unit
SFks	Sxw-Falsebox-Feathermoss; cool aspect, shallow soil ecosystem unit
SFs	Sxw-Falsebox-Feathermoss; shallow soil ecosystem unit
SFsw	Sxw-Falsebox-Feathermoss; shallow soil, warm aspect ecosystem unit
SFt	Sxw-Falsebox-Feathermoss; terraced ecosystem unit
SFw	Sxw-Falsebox-Feathermoss; warm aspect ecosystem unit

Sxw-Falsebox-Feathermoss (SF) occurs on deep, medium-textured soil, level to gently sloping, mesic to submesic, moraine, colluvium, fluvial and glaciofluvial materials
SFc occurs on coarse-textured moraine and glaciofluvial materials
SFck ocuurs on coarse-textured soil, cool aspects, moderately sloping moraine
SFg occurs in gullies, on moraine
SFgw occurs in gullies, on warm aspects, moderately sloping moraine
SFh occurs on hummocky moraine and glaciofluvial materials
SFk occurs on cool aspects, moderately sloping moraine, colluvium, fluvial and glaciofluvial materials
SFks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium
SFs occurs on shallow moraine and colluvium
SFsw occurs on shallow soil, warm aspects, moderately sloping moraine
SFt occurs on fluvial terraces
SFw occurs on warm aspects, moderately sloping moraine, colluvium and glaciofluvial materials

Map Symbol	**SF2** **SFc2** **SFck2** **SFg2** **SFgw2** **SFh2** **SFk2** **SFks2** **SFs2** **SFsw2** **SFt2** **SFw2**	**SF3** **SFc3** **SFck3** **SFg3** **SFgw3** **SFh3** **SFk3** **SFks3** **SFs3** **SFsw3** **SFt3** **SFw3**	**SF4** **SFc4** **SFck4** **SFg4** **SFgw4** **SFh4** **SFk4** **SFks4** **SFs4** **SFsw4** **SFt4** **SFw4**	**SF5** **SFc5** **SFck5** **SFg5** **SFgw5** **SFh5** **SFk5** **SFks5** **SFs5** **SFsw5** **SFt5** **SFw5**	**SF6** **SFc6** **SFck6** **SFg6** **SFgw6** **SFh6** **SFk6** **SFks6** **SFs6** **SFsw6** **SFt6** **SFw6**	**SF7** **SFc7** **SFck7** **SFg7** **SFgw7** **SFh7** **SFk7** **SFks7** **SFs7** **SFsw7** **SFt7** **SFw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass grouseberry *Poa* spp.	lodgepole pine grouseberry wild strawberry pinegrass	lodgepole pine grouseberry soopolallie pinegrass	lodgepole pine grouseberry soopolallie pinegrass	grouseberry hybrid white spruce lodgepole pine pinegrass	subalpine fir pinegrass red-stemmed feathermoss hybrid white spruce
Associates	yarrow lodgepole pine wild strawberry bunchberry falsebox	bunchberry *Poa* spp. firemoss Utah honeysuckle falsebox Sitka alder soopolallie twinflower	Utah honeysuckle bunchberry twinflower red-stemmed feathermoss hybrid white spruce falsebox Sitka alder wild strawberry	Utah honeysuckle hybrid white spruce bunchberry red-stemmed feathermoss subalpine fir twinflower falsebox Sitka alder wild strawberry	subalpine fir red-stemmed feathermoss soopolallie Utah honeysuckle Sitka alder falsebox bunchberry twinflower	grouseberry lodgepole pine bunchberry soopolallie Utah honeysuckle falsebox Sitka alder twinflower
Plots	1-19	1-76, 2-93,r388,r387, r239	r363	2-36	X780363	

BEC= **MSdm1/05**

Map Unit	Description
ST	Sxw-Trapper's tea-Grouseberry; typic ecosystem unit
STa	Sxw-Trapper's tea-Grouseberry; active floodplain ecosystem unit
STc	Sxw-Trapper's tea-Grouseberry; coarse-textured soil ecosystem unit
STcg	Sxw-Trapper's tea-Grouseberry; coarse-textured soil, gully ecosystem unit
STck	Sxw-Trapper's tea-Grouseberry; coarse textured soil, cool aspect ecosystem unit
STg	Sxw-Trapper's tea-Grouseberry; gully ecosystem unit
STgh	Sxw-Trapper's tea-Grouseberry; gully, hummocky ecosystem unit
STgk	Sxw-Trapper's tea-Grouseberry; gully, cool aspect ecosystem unit
STgs	Sxw-Trapper's tea-Grouseberry; gully, shallow soil ecosystem unit
STgw	Sxw-Trapper's tea-Grouseberry; gully, warm aspect ecosystem unit
STh	Sxw-Trapper's tea-Grouseberry; hummocky ecosystem unit
STk	Sxw-Trapper's tea-Grouseberry; cool aspect ecosystem unit
STn	Sxw-Trapper's tea-Grouseberry; fan ecosystem unit
STs	Sxw-Trapper's tea-Grouseberry; shallow soil ecosystem unit
STt	Sxw-Trapper's tea-Grouseberry; terraced ecosystem unit
STw	Sxw-Trapper's tea-Grouseberry; warm aspect ecosystem unit

Sxw-Trapper's tea-Grouseberry (ST) occurs on deep, medium-textured soils, subhygric, level to gently sloping moraine, fluvial and glaciofluvial materials
STa occurs on active fluvial floodplain
STc occurs on coarse-textured moraine and glaciofluvial materials
STcg occurs on coarse-textured soil, in gullies, on moraine
STck occurs on coarse-textured soil, cool aspects, moderately sloping moraine
STg occurs in gullies, on moraine, colluvium, and glaciofluvial materials
STgh occurs in gullies, on hummocky moraine
STgk occurs in gullies, on cool aspects, moderately sloping moraine, colluvium, fluvial and glaciofluvial materials
STgs occurs on shallow soils, in gullies, on moraine
STgw occurs in gullies, on warm aspects, moderately sloping moraine
STh occurs on hummocky moraine and glaciofluvial materials
STk occurs on cool aspects, moderately sloping moraine, colluvium and glaciofluvial materials
STn occurs on fluvial fans
STs occurs on shallow soil, where bedrock impedes soil drainage, on moraine
STt occurs on fluvial and glaciofluvial terraces
STw occurs on warm aspects, moderately sloping, moisture receiving sites on lower slopes, on moraine and glaciofluvial materials

Map Symbol	**ST2** **STa2** **STc2** **STcg2** **STck2** **STg2** **STgh2** **STgk2** **STgs2** **STgw2** **STh2** **STk2** **STn2** **STs2** **STt2** **STw2**	**ST3** **STa3** **STc3** **STcg3** **STck3** **STg3** **STgh3** **STgk3** **STgs3** **STgw3** **STh3** **STk3** **STn3** **STs3** **STt3** **STw3**	**ST4** **STa4** **STc4** **STcg4** **STck4** **STg4** **STgh4** **STgk4** **STgs4** **STgw4** **STh4** **STk4** **STn4** **STs4** **STt4** **STw4**	**ST5** **STa5** **STc5** **STcg5** **STck5** **STg5** **STgh5** **STgk5** **STgs5** **STgw5** **STh5** **STk5** **STn5** **STs5** **STt5** **STw5**	**ST6** **STa6** **STc6** **STcg6** **STck6** **STg6** **STgh6** **STgk6** **STgs6** **STgw6** **STh6** **STk6** **STn6** **STs6** **STt6** **STw6**	**ST7** **STa7** **STc7** **STcg7** **STck7** **STg7** **STgh7** **STgk7** **STgs7** **STgw7** **STh7** **STk7** **STn7** **STs7** **STt7** **STw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	grouseberry trapper's tea pinegrass	trapper's tea lodgepole pine juniper haircap moss	lodgepole pine trapper's tea	trapper's tea lodgepole pine hybrid white spruce	trapper's tea hybrid white spruce lodgepole pine	trapper's tea hybrid white spruce subalpine fir
Associates	juniper haircap moss lodgepole pine Utah honeysuckle fireweed hybrid white spruce	grouseberry Utah honeysuckle twinflower pinegrass fireweed hybrid white spruce	juniper haircap moss grouseberry hybrid white spruce Utah honeysuckle twinflower five-leaved bramble subalpine fir	grouseberry juniper haircap moss Utah honeysuckle subalpine fir twinflower five-leaved bramble bunchberry	grouseberry subalpine fir Utah honeysuckle bunchberry twinflower five-leaved bramble	grouseberry Utah honeysuckle bunchberry lodgepole pine twinflower five-leaved bramble
Plots	1-18	1-68,2-83,r282,r302, r511	r376	2-35,X780376, X780377	1-21,X780354,X780357	

BEC= **MSdm1/06**

Map Unit	Description
SG	Sxw-Gooseberry; typic ecosystem unit
SGa	Sxw-Gooseberry; active floodplain
SGc	Sxw-Gooseberry; coarse-textured soil ecosystem unit
SGg	Sxw-Gooseberry; gully ecosystem unit
SGgh	Sxw-Gooseberry; gully, hummocky ecosystem unit
SGk	Sxw-Gooseberry; cool aspect ecosystem unit
SGt	Sxw-Gooseberry; terraced ecosystem unit
SGw	Sxw-Gooseberry; warm aspect ecosystem unit

Sxw-Gooseberry (SG) occurs on deep, medium-textured soil, subhygric to hygric, level to gentle lower slope receiving sites, on moraine, fluvial and glaciofluvial floodplains
SGa occurs on active fluvial and glaciofluvial plains
SGc occurs on coarse-textured moraine and glaciofluvial materials
SGg occurs in gullies, on moraine and colluvium
SGgh occurs in gullies, on hummocky moraine
SGk occurs on cool aspects, moderately sloping moraine
SGt occurs on fluvial terraces
SGw occurs on warm aspects, lower slope, moisture receiving positions, moderately sloping moraine

Map Symbol	**SG2** **SGa2** **SGc2** **SGg2** **SGgh2** **SGk2** **SGt2** **SGw2**	**SG3** **SGa3** **SGc3** **SGg3** **SGgh3** **SGk3** **SGt3** **SGw3**	**SG4** **SGa4** **SGc4** **SGg4** **SGgh4** **SGk4** **SGt4** **SGw4**	**SG5** **SGa5** **SGc5** **SGg5** **SGgh5** **SGk5** **SGt5** **SGw5**	**SG6** **SGa6** **SGc6** **SGg6** **SGgh6** **SGk6** **SGt6** **SGw6**	**SG7** **SGa7** **SGc7** **SGg7** **SGgh7** **SGk7** **SGt7** **SGw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	bluejoint streambank butterweed	*Salix* spp trembling aspen bluejoint	trembling aspen *Salix* spp bluejoint	bluejoint trembling aspen *Salix* spp. five-leaved bramble	hybrid white spruce five-leaved bramble bluejoint	hybrid white spruce five-leaved bramble bluejoint
Associates	five-leaved bramble *Salix* spp trembling aspen sweet coltsfoot palmate-leaved coltsfoot	five-leaved bramble streambank butterweed palmate-leaved coltsfoot sweet coltsfoot black gooseberry bunchberry hybrid white spruce	five-leaved bramble streambank butterweed palmate-leaved coltsfoot bunchberry hybrid white spruce sweet coltsfoot black gooseberry	streambank butterweed hybrid white spruce bunchberry palmate-leaved coltsfoot sweet coltsfoot black gooseberry	bunchberry black gooseberry streambank butterweed trembling aspen *Salix* spp. palmate-leaved coltsfoot sweet coltsfoot	bunchberry black gooseberry streambank butterweed palmate-leaved coltsfoot sweet coltsfoot *Salix* spp.
Plots				2-78	X780360	

BEC= **MSdm1/07**

Map Unit	Description
SH	Sxw-Trapper's tea-Horsetail; typic ecosystem unit
SHa	Sxw-Trapper's tea-Horsetail; active floodplain ecosystem unit
SHp	Sxw-Trapper's tea-Horsetail; peaty ecosystem unit
SHt	Sxw-Trapper's tea-Horsetail; terraced ecosystem unit

Sxw-Trapper's tea-Horsetail (SH) occurs on deep, medium-textured soil, hygric to subhydric, level to gentle lower slope receiving sites on moraine, fluvial and glaciofluvial floodplains
SHa occurs on active fluvial floodplains
SHp occurs on peaty (organic) soil, on fluvial and glaciofluvial materials
SHt occurs on glaciofluvial terraces

Map Symbol	**SH2** **SHa2** **SHp2** **SHt2**	**SH3** **SHa3** **SHp3** **SHt3**	**SH4** **SHa4** **SHp4** **SHt4**	**SH5** **SHa5** **SHp5** **SHt5**	**SH6** **SHa6** **SHp6** **SHt6**	**SH7** **SHa7** **SHp7** **SHt7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	common horsetail glow moss *Carex* spp.	trapper's tea *Salix* spp. common horsetail glow moss	trapper's tea subalpine fir *Salix* spp. common horsetail	trapper's tea subalpine fir common horsetail hybrid white spruce	hybrid white spruce common horsetail trapper's tea subalpine fir	hybrid white spruce common horsetail subalpine fir trapper's tea
Associates	trapper's tea *Salix* spp. subalpine fir hybrid white spruce	*Carex* spp. subalpine fir hybrid white spruce grouseberry black gooseberry black twinberry	glow moss hybrid white spruce *Carex* spp. grouseberry black gooseberry black twinberry	*Salix* spp. glow moss *Carex* spp. grouseberry black gooseberry black twinberry	glow moss *Carex* spp. *Salix* spp. grouseberry black gooseberry black twinberry	glow moss *Carex* spp. *Salix* spp. grouseberry black gooseberry black twinberry
Plots						

BEC= **MSdm1/00**

Map Unit	Description
AB	Alder/Willow-Sedge-Bluejoint; typic ecosystem unit
ABa	Alder/Willow-Sedge-Bluejoint; active floodplain ecosystem unit
ABg	Alder/Willow-Sedge-Bluejoint; gully ecosystem unit
ABk	Alder/Willow-Sedge-Bluejoint; cool aspect ecosystem unit
ABw	Alder/Willow-Sedge-Bluejoint; warm aspect ecosystem unit

Alder/Willow-Sedge-Bluejoint (AB) occurs on deep, medium-textured soil, hygric to subhydric, level fluvial and glaciofluvial sites with associated seepage, and on shallow organic soils
ABa occurs on active fluvial floodplain
ABg occurs in gullies, on glaciofluvial materials
ABk occurs on cool aspects, moderately sloping moraine
ABw occurs on warm aspects, moderately sloping, lower slope position, moisture receiving sites, on moraine

Map Symbol	**AB2b** **ABa2b** **ABg2b** **ABk2b** **ABw2b**	**AB3a** **ABa3a** **ABg3a** **ABk3a** **ABw3a**	**AB3b** **AB3b** **ABg3b** **ABk3b** **ABw3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	bluejoint arrow-leaved groundsel large-leaved avens marsh scullcap	bluejoint mountain alder *Salix* spp. arrow-leaved groundsel	bluejoint mountain alder *Salix* spp. arrow-leaved groundsel
Associates	mountain alder *Salix* spp. lady fern common leafy moss	large-leaved avens marsh scullcap lady fern common leafy moss	large-leaved avens marsh scullcap lady fern common leafy moss
Plots			2-81,9650027, 9650030,9650032

BEC= **MSdm1/08**

Map Unit	Description
WS	Willow-Sedge; typic ecosystem unit
WSa	Willow-Sedge; active floodplane ecosystem unit

Willow-Sedge (WS) occurs on deep soil, subhydric, level organic sites, and on fluvial and glaciofluvial plains
WSa occurs on active fluvial plains

Map Symbol	**WS2b** **Wsa2b**	**WS3a** **WSa3a**	**WS3b** **WSa3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	water sedge *Sphagnum* mosses	water sedge *Salix* spp. *Sphagnum* mosses	*Salix* spp. water sedge *Sphagnum* mosses
Associates	glow moss *Salix* spp. sickle moss soft-leaved sedge bluejoint	glow moss sickle moss soft-leaved sedge bluejoint	glow moss bluejoint sickle moss soft-leaved sedge
Plots		1-20,9650007,9650008,9650018	9650002,9650035

BEC= **MSdm1/00**	
Map Unit	Description
SW[1]	Sedge wetlands; typic ecosystem unit
Sedge wetlands (SW) occurs on deep soil, subhydric to hydric, level organic sites	

Map Symbol	**SW2b**
Plant Species	Graminoid-dominated (2b)[2]
Dominants	*Carex* spp. narrow-leaved cotton-grass tufted clubrush *Sphagnum* mosses
Associates	bluejoint western bog-laurel scrub birch
Plots	9650028, 2-91

[1]Three wetland community types occur within this site series: a) bog birch, sedge, sphagnum dominated community type; b) cottongrass-clubrush dominated community type; and c) sedge dominated non-shrubby wetland. All three wetland types have been mapped as SW because of the insufficient plot data and inability to distinguish each of the wetlands on 1:20,000 aerial photography.
[2]Fifteen SW units were mapped as structural stage 3a, two as 3b and three as 5. Those shrub-dominated units differ from typical SW units only in the higher cover of shrub birch. The two unites labeled as structural stage 5 had more then 10% tree cover but were otherwise typical SW units.

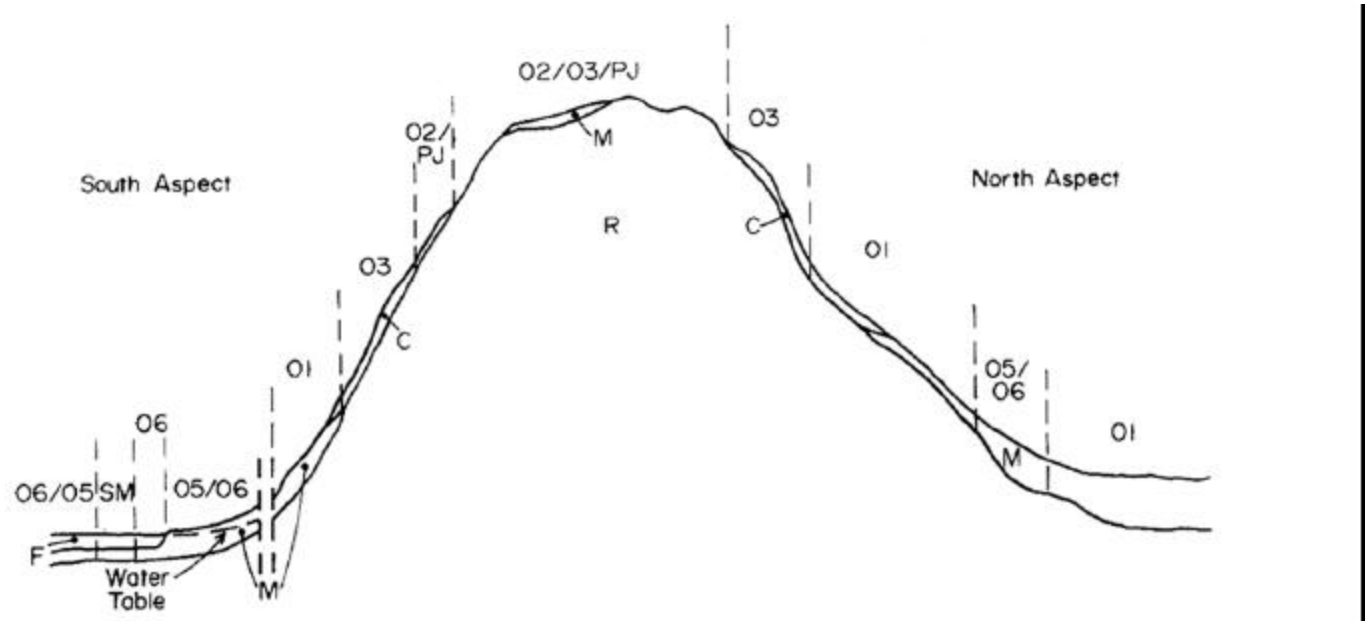
BEC= **MSdm1/00**	
Map Unit	Description
SM	Sedge wet meadow; typic ecosystem unit
Sedge wet meadow (SM) occurs on deep, medium-textured soil, subhydric to hygric, on level to gently sloping moraine, fluvial and glaciofluvial sites with associated seepage, and lacustrine materials	

Map Symbol	**SM2b**
Plant Species	Graminoid-dominated (2b)
Dominants	beaked sedge water sedge grey sedge
Associates	glow moss *Polytrichum* mosses slender sedge bluejoint shrubby cinquefoil
Plots	9650013,9650031,9650034

[1]One units was mapped as SM 3b because it had more than 20% of tall shrub cover.

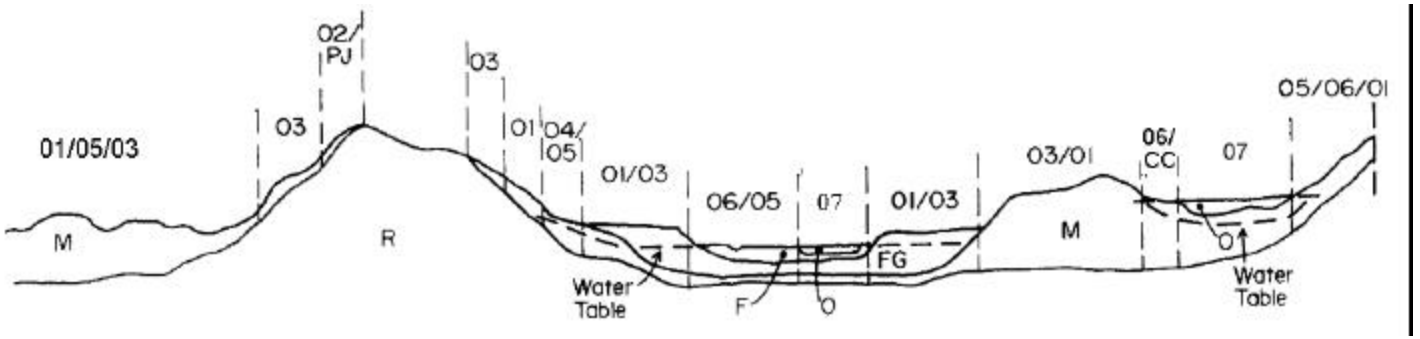
Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within MSdm1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
BF	Blockfields, Blockslopes, Blockstreams	Level or gently sloping areas that are covered with moderately sized or large, angular blocks of rock derived from the underlying bedrock or drift by weathering and/or frost heave, and that have not undergone any significant downslope movement	w	1
CL	Cliff	A steep, vertical or overhanging rock face	q	1
ES	Exposed Soil	Any area of exposed soil that is not included in any of the other definitions. It includes areas of recent disturbance, such as mudslides, debris torrents, avalanches, and human-made disturbances where vegetation cover is less than 5%	k,w	1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable
RI	River	A watercourse formed when water flows between continuous, definable banks. The flow may be intermittent or perennial	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable
RU	Rubble	Rubble is common on the ground surface in and adjacent to alpine areas, on ridgetops, gentle slopes and flat areas due to the effects of frost heaving	k	1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	k,n,q,w,	1
UR	Urban/Suburban	An are in which residences and other human developments form an almost continuous covering of the landscape.	not applicable	not applicable

Appendix 5
Expanded Legend for Ecosystems found in the ESSFdc1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR ESSFdc1		
00	PJ	Pl-Juniper-Cladonia
02	EP	PlSe–Pinegrass
03	FG	Bl-Grouseberry-Cladonia
01	FR	Bl-Rhododendron-Grouseberry
04	RV	Bl-Rhododendron-Valerian
05	FT	Bl-Trapper's tea
06	FH	Bl-Horsetail-Glow moss
00	SM	Sedge wet meadow
07	SS	Sedge-Sphagnum
00	CC	Cottongrass-Clubrush



BEC= **ESSFdc1/00**	
Map Unit	Description
PJ	Pl-Juniper-Cladonia; typic ecosystem unit
PJh	Pl-Juniper-Cladonia; hummocky ecosystem unit
PJk	Pl-Juniper-Cladonia; cool aspect ecosystem unit
PJw	Pl-Juniper-Cladonia; warm aspect ecosystem unit
Pl-Juniper-Cladonia (PJ) occurs on shallow, medium-textured soil, xeric to very xeric, gentle to moderate upper slopes and crest slope positions on morainal materials. Often with associated bedrock outcrops **PJh** occurs on hymmocky moraine **PJk** occurs on cool aspects, moderately sloping moraine and colluvium **PJw** occurs on warm aspects, moderately sloping moraine	

Map Symbol	**PJ2** **PJh2** **PJk2** **PJw2**	**PJ3** **PJh3** **PJk3** **PJw3**	**PJ4** **PJh4** **PJk4** **PJw4**	**PJ5** **PJh5** **PJk5** **PJw5**	**PJ6** **PJh6** **PJk6** **PJw6**	**PJ7** **PJh7** **PJk7** **PJw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass common juniper lance-leaved stonecrop juniper haircap moss	common juniper grouseberry pinegrass	common juniper grouseberry lodgepole pine	lodgepole pine grouseberry common juniper	grouseberry lodgepole pine common juniper	grouseberry lodgepole pine common juniper subalpine fir
Associates	soopolallie old man's whiskers lodgepole pine grouseberry *Cladonia* spp. racemose pussytoes black huckleberry thread-leaved sandwort	lodgepole pine lance-leaved stonecrop soopolallie juniper haircap moss *Cladonia* spp. old man's whiskers black huckleberry racemose pussytoes thread-leaved sandwort silky lupine	black huckleberry racemose pussytoes juniper haircap moss *Cladonia* spp. pinegrass lance-leaved stonecrop thread-leaved sandwort soopolallie old man's whiskers silky lupine	black huckleberry racemose pussytoes juniper haircap moss *Cladonia* spp. pinegrass silky lupine subalpine fir thread-leaved sandwort soopolallie	subalpine fir juniper haircap moss black huckleberry *Cladonia* spp. racemose pussytoes pinegrass silky lupine thread-leaved sandwort soopolallie	black huckleberry juniper haircap moss racemose pussytoes *Cladonia* spp. pinegrass silky lupine thread-leaved sandwort soopolallie
Plots	2-49	r518		r434, 2-30		

BEC= **ESSFdc1/02**

Map Unit	Description
EP	PlSe-Pinegrass; typic ecosystem unit
EPgk	PlSe-Pinegrass; gully, cool aspect ecosystem unit
EPks	PlSe-Pinegrass; cool aspect, shallow soils ecosystem unit
EPs	PlSe-Pinegrass; shallow soils ecosystem unit

PlSe-Pinegrass (EP) typically occurs on deep, medium-textured soil, subxeric, warm aspect, significant sloping sites, generally on moraine and colluvium
EPgk occurs in gullies, on cool aspects, moderately sloping moraine
EPks occurs on shallow soil, cool aspects, moderately sloping moraine
EPs occurs on shallow soil, moraine and colluvium

Map Symbol	**EP2** **EPgk2** **EPks2** **EPs2**	**EP3** **EPgk3** **EPks3** **EPs3**	**EP4** **EPgk4** **EPks4** **EPs4**	**EP5** **EPgk5** **EPks5** **EPs5**	**EP6** **EPgk6** **EPks6** **EPs6**	**EP7** **EPgk7** **EPks7** **EPs7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass common juniper kinnikinnick	lodgepole pine pinegrass common juniper	lodgepole pine pinegrass grouseberry	lodgepole pine pinegrass grouseberry	pinegrass grouseberry Engelmann spruce subalpine fir	pinegrass grouseberry Engelmann spruce subalpine fir
Associates	grouseberry lodgepole pine racemose pussytoes falsebox *Cladina* lichens sidewalk moss	grouseberry racemose pussytoes kinnikinnick falsebox *Cladina* lichens sidewalk moss	racemose pussytoes common juniper falsebox kinnikinnick *Cladina* lichens sidewalk moss Engelmann spruce	racemose pussytoes falsebox common juniper kinnikinnick Engelmann spruce subalpine fir *Cladina* lichens sidewalk moss	racemose pussytoes *Cladina* lichens sidewalk moss lodgepole pine falsebox common juniper	*Cladina* lichens racemose pussytoes sidewalk moss falsebox common juniper
Plots		2-86			X770001	

BEC= **ESSFdc1/03**

Map Unit	Description
FG[1]	Bl-Grouseberry-Cladonia; typic ecosystem unit
FGh	Bl-Grouseberry-Cladonia; hummocky ecosystem unit
FGhs	Bl-Grouseberry-Cladonia; hummocky, shallow soil ecosystem unit
FGj	Bl-Grouseberry-Cladonia; gently sloping ecosystem unit
FGjm	Bl-Grouseberry-Cladonia; gently sloping, medium-textured soil ecosystem unit
FGjs	Bl-Grouseberry-Cladonia; gently sloping, shallow soil ecosystem unit
FGjv	Bl-Grouseberry-Cladonia; gently sloping, very shallow soil ecosystem unit
FGk	Bl-Grouseberry-Cladonia; cool aspect ecosystem unit
FGkm	Bl-Grouseberry-Cladonia; cool aspect, medium-textured soil ecosystem unit
FGks	Bl-Grouseberry-Cladonia; cool aspect, shallow soil ecosystem unit
FGmr	Bl-Grouseberry-Cladonia; medium textured soil, ridged ecosystem unit
FGms	Bl-Grouseberry-Cladonia; medium textured, shallow soil ecosystem unit
FGmw	Bl-Grouseberry-Cladonia; medium textured, warm aspect ecosystem unit
FGr	Bl-Grouseberry-Cladonia; ridged ecosystem unit
FGrs	Bl-Grouseberry-Cladonia; ridged, shallow soil ecosystem unit
FGs	Bl-Grouseberry-Cladonia; shallow soil ecosystem unit
FGsw	Bl-Grouseberry-Cladonia; shallow soil, warm aspect ecosystem unit
FGvw	Bl-Grouseberry-Cladonia; very shallow soil, warm aspect ecosystem unit
FGw	Bl-Grouseberry-Cladonia; warm aspect ecosystem unit

Bl-Grouseberry-Cladonia (FG) occurs on deep, coarse-textured soil, subxeric to submesic, level to significantly sloping moraine, colluvium, and on fluvial and glaciofluvial materials
FGh occurs on hummocky moraine
FGhs occurs on shallow soil, hummocky moraine and colluvium
FGj occurs on gently sloping moraine
FGjm occurs on medium textured soil, gently sloping moraine
FGjs occurs on shallow soil, gently sloping moraine
FGjv occurs on very shallow soil, gently sloping moraine
FGk occur on cool aspects, moderately sloping moraine
FGkm occurs on medium-textured soil, cool aspects, moderately sloping moraine
FGks occurs on shallow soil, cool aspect, moderately sloping moraine and colluvium
FGmr occurs on medium-textured soil, ridged moraine
FGms occurs on shallow, medium-textured moraine
FGmw occurs on medium textured soil, warm aspects, moderately sloping moraine
FGr occurs on ridged moraine and glaciofluvial materials
FGrs occurs on shallow soil, ridged moraine
FGs occurs on shallow moraine and colluvium
FGsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
FGvw occurs on very shallow soil, warm aspects, moderately sloping moraine and colluvium
FGw occurs on warm aspects, moderately sloping moraine, colluvium, and glaciofluvial materials

[1]If more than two modifier were needed to describe this site series only the two more important ones were mapped

Map Symbol	**FG2** **FGh2** **FGhs2** **FGj2** **FGjm2** **FGjs2** **FGjv2** **FGk2** **FGkm2** **FGks2** **FGmr2** **FGms2** **FGmw2** **FGr2** **FGrs2** **FGs2** **FGsw2** **FGvw2** **FGw2**	**FG3** **FGh3** **FGhs3** **FGj3** **FGjm3** **FGjs3** **FGjv3** **FGk3** **FGkm3** **FGks3** **FGmr3** **FGms3** **FGmw3** **FGr3** **FGrs3** **FGs3** **FGsw3** **FGvw3** **FGw3**	**FG4** **FGh4** **FGhs4** **FGj4** **FGjm4** **FGjs4** **FGjv4** **FGk4** **FGkm4** **FGks4** **FGmr4** **FGms4** **FGmw4** **FGr4** **FGrs4** **FGs4** **FGsw4** **FGvw4** **FGw4**	**FG5** **FGh5** **FGhs5** **FGj5** **FGjm5** **FGjs5** **FGjv5** **FGk5** **FGkm5** **FGks5** **FGmr5** **FGms5** **FGmw5** **FGr5** **FGrs5** **FGs5** **FGsw5** **FGvw5** **FGw5**	**FG6** **FGh6** **FGhs6** **FGj6** **FGjm6** **FGjs6** **FGjv6** **FGk6** **FGkm6** **FGks6** **FGmr6** **FGms6** **FGmw6** **FGr6** **FGrs6** **FGs6** **FGsw6** **FGvw6** **FGw6**	**FG7** **FGh7** **FGhs7** **FGj7** **FGjm7** **FGjs7** **FGjv7** **FGk7** **FGkm7** **FGks7** **FGmr7** **FGms7** **FGmw7** **FGr7** **FGrs7** **FGs7** **FGsw7** **FGvw7** **FGw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	grouseberry awned haircap moss juniper haircap moss	grouseberry awned haircap moss juniper haircap moss lodgepole pine	lodgepole pine grouseberry juniper haircap moss	grouseberry lodgepole pine Engelmann spruce	grouseberry lodgepole pine Engelmann spruce subalpine fir	grouseberry subalpine fir Engelmann spruce
Associates	arctic lupine pearly everlasting lodgepole pine subalpine daisy *Cladina* lichens	arctic lupine pearly everlasting subalpine daisy Engelmann spruce *Cladina* lichens	Engelmann spruce *Cladina* lichens arctic lupine subalpine fir awned haircap moss falsebox	subalpine fir juniper haircap moss *Cladina* lichens falsebox arctic lupine red-stemmed feathermoss	*Cladina* lichens falsebox juniper haircap moss arctic lupine red-stemmed feathermoss	*Cladina* lichens falsebox juniper haircap moss lodgepole pine arctic lupine red-stemmed feathermoss
Plots		2-38,2-46		2-31,2-32,2-43,9650006	2-37,2-42,2-550,2-85	

BEC= **ESSFdc1/01**

Map Unit	Description
FR	Bl-Rhododendron-Grouseberry; typic ecosystem unit
FRc	Bl-Rhododendron-Grouseberry; coarse-textured soil ecosystem unit
FRg	Bl-Rhododendron-Grouseberry; gully ecosystem unit
FRgw	Bl-Rhododendron-Grouseberry; gully, warm aspect ecosystem unit
FRh	Bl-Rhododendron-Grouseberry; hummocky ecosystem unit
FRk	Bl-Rhododendron-Grouseberry; cool aspect ecosystem unit
FRks	Bl-Rhododendron-Grouseberry; cool aspect, shallow soil ecosystem unit
FRs	Bl-Rhododendron-Grouseberry; shallow soil ecosystem unit
FRsw	Bl-Rhododendron-Grouseberry; shallow soil, warm aspect ecosystem unit
FRw	Bl-Rhododendron-Grouseberry; warm aspect ecosystem unit

Bl-Rhododendron-Grouseberry (FR) occurs on deep, medium-textured soil, level to gently sloping, mesic sites, generally on moraine, fluvial and glaciofluvial materials
FRc occurs on coarse-textured moraine
FRg occurs in gullies, on moraine

FRgw occurs in gullies, on warm aspects, moderately sloping moraine
FRh occurs on hummocky moraine
FRk occurs on cool aspects, moderately sloping moraine
FRks occurs on shallow soils, cool aspects, moderately sloping moraine and colluvium
FRs occurs on shallow moraine
FRsw occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium
FRw occurs on warm aspects, moderately sloping moraine, colluvium and glaciofluvial material

Map Symbol	**FR2** **FRc2** **FRg2** **FRgw2** **FRh2** **FRk2** **FRks2** **FRs2** **FRsw2** **FRw2**	**FR3** **FRc3** **FRg3** **FRgw3** **FRh3** **FRk3** **FRks3** **FRs3** **FRsw3** **FRw3**	**FR4** **FRc4** **FRg4** **FRgw4** **FRh4** **FRk4** **FRks4** **FRs4** **FRsw4** **FRw4**	**FR5** **FRc5** **FRg5** **FRgw5** **FRh5** **FRk5** **FRks5** **FRs5** **FRsw5** **FRw5**	**FR6** **FRc6** **FRg6** **FRgw6** **FRh6** **FRk6** **FRks6** **FRs6** **FRsw6** **FRw6**	**FR7** **FRc7** **FRg7** **FRgw7** **FRh7** **FRk7** **FRks7** **FRs7** **FRsw7** **FRw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	grouseberry juniper haircap moss fireweed Sitka valerian	grouseberry lodgepole pine juniper haircap moss subalpine daisy	lodgepole pine grouseberry white-flowered rhododendron	lodgepole pine white-flowered rhododendron subalpine fir	white-flowered rhododendron red-stemmed feathermoss subalpine fir	white-flowered rhododendron red-stemmed feathermoss subalpine fir
Associates	lodgepole pine subalpine daisy arctic lupine mountain arnica white-flowered hawkweed black huckleberry white-flowered rhododendron	arctic lupine fireweed black huckleberry white-flowered rhododendron twinflower Sitka valerian mountain arnica subalpine fir	juniper haircap moss black huckleberry subalpine fir twinflower subalpine daisy arctic lupine red-stemmed feathermoss fireweed five-leaved bramble	red-stemmed feathermoss grouseberry twinflower five-leaved bramble lawn moss black huckleberry Engelmann spruce juniper haircap moss subalpine daisy	lodgepole pine lawn moss Engelmann spruce grouseberry twinflower five-leaved bramble black huckleberry	lawn moss Engelmann spruce grouseberry twinflower five-leaved bramble lodgepole pine black huckleberry
Plots	2-39	r197	r397		X780368	

BEC= **ESSFdc1/04**	
Map Unit	Description
RV	Bl-Rhododendron-Valerian; typic ecosystem unit
Bl-Rhododendron-Valerian (RV) occurs on deep, medium-textured soil, subhygric, lower slope receiving positions on morainal and fluvial materials	

Map Symbol	**RV2**	**RV3**	**RV4**	**RV5**	**RV6**	**RV7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	mountain arnica awned haircap moss Sitka valerian Canby's lovage	mountain arnica Sitka valerian subalpine fir lodgepole pine	lodgepole pine mountain arnica Sitka valerian subalpine fir	mountain arnica subalpine fir Engelmann spruce lodgepole pine	Engelmann spruce white-flowered rhododendron subalpine fir mountain arnica	subalpine fir white-flowered rhododendron Engelmann spruce mountain arnica
Associates	subalpine fir lodgepole pine five-leaved bramble five-stamened mitrewort Engelmann spruce white-flowered rhododendron black huckleberry rosy twistedstalk	five-leaved bramble five-stamened mitrewort Engelmann spruce awned haircap moss white-flowered rhododendron black huckleberry Canby's lovage rosy twistedstalk	Engelmann spruce five-leaved bramble five-stamened mitrewort white-flowered rhododendron black huckleberry awned haircap moss glow moss rosy twistedstalk	Sitka valerian white-flowered rhododendron five-leaved bramble glow moss black huckleberry awned haircap moss five-stamened mitrewort rosy twistedstalk	Sitka valerian glow moss black huckleberry five-leaved bramble five-stamened mitrewort lodgepole pine rosy twistedstalk awned haircap moss	Sitka valerian glow moss black huckleberry five-leaved bramble five-stamened mitrewort rosy twistedstalk awned haircap moss
Plots					X770073	

BEC= **ESSFdc1/05**

Map Unit	Description
FT	Bl-Trapper's tea; typic ecosystem unit
FTa	Bl-Trapper's tea; active floodplain ecosystem unit
FTg	Bl-Trapper's tea; gully ecosystem unit
FTgk	Bl-Trapper's tea; gully, cool aspect ecosystem unit
FTgw	Bl-Trapper's tea; gully, warm aspect ecosystem unit
FTh	Bl-Trapper's tea; hummocky ecosystem unit
FTk	Bl-Trapper's tea; cool aspect ecosystem unit
FTw	Bl-Trapper's tea; warm aspect ecosystem unit

Bl-Trapper's tea (FT) occurs on deep, medium-textured soil, subhygric, gentle sloping, moisture receiving sites on moraine, colluvium, and on fluvial and glaciofluvial materials
FTa occurs on active fluvial floodplains
FTg occurs in gullies, on moraine
FTgk occurs in gullies, on cool aspects, moderately sloping moraine
FTgw occurs in gullies, on warm aspects, moderately sloping, lower moisture receiving sites, on moraine
FTh occurs on hummocky moraine
FTk occurs on cool aspects, moderately sloping moraine
FTw occurs on warm aspects, moderately sloping, lower moisture receiving sites, on moraine

Map Symbol	**FT2** **FTa2** **FTg2** **FTgk2** **FTgw2** **FTh2** **FTk2** **FTw2**	**FT3** **FTa3** **FTg3** **FTgk3** **FTgw3** **FTh3** **FTk3** **FTw3**	**FT4** **FTa4** **FTg4** **FTgk4** **FTgw4** **FTh4** **FTk4** **FTw4**	**FT5** **FTa5** **FTg5** **FTgk5** **FTgw5** **FTh5** **FTk5** **FTw5**	**FT6** **FTa6** **FTg6** **FTgk6** **FTgw6** **FTh6** **FTk6** **FTw6**	**FT7** **FTa7** **FTg7** **FTgk7** **FTgw7** **FTh7** **FTk7** **FTw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	grouseberry juniper haircap moss Sitka valerian Canby's lovage	grouseberry trapper's tea pinegrass juniper haircap moss	grouseberry trapper's tea subalpine fir Engelmann spruce	trapper's tea subalpine fir Engelmann spruce	subalpine fir Engelmann spruce trapper's tea Sitka valerian	subalpine fir trapper's tea Sitka valerian Engelmann spruce
Associates	trapper's tea Utah honeysuckle pinegrass arctic lupine Engelmann spruce black twinberry mountain arnica	Utah honeysuckle Engelmann spruce arctic lupine subalpine fir Sitka valerian Canby's lovage black twinberry mountain arnica	Utah honeysuckle arctic lupine Sitka valerian black twinberry mountain arnica pinegrass juniper haircap moss globeflower glow moss	Sitka valerian grouseberry globeflower mountain arnica black twinberry Utah honeysuckle arctic lupine elephant's- head lousewort five-leaved bramble glow moss	globeflower grouseberry mountain arnica black twinberry elephant's- head lousewort five-leaved bramble Utah honeysuckle red-stemmed feathermoss glow moss	globeflower mountain arnica black twinberry grouseberry elephant's- head lousewort five-leaved bramble Utah honeysuckle red-stemmed feathermoss glow moss
Plots		2-40,2-87			X770075,X780349, X780351,X780364	

BEC= **ESSFdc1/06**

Map Unit	Description
FH	Bl-Horsetail-Glow moss; typic ecosystem unit
FHg	Bl-Horsetail-Glow moss; gully ecosystem unit
FHp	Bl-Horsetail-Glow moss; peaty ecosystem unit
FHs	Bl-Horsetail-Glow moss; shallow soil ecosystem unit

Bl-Horsetail-Glow moss (FH) occurs on deep, medium-textured soil, hygric, level sites or gentle, lower slope receiving sites and floodplains, generally on moraine, colluvium, fluvial and glaciofluvial materials, occasionally on organic soils
FHg occurs in gullies, on moraine
FHp occurs on peaty (organic) soil
FHs occurs on shallow soil, where bedrock impedes soil drainage, on moraine

Map Symbol	**FH2** **FHg2** **FHp2** **FHs2**	**FH3** **FHg3** **FHp3** **FHs3**	**FH4** **FHg4** **FHp4** **FHs4**	**FH5** **FHg5** **FHp5** **FHs5**	**FH6** **FHg6** **FHp6** **FHs6**	**FH7** **FHg7** **FHp7** **FHs7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	common horsetail Sitka valerian grouseberry *Carex* spp.	common horsetail Sitka valerian trapper's tea grouseberry	common horsetail Sitka valerian trapper's tea lodgepole pine	common horsetail Sitka valerian trapper's tea lodgepole pine	common horsetail trapper's tea Sitka valerian Engelmann spruce	common horsetail trapper's tea Sitka valerian Engelmann spruce
Associates	trapper's tea arrow-leaved groundsel globeflower clasping twistedstalk five-leaved bramble one-leaved foamflower *Sphagnum* mosses glow moss lodgepole pine subalpine fir	arrow-leaved groundsel globeflower lodgepole pine *Carex* spp. subalpine fir clasping twistedstalk five-leaved bramble one-leaved foamflower *Sphagnum* mosses glow moss	grouseberry subalpine fir arrow-leaved groundsel globeflower *Carex* spp. clasping twistedstalk five-leaved bramble one-leaved foamflower Engelmann spruce *Sphagnum* mosses glow moss	subalpine fir grouseberry *Carex* spp. Engelmann spruce arrow-leaved groundsel globeflower clasping twistedstalk five-leaved bramble one-leaved foamflower *Sphagnum* mosses glow moss	subalpine fir grouseberry *Carex* spp. arrow-leaved groundsel lodgepole pine globeflower clasping twistedstalk *Sphagnum* mosses five-leaved bramble one-leaved foamflower glow moss	subalpine fir *Carex* spp. arrow-leaved groundsel globeflower *Sphagnum* mosses glow moss clasping twistedstalk one-leaved foamflower five-leaved bramble grouseberry
Plots					2-92, X780348	9650010

BEC= **ESSFdc1/00**	
Map Unit	Description
SM	Sedge wet meadow; typic ecosystem unit
SMa	Sedge wet meadow; active floodplain ecosystem unit
SMk	Sedge wet meadow; cool aspect ecosystem unit
SMw	Sedge wet meadow; warm aspect ecosystem unit
Sedge wet meadow (SM) occurs on deep, medium-textured soil, hygric to subhydric, level morainal and active fluvial sites with associated seepage, occasionally on thin organic soils **SMa** occurs on active fluvial floodplains **SMk** occurs on cool aspects, moderately sloping moraine **SMw** occurs on warm aspects, moderate slope, lower moisture receiving positions, on moraine	

Map Symbol	**SM2b** **SMa2b** **SMk2b** **SMw2b**
Plant Species	Graminoid-dominated (2b) [1]
Dominants	beaked sedge water sedge golden sedge
Associates	glow moss *Calliergon cordifolium* spring moss *Salix* spp. shrubby cinquefoil globeflower
Plots	9650015,9650016

[1] In two occasions SM map units contained more than 20% cover of low shrub. Those map units were labeled as structural stage 3a.

BEC= **ESSFdc1/07**	
Map Unit	Description
SS	Sedge-Sphagnum; typic ecosystem unit
Sedge-Sphagnum (SS) occurs on deep soil, subhydric to hydric, level organic sites, occasionally on fluvial materials	

Map Symbol	**SS2b**	**SS3a**	**SS3b**
Plant Species	Graminoid-dominated (2b)	Low shrub (3a)	Tall shrub (3b)
Dominants	pointed broom sedge *Sphagnum* mosses *Carex* spp.	*Salix* spp. pointed broom sedge *Sphagnum* mosses	pointed broom sedge *Sphagnum* mosses Engelmann spruce trapper's tea
Associates	*Salix* spp. trapper's tea lodgepole pine arrow-leaved groundsel two-toned sedge	arrow-leaved groundsel trapper's tea two-toned sedge Engelmann spruce lodgepole pine *Carex* spp.	*Salix* spp. arrow-leaved groundsel two-toned sedge lodgepole pine subalpine fir *Carex* spp.
Plots	2-96	2-41,9650011	9650012

BEC= **ESSFdc1/00**

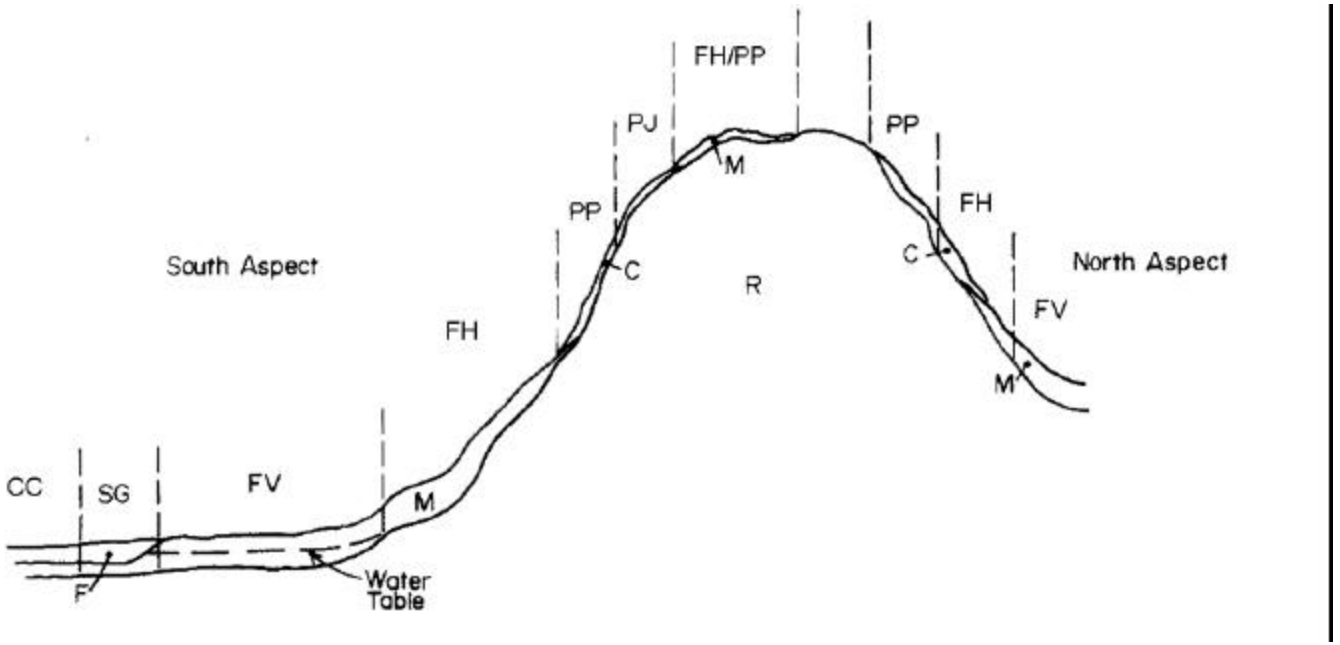
Map Unit	Description
CC	Cottongrass-Clubrush; typic ecosystem unit
CCp	Cottongrass-Clubrush; peaty soil ecosystem unit

Cottongrass- Clubrush (CC) occurs on deep soil, subhydric to hydric, level morainal sites.
CCp occurs on peaty (organic) soil

Map Symbol	**CC2b** **CCp2b**
Plant Species	Graminoid-dominated (2b)
Dominants	narrow-leaved cotton-grass tufted clubrush
Associates	water sedge spring moss *Carex* spp. *Sphagnum* mosses
Plots	9650014,9650040

Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within ESSFdc1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
BF	Blockfields, Blockslopes, Blockstreams	Level or gently sloping areas that are covered with moderately sized or large, angular blocks of rock derived from the underlying bedrock or drift by weathering and/or frost heave, and that have not undergone any significant downslope movement	k,w	1
CL	Cliff	A steep, vertical or overhanging rock face	q,z	1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
RP	Road Surface	An area cleared for the purpose of transporting goods and services by vehicles	not applicable	not applicable
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	k,w,z	1

Appendix 6
Expanded Legend for Ecosystems found in the ESSFdcu



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR ESSFdcu		
00	PJ	PlBl-Juniper-Grouseberry
00	PP	Pl-Pinegrass
00	FH	BlPl-Pink mountain heather-Grouseberry
00	FV	Bl-Valerian
00	SG	Sedge-Glow moss wet meadow
00	CC	Cottongrass-Clubrush

BEC= **ESSFdcu/00**

Map Unit	Description
PJ	Pl/Bl-Juniper-Grouseberry; typic ecosystem unit
PJk	Pl/Bl-Juniper-Grouseberry; cool aspect ecosystem unit
PJr	Pl/Bl-Juniper-Grouseberry; ridged ecosystem unit
PJw	Pl/Bl-Juniper-Grouseberry; warm aspect ecosystem unit

Pl/Bl-Juniper-Grouseberry (PJ) occurs on shallow, medium-textured soil, xeric to subxeric, gently to moderately sloping sites, upper and crest slope positions on morainal and colluvial materials. Generally dominates upper elevational ESSFdcu.
PJk occurs on cool aspects, moderately sloping moraine
PJr occurs on ridged moraine
PJw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**PJ2** **PJk2** **PJr2** **PJw2**	**PJ3** **PJk3** **PJr3** **PJw3**	**PJ4** **PJk4** **PJr4** **PJw4**	**PJ5** **PJk5** **PJr5** **PJw5**	**PJ6** **PJk6** **PJr6** **PJw6**	**PJ7** **PJk7** **PJr7** **PJw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	common juniper compact selaginella northwestern sedge	common juniper grouseberry northwestern sedge	common juniper grouseberry lodgepole pine	lodgepole pine grouseberry common juniper	grouseberry lodgepole pine common juniper	grouseberry lodgepole pine common juniper subalpine fir
Associates	pinegrass spike trisetum lodgepole pine grouseberry stiff-leaved haircap moss black huckleberry thread-leaved sandwort	lodgepole pine compact selaginella pinegrass stiff-leaved haircap moss spike trisetum black huckleberry thread-leaved sandwort arctic lupine	black huckleberry stiff-leaved haircap moss pinegrass thread-leaved sandwort compact selaginella spike trisetum northwestern sedge arctic lupine	black huckleberry stiff-leaved haircap moss pinegrass arctic lupine subalpine fir thread-leaved sandwort compact selaginella northwestern sedge spike trisetum	stiff-leaved haircap moss subalpine fir black huckleberry pinegrass arctic lupine thread-leaved sandwort compact selaginella northwestern sedge spike trisetum	stiff-leaved haircap moss black huckleberry pinegrass arctic lupine thread-leaved sandwort compact selaginella northwestern sedge spike trisetum
Plots		r153				

BEC= **ESSFdcu/00**

Map Unit	Description
PP	Pl-Pinegrass; typic ecosystem unit
PPw	Pl-Pinegrass; warm aspect ecosystem unit

Pl-Pinegrass (PP) occurs on shallow, medium-textured soil, subxeric to submesic, level to moderately sloping moraine and colluvium
PPw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**PP2** **PPw2**	**PP3** **PPw3**	**PP4** **PPw4**	**PP5** **PPw5**	**PP6** **PPw6**	**PP7** **PPw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pinegrass grouseberry white-flowered hawkweed arctic lupine	pinegrass grouseberry lodgepole pine	lodgepole pine pinegrass grouseberry heart-leaved arnica	pinegrass grouseberry lodgepole pine heart-leaved arnica	pinegrass grouseberry subalpine fir heart-leaved arnica lodgepole pine	pinegrass grouseberry subalpine fir heart-leaved arnica lodgepole pine
Associates	heart-leaved arnica lodgepole pine white-flowered rhododendron trapper's tea	heart-leaved arnica white-flowered hawkweed arctic lupine subalpine fir white-flowered rhododendron trapper's tea	subalpine fir white-flowered rhododendron trapper's tea white-flowered hawkweed Utah honeysuckle arctic lupine	subalpine fir white-flowered rhododendron trapper's tea Utah honeysuckle arctic lupine Engelmann spruce	white-flowered rhododendron trapper's tea Engelmann spruce Utah honeysuckle arctic lupine	Engelmann spruce white-flowered rhododendron trapper's tea Utah honeysuckle arctic lupine
Plots			2-99			

BEC= **ESSFdcu/00**	
Map Unit	Description
FH	Bl/Pl-Pink mountain heather-Grouseberry; typic ecosystem unit
FHh	Bl/Pl-Pink mountain heather-Grouseberry; hummocky ecosystem unit
FHhs	Bl/Pl-Pink mountain heather-Grouseberry; hummocky, shallow soil ecosystem unit
FHk	Bl/Pl-Pink mountain heather-Grouseberry; cool aspect ecosystem unit
FHks	Bl/Pl-Pink mountain heather-Grouseberry; cool aspect, shallow soil ecosystem unit
FHr	Bl/Pl-Pink mountain heather-Grouseberry; ridged ecosystem unit
FHrs	Bl/Pl-Pink mountain heather-Grouseberry; ridged, shallow soil ecosystem unit
FHs	Bl/Pl-Pink mountain heather-Grouseberry; shallow soil ecosystem unit
FHsw	Bl/Pl-Pink mountain heather-Grouseberry; shallow soil, warm aspect ecosystem unit
FHw	Bl/Pl-Pink mountain heather-Grouseberry; warm aspect ecosystem unit
Bl/Pa-Pink mountain heather-Grouseberry (FH) occurs on deep, medium-textured soil, mesic to submesic, gently sloping moraine and colluvium **FHh** occurs on hummocky moraine **FHhs** occurs on shallow soil, hummocky moraine **FHk** occurs on cool aspects, moderately sloping moraine	
FHks occurs on shallow soil, cool aspects, moderately sloping moraine and colluvium **FHr** occurs on ridged moraine **FHrs** occurs on shallow soil, ridged moraine **FHs** occurs on shallow moraine **FHsw** occurs on shallow soil, warm aspects, moderately sloping moraine and colluvium **FHw** occurs on warm aspects, moderately sloping moraine and colluvium	

Map Symbol	**FH2** **FHh2** **FHhs2** **FHk2** **FHks2** **FHr2** **FHrs2** **FHs2** **FHsw2** **FHw2**	**FH3** **FHh3** **FHhs3** **FHk3** **FHks3** **FHr3** **FHrs3** **FHs3** **FHsw3** **FHw3**	**FH4** **FHh4** **FHhs4** **FHk4** **FHks4** **FHr4** **FHrs4** **FHs4** **FHsw4** **FHw4**	**FH5** **FHh5** **FHhs5** **FHk5** **FHks5** **FHr5** **FHrs5** **FHs5** **FHsw5** **FHw5**	**FH6** **FHh6** **FHhs6** **FHk6** **FHks6** **FHr6** **FHrs6** **FHs6** **FHsw6** **FHw6**	**FH7** **FHh7** **FHhs7** **FHk7** **FHks7** **FHr7** **FHrs7** **FHs7** **FHsw7** **FHw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	grouseberry juniper haircap moss Sitka valerian	grouseberry juniper haircap moss lodgepole pine Sitka valerian	lodgepole pine grouseberry juniper haircap moss Sitka valerian	grouseberry subalpine fir Engelmann spruce Pohlia cruda	grouseberry pink mountain heather Pohlia cruda subalpine fir Engelmann spruce	grouseberry pink mountain heather Pohlia cruda subalpine fir Engelmann spruce
Associates	pink mountain heather fire moss arctic lupine lodgepole pine Indian hellebore Pohlia cruda whitebark pine	pink mountain heather Engelmann spruce fire moss arctic lupine white-flowered rhododendron Indian hellebore whitebark pine Pohlia cruda	Engelmann spruce subalpine fir *pink mountain heather* *white-flowered* rhododendron Pohlia cruda whitebark pine arctic lupine Indian hellebore	Sitka valerian pink mountain heather white-flowered rhododendron lodgepole pine whitebark pine juniper haircap moss arctic lupine Indian hellebore	white-flowered rhododendron Sitka valerian Indian hellebore whitebark pine lodgepole pine juniper haircap moss arctic lupine	white-flowered rhododendron Sitka valerian Indian hellebore whitebark pine juniper haircap moss arctic lupine
Plots		9650017,r404			2-94	

BEC= **ESSFdcu/00**

Map Unit	Description
FV	Bl-Valerian; typic ecosystem unit
FVgw	Bl-Valerian; gully, warm aspect ecosystem unit
FVk	Bl-Valerian; cool aspect ecosystem unit
FVks	Bl-Valerian; cool aspect, shallow soil ecosystem unit

Bl-Valerian (FV) occurs on deep, medium-textured soil, subhygric to hygric, gentle to moderately sloping moraine and fluvial materials
FVgw occurs in gullies, on warm aspects, moderately sloping, lower moisture receiving sites, on moraine
FVk occurs on cool aspects, moderately sloping moraine
FVks occurs on shallow soil where bedrock impedes soil drainage, cool aspects, moderately sloping moraine

Map Symbol	**FV2** **FVgw2** **FVk2** **FVks2**	**FV3** **FVgw3** **FVk3** **FVks3**	**FV4** **FVgw4** **FVk4** **FVks4**	**FV5** **FVgw5** **FVk5** **FVks5**	**FV6** **FVgw6** **FVk6** **FVks6**	**FV7** **FVgw7** **FVk7** **FVks7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	sickle moss Sitka valerian Canby's lovage	sickle moss Sitka valerian Canby's lovage Engelmann spruce	sickle moss Engelmann spruce Sitka valerian globeflower	sickle moss globeflower Engelmann spruce Sitka valerian	sickle moss globeflower Sitka valerian arrow-leaved groundsel Engelmann spruce	sickle moss globeflower Sitka valerian arrow-leaved groundsel Engelmann spruce
Associates	Indian hellebore Engelmann spruce arrow-leaved groundsel bracted lousewort globeflower	Indian hellebore globeflower arrow-leaved groundsel bracted lousewort white marsh-marigold trapper's tea white-flowered rhododendron	Indian hellebore Canby's lovage arrow-leaved groundsel bracted lousewort white marsh-marigold trapper's tea white-flowered rhododendron	arrow-leaved groundsel Indian hellebore Canby's lovage bracted lousewort white marsh-marigold trapper's tea white-flowered rhododendron	Indian hellebore Canby's lovage white marsh-marigold bracted lousewort trapper's tea white-flowered rhododendron	Indian hellebore Canby's lovage white marsh-marigold bracted lousewort trapper's tea white-flowered rhododendron
Plots		r403			2-95	

BEC= **ESSFdcu/00**	
Map Unit	Description
SG	Sedge-Glow moss wet meadow; typic ecosystem unit
Sedge –Glow moss wet meadow (SG) occurs on deep, medium-textured soil, level to gently sloping, hygric sites on fluvial materials	

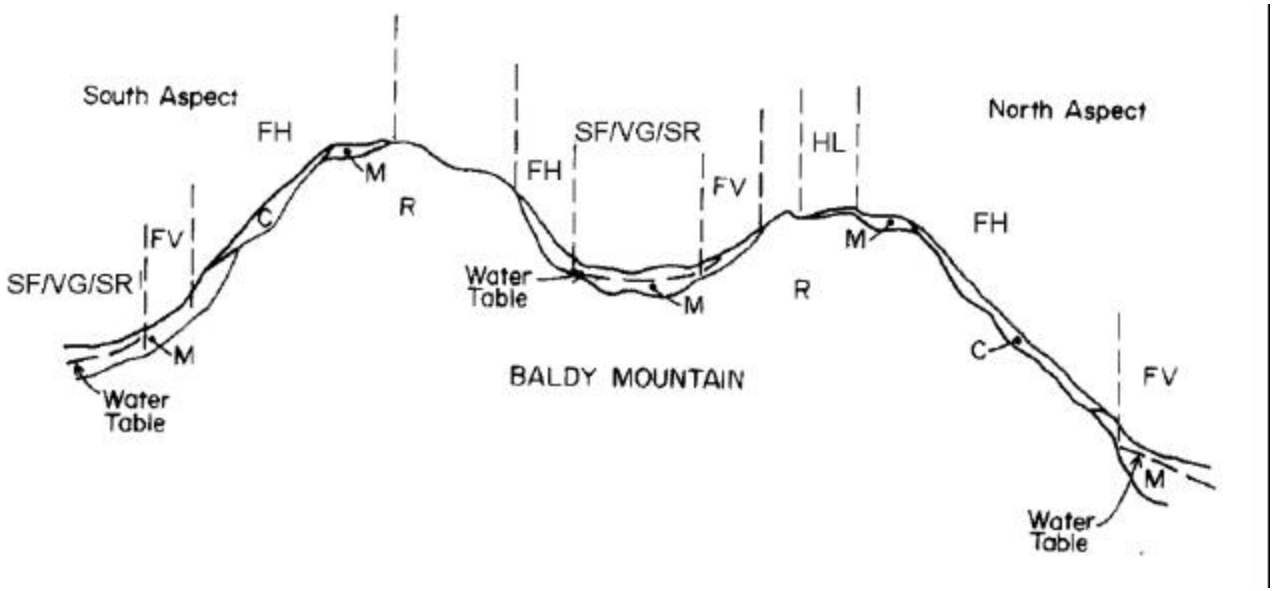
Map Symbol	**SG2b**
Plant Species	Graminoid-dominated (2b)
Dominants	glow moss dwarf blueberry large-awned sedge Chamisso's cotton-grass
Associates	globeflower subalpine daisy Sitka valerian two-toned sedge black alpine sedge
Plots	2-48

BEC= **ESSFdcu/00**	
Map Unit	Description
CC	Cottongrass-Clubrush; typic ecosystem unit
Cottongrass-Clubrush (CC) occurs on deep, medium-textured soil, level, subhydric to hydric, fluvial and morainal sites with associated seepage	

Map Symbol	**CC2b**
Plant Species	Graminoid-dominated (2b)
Dominants	narrow-leaved cotton-grass tufted clubrush
Associates	water sedge spring moss *Carex* spp. *Sphagnum* mosses
Plots	

Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within ESSFdcu				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
CL	Cliff	A steep, vertical or overhanging rock face	z	1
OW	Shallow Open Water	A wetland composed of permanent shallow open water and lacking emergent plant cover. The water is less than 2 m deep	not applicable	not applicable
PD	Pond	A small body of water greater than 2 m deep, but not large enough to be classified as a lake (e.g., <50 ha)	not applicable	not applicable
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,r,w	1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	k,w,z	1

Appendix 7
Expanded Legend for Ecosystems found in the ESSFdcp1



PARENT MATERIAL LEGEND	
C	Colluvial
F	Fluvial
FG	Glaciofluvial
M	Moraine
O	Organic
R	Mixed Bedrock

SITE SERIES LEGEND FOR ESSFdcp1		
00	HL	Pink mountain heather-Lichen
00	FH	BlPa- Pink mountain heather -Grouseberry
00	SF	Sedge-Alpine fescue
00	VG	Valerian-Globeflower herbaceous meadow
00	FV	Bl-Valerian-Pink mountain heather
00	SR	Black alpine sedge-Rush

BEC= **ESSFdcp1/00**	
Map Unit	Description
HL	Pink mountain heather-Lichen; typic ecosystem unit
HLw	Pink mountain heather-Lichen; warm aspect ecosystem unit
Pink mountain heather-Lichen (HL) occurs on shallow, medium-textured soil, subxeric to submesic, gently sloping moraine **HLw** occurs on warm aspects, moderately sloping moraine	

Map Symbol	**HL2a** **HLw2a**
Plant Species	Graminoid-dominated (2a)
Dominants	pink mountain heather rosy pussytoes bog haircap moss *Cladonia* lichens
Associates	Canby's lovage whitebark pine sibbaldia Cusick's bluegrass *Luzula* spp. Parry's rush
Plots	2-97

BEC= **ESSFdcp1/00**

Map Unit	Description
FH	Bl/Pa-Pink mountain heather-Grouseberry; typic ecosystem unit
FHh	Bl/Pa-Pink mountain heather-Grouseberry; hummocky ecosystem unit
FHk	Bl/Pa-Pink mountain heather-Grouseberry; cool aspect ecosystem unit
FHw	Bl/Pa-Pink mountain heather-Grouseberry; warm aspect ecosystem unit

Bl/Pa-Pink mountain heather-Grouseberry (FH) occurs on shallow, medium-textured soil, mesic to submesic, gentle to moderately sloping moraine and colluvium
FHh occurs on hummocky moraine
FHk occurs on cool aspects, moderately sloping moraine and colluvium
FHw occurs on warm aspects, moderately sloping moraine and colluvium

Map Symbol	**FH2** **FHh2** **FHk2** **FHw2**	**FH3** **FHh3** **FHk3** **FHw3**	**FH4** **FHh4** **FHk4** **FHw4**	**FH5** **FHh5** **FHk5** **FHw5**	**FH6** **FHh6** **FHk6** **FHw6**	**FH7** **FHh7** **FHk7** **FHw7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pink mountain heather grouseberry *Cladonia* lichens awned haircap moss Piper's woodrush	pink mountain heather grouseberry whitebark pine subalpine fir awned haircap moss	pink mountain heather whitebark pine subalpine fir grouseberry awned haircap moss	pink mountain heather grouseberry whitebark pine subalpine fir awned haircap moss	pink mountain heather grouseberry whitebark pine subalpine fir awned haircap moss	pink mountain heather grouseberry whitebark pine subalpine fir awned haircap moss
Associates	whitebark pine woolly pussytoes subalpine fir bracted lousewort Drummond's rush common juniper Canby's lovage arctic lupine Engelmann spruce	bracted lousewort *Cladonia* lichens woolly pussytoes Engelmann spruce common juniper Drummond's rush Canby's lovage arctic lupine Piper's woodrush	bracted lousewort *Cladonia* lichens common juniper woolly pussytoes Engelmann spruce Drummond's rush Canby's lovage arctic lupine Piper's woodrush	bracted lousewort Engelmann spruce *Cladonia* lichens common juniper Drummond's rush Canby's lovage woolly pussytoes arctic lupine Piper's woodrush	Engelmann spruce bracted lousewort *Cladonia* lichens common juniper Drummond's rush Canby's lovage arctic lupine woolly pussytoes Piper's woodrush	Engelmann spruce bracted lousewort *Cladonia* lichens common juniper Drummond's rush Canby's lovage arctic lupine Piper's woodrush woolly pussytoes
Plots		2-98,9650039, r515				

BEC= **ESSFdcp1/00**	
Map Unit	Description
SF	Sedge-Alpine fescue; typic ecosystem unit
SFk	Sedge-Alpine fescue; cool aspect ecosystem unit
Sedge-Alpine fescue (SF) occurs on shallow, medium-textured soil, gentle to level sloping, mesic moraine and colluvium **SFk** occurs on cool aspects, moderately sloping moraine and colluvium	

Map Symbol	**SF2b** **SFk2b**
Plant Species	Graminoid-dominated (2b)
Dominants	two-toned sedge alpine fescue woolly pussytoes diverse-leaved cinquefoil grouseberry
Associates	Parry's rush long-stalked starwort Lyall's goldenweed sibbaldia dwarf snow willow Cusick's bluegrass pink mountain heather junegrass spike trisetum alpine pussytoes timber oatgrass
Plots	9650038

BEC= **ESSFdcp1/00**	
Map Unit	Description
VG	Valerian-Globeflower herbaceous meadow; typic ecosystem unit
Valerian – Globeflower herbaceous meadow (VG) occurs on shallow, medium-textured soil, gently sloping, subhygric moraine; generally restricted to areas subjected to late snowmelt	

Map Symbol	**VG2a**
Plant Species	Forb-dominated (2a)
Dominants	Sitka valerian globeflower glowmoss Piper's woodrush subalpine daisy
Associates	Canby's lovage arrow-leaved groundsel lawn moss black alpine sedge arctic lupine Parry's rush
Plots	9629890

BEC= **ESSFdcp1/00**

Map Unit	Description
FV	Bl-Valerian-Pink mountain heather; typic ecosystem unit
FVdk	Bl-Valerian-Pink mountain heather; deep soil, cool aspect ecosystem unit
FVk	Bl-Valerian-Pink mountain heather; cool aspect ecosystem unit
FVkv	Bl-Valerian-Pink mountain heather; cool aspect, very shallow soil ecosystem unit

Bl-Valerian-Pink mountain heather (FV) occurs on shallow, medium-textured soil where bedrock impedes soil drainage, subhygric to hygric, gentle to moderately sloping moraine and fluvial materials
FVdk occurs on deep soil, warm aspects, moderately sloping moraine
FVk occurs on cool aspects, moderately sloping moraine and colluvium
FVkv occurs on very shallow soil, cool aspects, moderately sloping moraine

Map Symbol	**FV2** **FVdk2** **FVk2** **FVkv2**	**FV3** **FVdk3** **FVk3** **FVkv3**	**FV4** **FVdk4** **FVk4** **FVkv4**	**FV5** **FVdk5** **FVk5** **FVkv5**	**FV6** **FVdk6** **FVk6** **FVkv6**	**FV7** **FVdk7** **FVk7** **FVkv7**
Plant Species	Herb (2)	Shrub/Herb (3)	Pole sapling (4)	Young forest (5)	Mature forest (6)	Old forest (7)
Dominants	pink mountain heather Sitka valerian Canby's lovage	pink mountain heather Sitka valerian Canby's lovage subalpine fir arctic lupine	pink mountain heather subalpine fir Sitka valerian arctic lupine	pink mountain heather subalpine fir Sitka valerian arctic lupine	pink mountain heather Sitka valerian arctic lupine subalpine fir	pink mountain heather Sitka valerian subalpine fir arctic lupine
Associates	arctic lupine subalpine fir grouseberry mountain arnica Indian hellebore bracted lousewort	grouseberry Indian hellebore bracted lousewort mountain arnica Engelmann spruce	Canby's lovage grouseberry Indian hellebore Engelmann spruce mountain arnica bracted lousewort	grouseberry Canby's lovage Indian hellebore Engelmann spruce bracted lousewort mountain arnica	grouseberry Canby's lovage Engelmann spruce Indian hellebore bracted lousewort mountain arnica	grouseberry Canby's lovage Engelmann spruce Indian hellebore bracted lousewort mountain arnica
Plots						

BEC= **ESSFdcp1/00**	
Map Unit	Description
SR	Black alpine sedge-rush; typic ecosystem unit
SRh	Black alpine sedge-rush; hummocky ecosystem unit
Black alpine sedge-rush (SR) occurs on shallow, medium-textured soil, level to gently sloping, hygric moraine usually associated with late-lying snow areas and associated seepage **SRh** occurs on hummocky moraine	

Map Symbol	**SR2b** **SRh2b**
Plant Species	Graminoid-dominated (2b)
Dominants	black alpine sedge bog haircap moss Drummond's rush
Associates	Piper's woodrush Polytrichum commune thread-leaved sandwort *Carex* spp. western springbeauty Cusick's bluegrass subalpine daisy
Plots	9650019

Non-vegetated, Sparsely Vegetated, and Anthropogenic units mapped within ESSFdcp1				
Symbol	**Ecosystem Unit**	**Definition**	**Mapped Modifiers**	**Structural Stage**
RO	Rock Outcrop	A gentle to steep, bedrock escarpment or outcropping, with little soil development and sparse vegetative cover	h,k,w	1
TA	Talus	Angular rock fragments of any size accumulated at the foot of steep rock slopes as a result of successive rock falls. It is a type of colluvium	k	1